DRAFT

ALISO CANYON PRESERVE RESOURCE MANAGEMENT PLAN

PREPARED BY:

Orange County Transportation Authority
550 S Main Street
Orange, California 92863
Contact: Lesley Hill

WITH SUPPORT FROM:

ICF
525 B Street, Suite 1700
San Diego, California 92101
Contact: Patrick Atchison

August 2017

OCTA

Orange County Transportation Authority (OCTA). 2017. Aliso Canyon Preserve Resource Management Plan. Draft. August. Orange, CA. Prepared with support from ICF, San Diego, CA.

Contents

Tables and Figures

Acronyms and Abbreviations

ASA	Archaeological Sensitivity Assessment
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRAM	California Rapid Assessment Method
EMP	Environmental Mitigation Program
EOC	Environmental Oversight Committee
EPA	U.S. Environmental Protection Agency
ESLs	environmentally sensitive lands
FMP	Fire Management Plan
FR	Federal Register
FTSP	Foothill/Trabuco Specific Plan
IA	Implementing Agreement
IPM	integrated pest management
LBFD	Laguna Beach Fire Department
Msl	mean sea level
NCCP/HCP	Natural Community Conservation Plan/Habitat Conservation Plan
NROC	Nature Reserve of Orange County (renamed Natural Communities Coalition)
OC Parks	Orange County Parks
OCTA	Orange County Transportation Authority
OSC	Open Space Conservation District
PAR	Property Analysis Report
PCAs	Priority Conservation Areas
Regulatory Agencies	USACE, SWRCB, and CDFW
RMP	Resource Management Plan
SWRCB	State Water Resources Control Board
TCR	Trabuco Canyon Residential District
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
Wildlife Agencies	USFWS and CDFW

Acknowledgements

OCTA would to thank the following individuals and organizations that provided input and support for the preparation of this RMP:

- Christine Beck, California Department of Fish and Wildlife
- David Mayer, California Department of Fish and Wildlife
- Jonathan Synder, U.S Fish and Wildlife Service
- Melanie Schlotterbeck, Friends of Harbors, Beaches and Parks
- Scott Thomas, OC Parks

This page intentionally left blank.

Executive Summary

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half-cent sales tax to provide funding for transportation projects and programs in the county. As part of the renewed Measure M (or Measure M2), a portion of the M2 freeway program revenues were set aside for the M2 Environmental Mitigation Program (EMP) to provide funding for programmatic mitigation to offset impacts from the 13 freeway projects covered by Measure M2. The Orange County Transportation Authority (OCTA) prepared the M2 Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP or Plan) as a mechanism to offset potential project-related effects on threatened and endangered species and their habitats in a comprehensive manner. A key component of the Plan conservation strategy has included the identification and acquisition of habitat Preserves to offset habitat impacts.

The Aliso Canyon Preserve (Preserve), purchased in April 2015, is one of seven properties acquired by OCTA as part of the M2 EMP. Currently the Preserve is being managed by OCTA, but a long-term Preserve Manager is anticipated to be in place within the next five years. The Preserve Manager is responsible for the implementation of management and monitoring tasks as outlined in this long-term Resource Management Plan (RMP). This RMP will be reviewed at least every five years and updated as necessary to prioritize management actions based on the changing Preserve needs. The RMP, including subsequent revisions, must be reviewed and approved by the Wildlife Agencies. For the purposes of this RMP, "Wildlife Agencies" is defined as the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) as the implementing agencies of the NCCP/HCP. All updates to the RMP will be shared with the OCTA Environmental Oversight Committee (EOC) as part of a public meeting.

Key issues addressed and management actions set forth in this RMP include:

- **Public Access** – A goal of this RMP is to provide for public access and passive recreational opportunities within the Preserve that are compatible with the protection of biological resources. The RMP identifies trails within the Preserve approved for passive recreational use based on an evaluation of biological resources as well as coordination with the Wildlife Agencies. The Preserve Manager will implement a public access program that allows for access along specific existing trails identified within the Laguna Beach General Plan. The current configuration of approved trails connects to other trails on County of Orange open space lands managed by Orange County Parks (OC Parks).
- **Invasive Species Control** – Invasive plants have been identified as a threat to natural communities and sensitive species on the Preserve, and invasive plant control is expected to be a long-term, ongoing management issue. The Preserve Manager has contracted with a Restoration Ecologist to prepare an invasive species management plan (ISMP) that is currently being prepared. The ISMP is being prepared using the Five-Year Invasive Plan Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP (Cal-IPC 2016) as a reference document (attached as Appendix D). The ISMP will prioritize invasive species for control; specify goals (eradication versus control); identify treatment locations, timelines (including potential re-treatments), and removal methods; provide realistic, measurable success criteria and monitoring methodology; and identify areas that may need post-treatment restoration.

- **Fire Management Plan** – The Laguna Beach Fire Department (LBFD) is responsible for fire control within the Preserve, and its first priority will be to protect life and property. The Preserve Manager will work closely with the LBFD to identify fire management guidelines. Within two years from adoption of the RMP, the Preserve Manager, in coordination with OCTA and LBFD, will develop a Fire Management Plan (FMP) that establishes policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible.
- **Public Outreach and Education** – The RMP sets forth the objective to develop and implement a public outreach and education program to inform and engage the public on Preserve values, goals, and guidelines to promote stewardship of biological resources and compliance with Preserve rules and regulations. If the public is properly informed of the biological values, goals, and activity restrictions within the Preserve, it is more likely that management goals and guidelines will be respected and followed.
- **Biological Monitoring and Management** – The RMP sets forth Preserve-specific management objectives and actions to ensure the long-term viability of natural communities and NCCP/HCP Covered Species (Covered Species) by protecting, managing, and enhancing populations and suitable habitat on the Preserve. Biological monitoring will be used to determine status, threats, and populations trends of Covered Species and their habitats within the Preserve.
- **Adaptive Management** – Adaptive management provides a strategy to improve future management actions through monitoring to evaluate management effectiveness. Where success criteria are not met, adaptive management provides a structured approach to improve management outcomes. Monitoring and adaptive management on the Preserve will be a cooperative effort between OCTA, the Preserve Manager, the Wildlife Agencies, and other parties with technical expertise or information to inform monitoring and adaptive management. Bi-annual meetings will be scheduled where both policy and technical expertise can be integrated into the process of revising goals and objectives, refining conceptual models, adjusting management and/or monitoring activities, or determining the allocation of funding.
- **Funding** – The RMP describes and outlines the financial requirements for start-up expenditures, ongoing Preserve management, adaptive management, effectiveness biological monitoring, and responding to changed circumstances. Using funds from the M2 EMP, OCTA has begun to establish a permanent, non-wasting endowment to provide funding for the commitments of Preserve management and monitoring in perpetuity.

Chapter 1
Introduction

The long-term Resource Management Plan (RMP) described herein provides guidelines for the management and monitoring of the Aliso Canyon Preserve in accordance with the goals and objectives set forth in the Orange County Transportation Authority's (OCTA's) M2 Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP or Plan). The Aliso Canyon Preserve RMP provides guidance for the ongoing protection, preservation, and adaptive management of the natural resources found within the Preserve, including control of site-specific encroachment activities, while addressing fire protection issues and accommodating safe access and recreational use of the site by the general public.

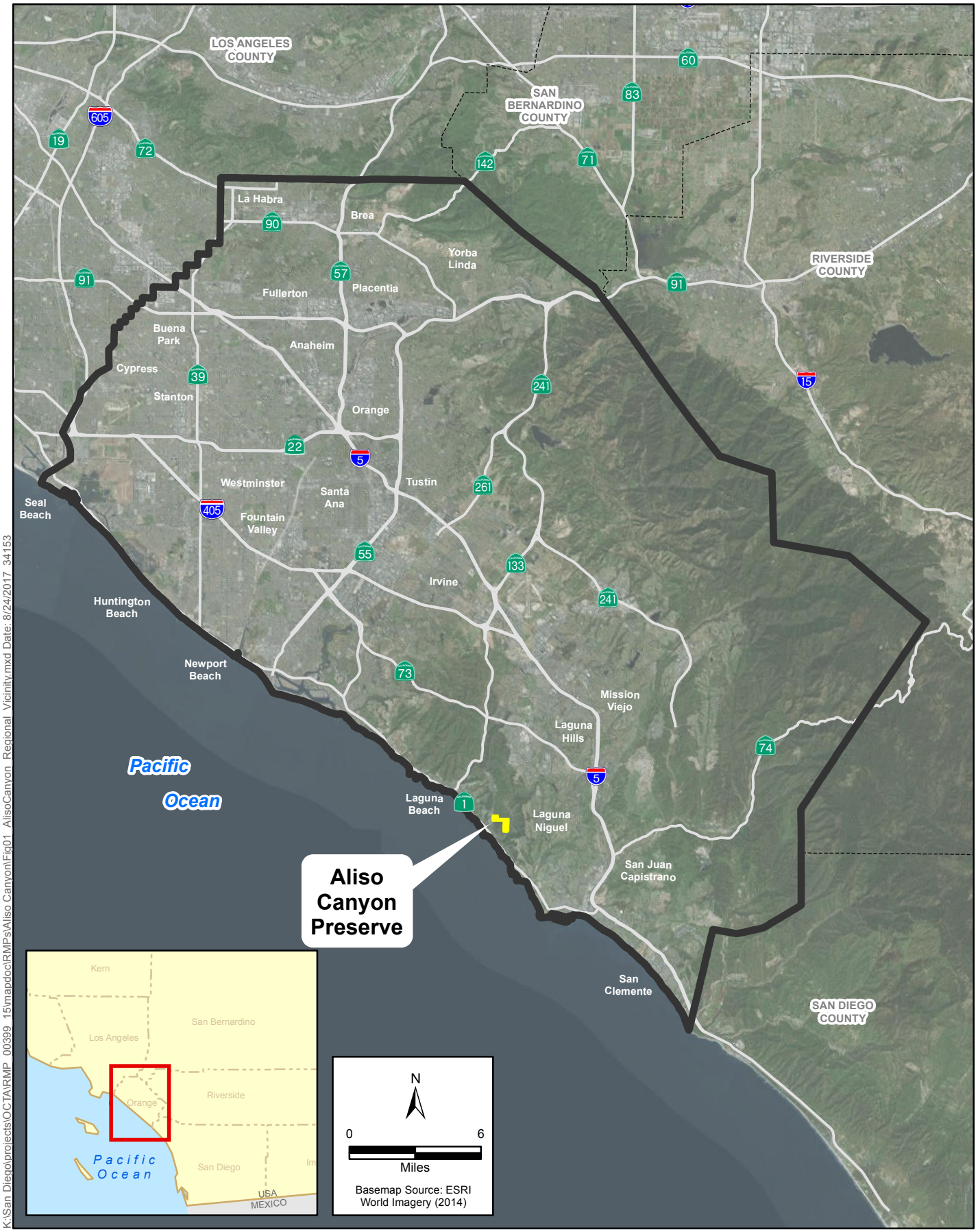
Implementation of the RMP will be handled by an approved entity with sufficient natural land management experience to meet the Wildlife Agencies requirements. The implementation of the RMP will be funded in perpetuity ("life of the RMP") through establishment of a non-wasting endowment held and distributed by a financial institution approved by the Wildlife Agencies. If the financial institution shows signs of mismanagement or poor appropriation of funds or enters into bankruptcy, endowment funds will be redirected to another financial institution upon approval from the Wildlife Agencies.

1.1 Aliso Canyon Preserve Acquisition

The Aliso Canyon Preserve was purchased as part of the OCTA M2 Environmental Mitigation Program (EMP) in April 2015. Located east of Pacific Coast Highway in the southeast portion of the City of Laguna Beach (Figures 1 and 2), the Aliso Canyon Preserve is a component of the overall strategy of the EMP to provide comprehensive mitigation to offset the environmental impacts of OCTA's 13 M2 freeway improvement projects. The EMP program is spearheaded by the Environmental Oversight Committee (EOC), which is made up of two OCTA Board of Directors members and representatives from the California Department of Transportation (Caltrans), Wildlife Agencies, United States Army Corps of Engineers (USACE), environmental groups, and public members. The goal of the EOC was to identify conservation measures that protect and enhance habitats as mitigation for potential impacts associated with the M2 funded freeway improvement projects. The EOC will continue to serve as the interagency and public forum for decisions and oversight of the EMP.

Instead of mitigating the natural resource impacts of M2 freeway projects on a project-by-project basis, the EMP presents a comprehensive mitigation approach that provides not only replacement habitat within preserved open space areas, but also provides the opportunity to improve the overall functions and value of sensitive biological resources on a regional basis throughout Orange County (i.e., Plan Area) by the enhancement of connectivity between EMP open space areas and other existing open space areas and preserves. Working collaboratively with the CDFW and USFWS, OCTA ultimately decided that the preparation of an NCCP/HCP would best serve as the EMP's main implementation tool.

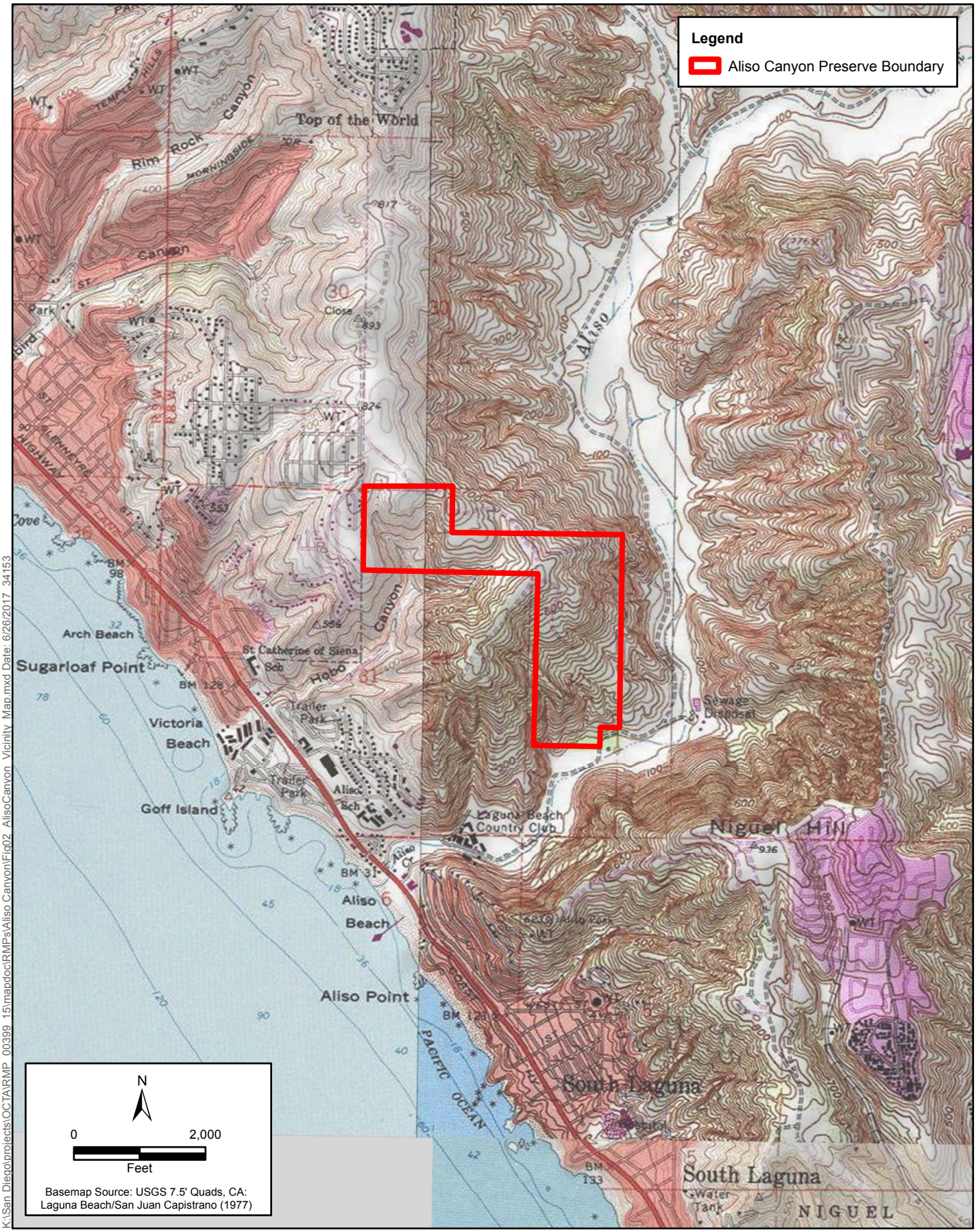
Based on the evaluation of conservation opportunities throughout the Plan Area, Priority Conservation Areas (PCAs) were identified as part of the open space acquisition process and include



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig01_AlisoCanyon_Regional_Vicinity.mxd Date: 8/24/2017 34153

ICF

Figure 1
Regional Vicinity Map
Aliso Canyon Resource Management Plan



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig02_AlisoCanyon_Vicinity_Map.mxd Date: 6/26/2017 34153

Figure 2
Preserve Vicinity Map
Aliso Canyon Resource Management Plan

candidate parcels and properties that could be managed as preserved open space for mitigation purposes (CBI 2009). A standardized criteria and prioritization process was also developed to facilitate property evaluation and assessment. Properties for acquisition and restoration/preservation were selected based on some of the criteria listed below:

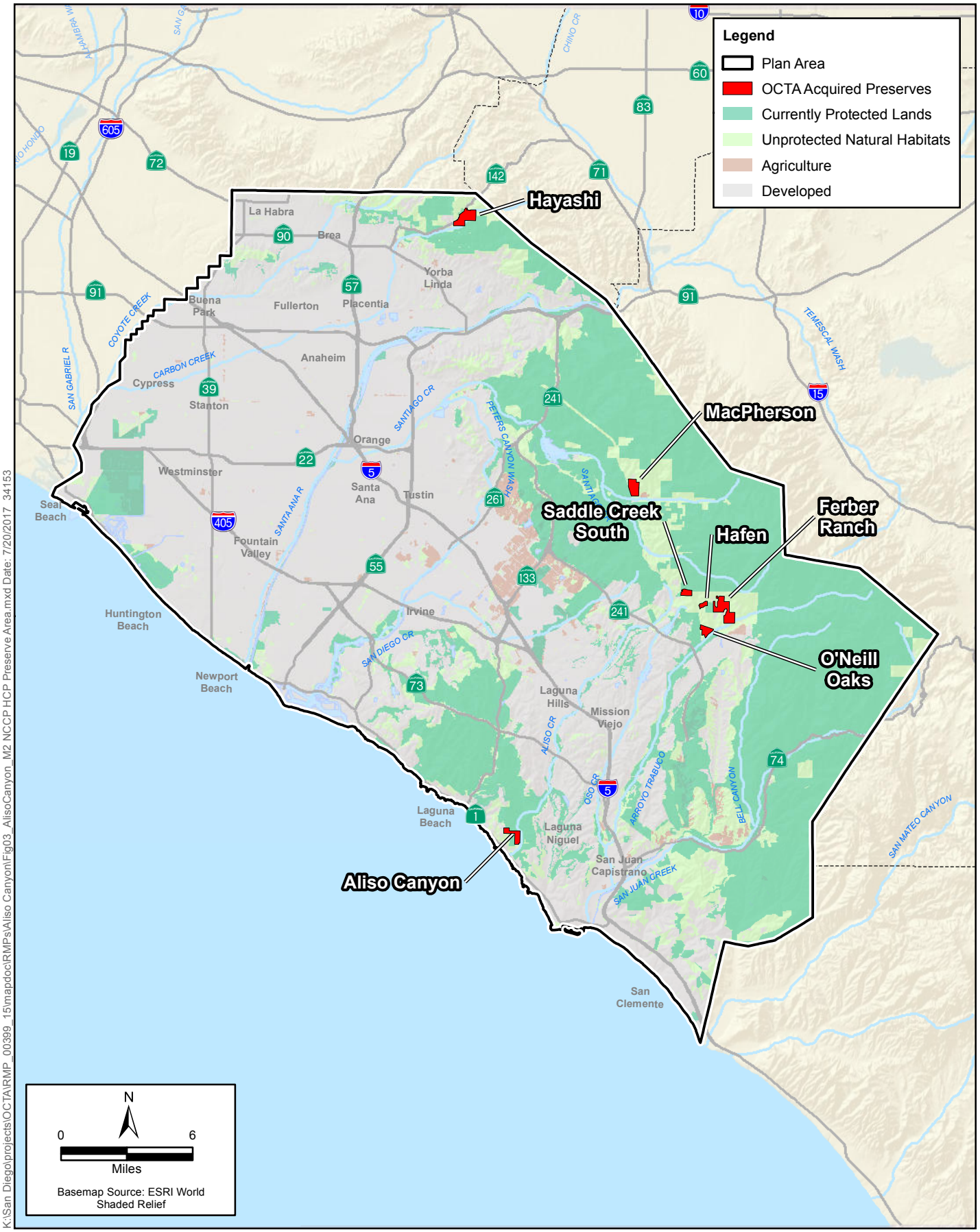
- Contains habitats impacted by the freeway projects.
- Contains habitat for Covered Species.
- Enhances natural lands connectivity, including significant wildlife corridors.
- Has potential to mitigate Covered Activities.
- Adjacent to or in close proximity to already conserved lands.

The M2 NCCP/HCP complements the existing NCCP and HCPs in Orange County, which include the Central and Coastal NCCP/HCP and the Southern Subregion HCP. In support of these goals and objectives, large blocks of unprotected land that are located outside the habitat reserves established by these NCCP and HCPs will be protected by the M2 NCCP/HCP through the acquisition of these parcels and incorporation into the M2 Preserve Area. The M2 NCCP/HCP conservation strategy included the purchase of seven preserves that make up the M2 Preserve Area: Aliso Canyon (151 ac), O'Neill Oaks (116 ac), Hafen (48 ac), Saddle Creek South (83 ac), Ferber Ranch (396 ac), MacPherson (204 ac), and Hayashi (301 ac). The Aliso Canyon Preserve is the western most preserve of the seven preserves (Figure 3).

The Aliso Canyon Preserve satisfies many of the property acquisition criteria that was utilized to evaluate potential alignment with the OCTA EMP program including being identified as a PCA; supporting Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including chaparral, grassland, and coastal sage scrub. A description of how the Aliso Canyon Preserve acquisition helped to achieve the M2 NCCP/HCP biological goals and objectives is included in Section 3.1.1, "OCTA M2 NCCP/HCP Goals and Objectives Relevant to the Aliso Canyon Preserve".

1.2 Relevant Land Use and Conservation Plans

The Aliso Canyon Preserve is located within the jurisdictional boundaries of the City of Laguna Beach General Plan. In addition, the property is immediately adjacent to the Aliso and Wood Canyons Wilderness Park. The Aliso Canyon Preserve is in a location that supports local and regional biological connectivity with conserved County open space areas adjacent to the Preserve to the north, east, and south. Figure 4 provides a regional perspective of how the Aliso Canyon Preserve is located within the network of open space lands, and Figure 5 depicts the other reserve areas in the nearby vicinity of the Aliso Canyon Preserve. The open space area surrounding the Preserve to the north and east are within the planning boundaries of the Aliso and Wood Canyons Wilderness Park Resource Management Plan (AWCWP RMP). The open space area to the south (beyond The Ranch at Laguna Beach and the Ben Brown Golf Course) is part of the Central-Coastal NCCP/HCP – Coastal Subregion. The following sections include a description of the relevant land use plans and conservation plans overlapping or in the vicinity of the Preserve.



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig03_AlisoCanyon_M2 NCCP HCP Preserve Area.mxd Date: 7/20/2017 34153

Figure 3
M2 NCCP/HCP Preserve Area
Aliso Canyon Resource Management Plan

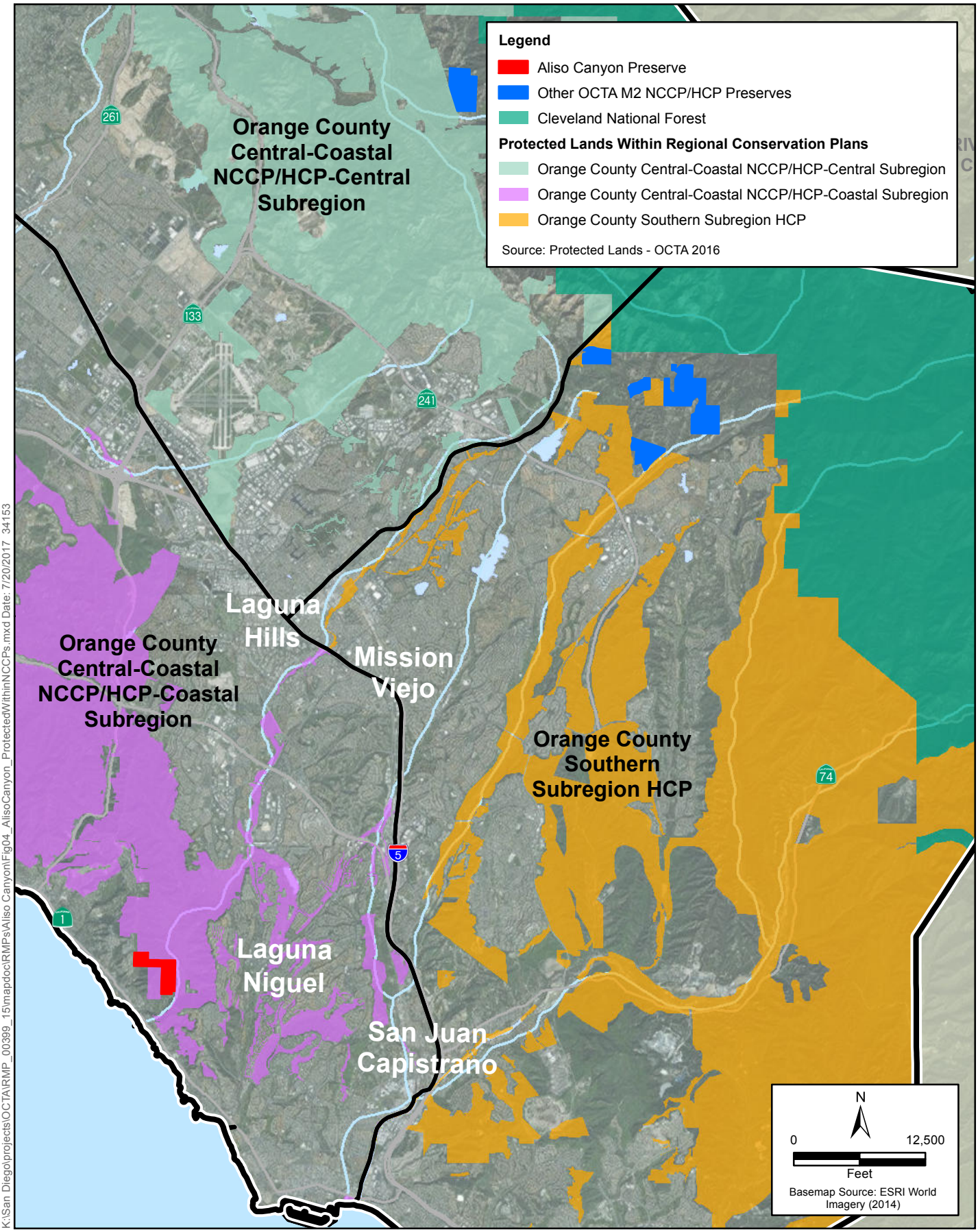
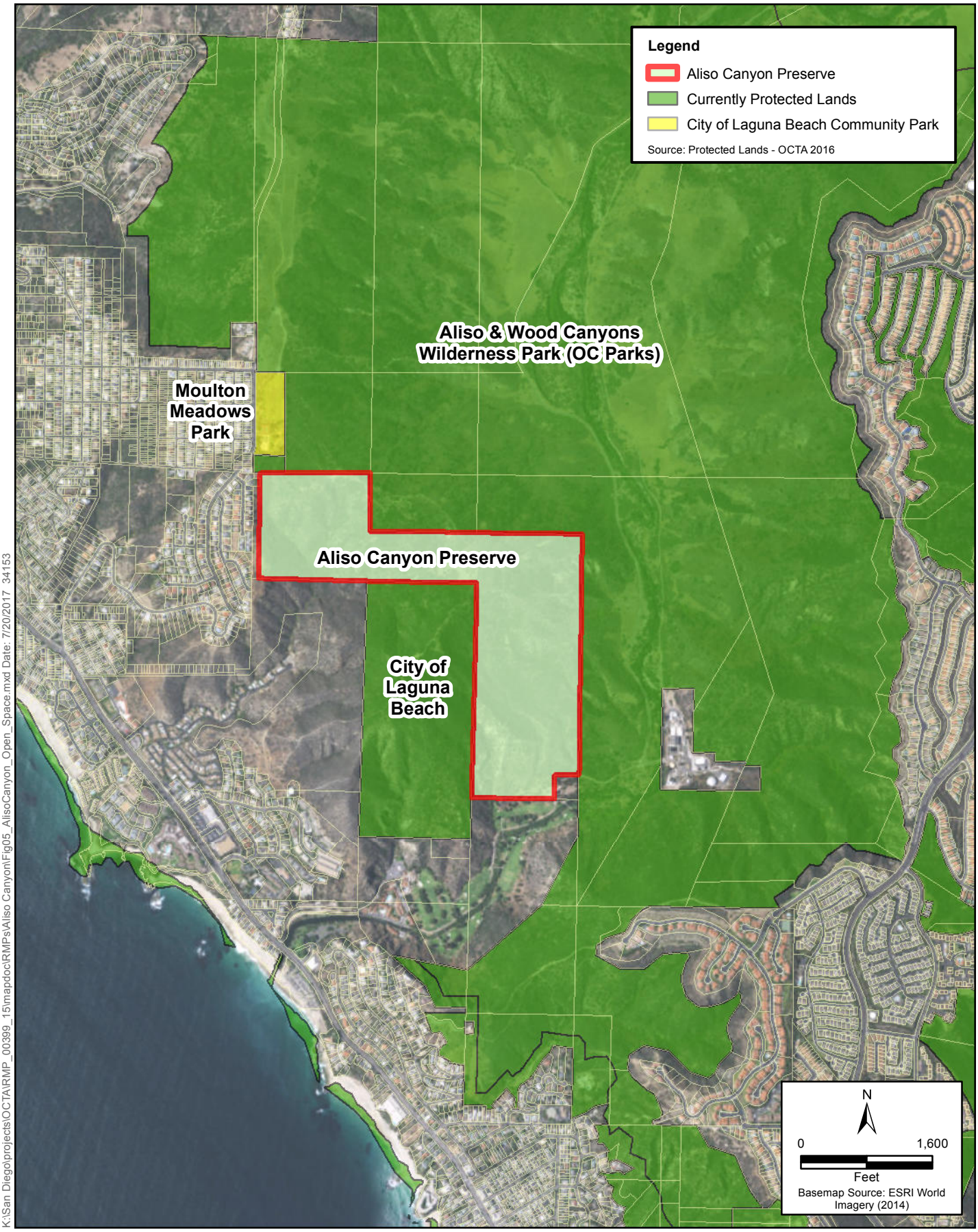


Figure 4
Protected Lands in Boundaries of Regional Conservation Plans
Aliso Canyon Resource Management Plan



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig05_AlisoCanyon_Open_Space.mxd Date: 7/20/2017 34153

Figure 5
Open Space in Vicinity of Aliso Canyon Preserve
Aliso Canyon Resource Management Plan

1.2.1 Laguna Beach General Plan

The Laguna Beach General Plan Land Use Element was adopted in 2012 by the City Council. Some relevant guiding principles for developing land use policies in the City include:

- Preserve and enhance the community's natural environment and distinct setting in the region – a picturesque seaside community surrounded by hillside open space.
- Enhance recreational opportunities for residents and visitors, while protecting environmentally sensitive natural resources.

The Aliso Canyon property is designated as Open Space/Conservation and Recreation (approximately 118.2 acres), Public Recreation and Parks (approximately 5.3 acres) and Residential/Hillside Protection (approximately 27.6 acres) by the General Plan and zoned Open Space/Conservation, Recreation, and Residential/Hillside Protection by the City's Zoning Code. The same acreages for the General Plan designations apply for the zoning designations.

The Open Space land use category is intended to preserve land in its natural state for open-space purposes. Lands within this category are typified by special ecological, wildlife, or scientific study potential and are areas of topographical, geological, and historical importance. Passive recreational uses such as walking and hiking are encouraged in appropriate areas.

The Public Recreation and Parks land use category is intended for those lands owned and maintained by the City, County, or State and developed for active or passible recreational activity. The Residential/Hillside Protection land use category is intended to promote a balanced management program focusing on the preservation of open-space lands and environmentally sensitive areas, while allowing for limited residential development. The parameters for hillside development in the City range from 0 to 3 units per acre depending on the slope aspect; however, OCTA's acquisition of this Preserve ensures this area will be preserved in perpetuity as open space.

1.2.2 Aliso and Wood Canyons Wilderness Park Resource Management Plan

As required by the NCCP/HCP for each of the County parks within the habitat reserve system, programs for implementing Central-Coastal NCCP/HCP – Coastal Subregion policies, restoration/enhancement, and recreation will be defined in a RMP. The fundamental objective for the AWCWP RMP is to identify the best way to manage, protect and enhance the cultural and natural resource values of AWCWP while balancing the needs of park visitors for safe recreational and educational opportunities. The major plan objectives are to enhance wildlife habitats, develop vegetation management practices, and provide recreational opportunities and public access that have minimal impacts on resources (OC Parks 2009). The AWCWP RMP includes a map of approved trails for recreational use. There is one trail (Aswut Trail) identified in the AWCWP RMP that continues out of AWCWP and crosses through the Aliso Canyon Preserve.

1.2.3 Conservation Plans

Currently, there are two completed subregional plans in Orange County: the Central-Coastal NCCP/HCP and the Southern Subregion HCP. The Central Coastal NCCP/HCP and the Southern Subregion HCP are two large-scale conservation programs designed to protect substantial amounts of open space that serve as habitat reserves for sensitive species and habitats. The Aliso Canyon

Preserve, located within the "Laguna Greenbelt," is within the Coastal Subregion of the Central-Coastal NCCP/HCP. The Preserve Area of the OCTA M2 NCCP/HCP was designed to specifically target areas that complement the conservation efforts of these existing programs and open space areas by identifying and contributing key properties within core habitats and/or linkages that have not been permanently protected (Figure 4).

1.3 Permitted Activities and Threats to Conservation

The management program set forth in this document addresses identified permitted activities (i.e. Covered Activities). A review of historic aerial photographs (back to 1939) of the property shows that, in general, vegetation communities have not been significantly altered. The residential development to the north of the Preserve was in the process of being built in aerial photographs from 1967. Structures in Aliso Canyon south of the Preserve are evident in 1963 aerials. Buildings or otherwise significant structures are not identified in the historic aerials of the Preserve.

The Preserve can be accessed via trails east of Moulton Meadows Park (Figure 13)). In addition, the Aliso and Wood Canyons' Moulton Meadows Linkage Trail (north of the Preserve), runs south through the Aliso Canyon Preserve. This trail then crosses onto City-owned lands to the south. These trails are currently used by hikers and mountain bikers and are included on OC Parks' trail maps. They are also depicted in the trail network of the Laguna Beach General Plan Open Space/Conservation Element as "trails on private property." Relatively little trash (e.g., cans, bottles, golf balls) was observed during the baseline surveys (BonTerra Psomas 2015); however, OCTA Preserve stewardship monitoring over the past two years has documented a high amount of dog waste as well as trash. Evidence of grazing is not present on this property, although goat grazing has been used historically to assist in vegetation fuel modification on the adjacent slope just west of the Preserve.

Management of the Aliso Canyon Preserve as part of the OCTA NCCP/HCP must address potential threats to conserved biological resources, including Covered Species and sensitive habitats. These threats may include:

- Introduction and spread of invasive, nonnative plant and wildlife species.
- Damage and clearing of native vegetation.
- Erosion caused by vegetation removal and the creation of unauthorized trails and/or unauthorized use of closed trails.
- Impacts to water quality and habitat in onsite drainages and other aquatic resources.
- Wildfire.
- Harassment of wildlife species, including disturbance of nesting bird species.
- Wildlife poaching.
- Disruption of wildlife movement

This RMP addresses these potential threats by providing guidance for the ongoing protection and preservation of the natural resources found within the Preserve, including Covered Species and sensitive habitats, while addressing fire protection issues and accommodating safe access and recreational use of the site by the general public.

This page intentionally left blank.

Chapter 2
Site Description

This chapter describes the land uses on site and adjacent to the Preserve, as well as physical characteristics and biological resources found on the Preserve. These descriptions are based on a baseline biological survey completed by BonTerra Psomas (2015a). A copy of the 2015 Baseline Biological Surveys Technical Report for the Aliso Canyon Property is included in Appendix B.

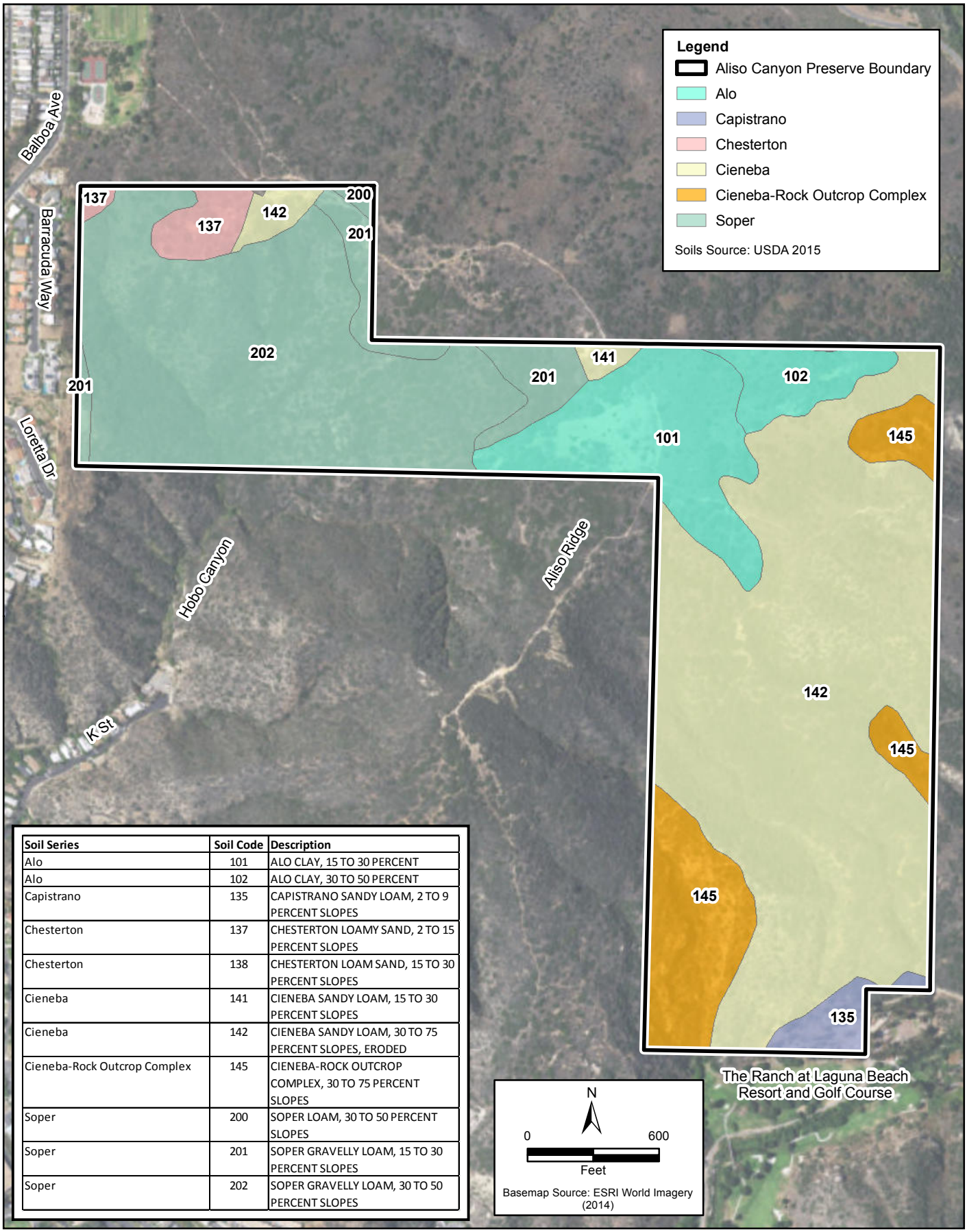
2.1 Preserve Setting, Adjacent Property Owners, and Land Uses

The 150-acre Preserve is located east of Pacific Coast Highway in the City of Laguna Beach (Figures 1 and 2). The northwestern edge of the property is adjacent to residential development along Barracuda Way and Loretta Drive, while the southeastern edge of the property is adjacent to The Ranch at Laguna Beach and the Ben Brown Golf Course. The northern and eastern boundaries abut open space in AWCWP. The City of Laguna Beach owns the property to the southwest. The Preserve can be accessed off dirt trails from the City owned Moulton Meadows Park in the northwest, dirt trails off of AWCWP to the east and dirt trails off of the City of Laguna Beach property to the southwest. The AWCWP is within the boundaries of the Orange County Central - Coastal NCCP/HCP Coastal Subregion (Figure 4). The Aliso Canyon Preserve is currently used by hikers and mountain bikers. Most of the trails on the property are included in the trail network of the Laguna Beach General Plan Open Space/Conservation Element as "trails on private property."

2.2 Physical Characteristics

Topography on the Preserve is hilly, with the main ridgeline running through the middle of the property and canyons draining steep slopes to either side. Elevations range from approximately 40 feet above mean sea level (msl) at the southeastern edge of the property to 840 feet above msl at the northwestern edge. Two unnamed blueline streams occur in the northwestern portion of the property, with smaller drainage features present in the canyon bottoms. Soil types mapped on the property consist of Alo clay (25 to 30 and 30 to 50 percent slopes), Capistrano sandy loam (2 to 9 percent slopes), Chesterton loamy sand (2 to 15 and 15 to 30 percent slopes), Cieneba sandy loam (15 to 30 and 30 to 75 percent slopes, eroded), Cieneba-Rock outcrop complex (30 to 75 percent slopes), Soper loam (30 to 50 percent slopes), and Soper gravelly loam (15 to 30 and 30 to 50 percent slopes) (Figure 6).

The Preserve is located in the steep, coastal hills of South Laguna. It is the most coastal of the acquisition properties. The property is part of the "Laguna Greenbelt," which encompasses 22,000 acres of largely undeveloped land surrounding the City. The City of Laguna Beach considers Hobo Canyon, particularly its surrounding ridges, including the Moulton Meadows marine terrace and the continuous south-facing slope of Aliso Canyon down to the golf course, to be the single-most significant habitat block in Laguna. Predominant topographic features of the area are Hobo Canyon and its flanking ridges and the south-facing slopes of Aliso Canyon, which is located just east of the property. These canyons are part of the 498-square-mile Aliso-San Onofre Watershed. The upper reaches of



Soil Series	Soil Code	Description
Alo	101	ALO CLAY, 15 TO 30 PERCENT
Alo	102	ALO CLAY, 30 TO 50 PERCENT
Capistrano	135	CAPISTRANO SANDY LOAM, 2 TO 9 PERCENT SLOPES
Chesterton	137	CHESTERTON LOAMY SAND, 2 TO 15 PERCENT SLOPES
Chesterton	138	CHESTERTON LOAM SAND, 15 TO 30 PERCENT SLOPES
Cieneba	141	CIENEBA SANDY LOAM, 15 TO 30 PERCENT SLOPES
Cieneba	142	CIENEBA SANDY LOAM, 30 TO 75 PERCENT SLOPES, ERODED
Cieneba-Rock Outcrop Complex	145	CIENEBA-ROCK OUTCROP COMPLEX, 30 TO 75 PERCENT SLOPES
Soper	200	SOPER LOAM, 30 TO 50 PERCENT SLOPES
Soper	201	SOPER GRAVELLY LOAM, 15 TO 30 PERCENT SLOPES
Soper	202	SOPER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES

K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig06_AlisoCanyon_Soils.mxd Date: 6/26/2017 34153

Figure 6
Soils
Aliso Canyon Resource Management Plan

Hobo Canyon are mapped by the National Wetlands Inventory as temporarily flooded Riverine and Palustrine wetlands. This area acts as the final open space connection between the south end of the Laguna Greenbelt, Aliso and Wood Canyons Wilderness Park, and the sea.

2.3 Biological Resources

The geology, topography, and maritime climate of this area allow Hobo and Aliso Canyon to support many biological resources. Previous fauna and flora inventories of this locality indicated the area is rich in rare, sensitive, or state and/or federally listed species. The Preserve's unique habitats are broadly connected to the permanent protected open space of the Laguna Greenbelt, insuring that wildlife diversity and use will continue to be high. (Marsh 1992).

Biological surveys were conducted on the Preserve in spring/summer 2015 to establish baseline biological conditions and assess special-status species, including Covered Species, and their associated natural communities (BonTerra Psomas 2015a). Subsequent ongoing biological monitoring has been and will continue to be conducted. The results of that monitoring will be compared to baseline information to measure change over time. Sub-regional and regional monitoring efforts undertaken by other conservation entities, such as the Natural Communities Coalition, will also be considered when evaluating Preserve-level changes/trends. Baseline biological surveys consisted of the following:

- Vegetation mapping and evaluation of habitat conditions.
- Focused plant and coastal California gnatcatcher (*Polioptila californica californica*) surveys.
- A jurisdictional delineation of riparian and wetland resources.

Refer to Appendix B for the biological technical report for the Preserve (BonTerra Psomas 2015a). The description of biological resources in this section is based on the surveys completed in 2015.

2.3.1 Vegetation

Fourteen vegetation types and other areas occur on the Preserve. These include scrub, chaparral, grassland, cliff and rock habitat, and developed/nonnative areas. Vegetation communities and other habitats documented in 2015 on the Preserve are summarized in Table 2-1 and shown on Figure 7. Refer to Appendix B for a complete list of plant species observed during 2015 focused plant surveys. A brief description of each vegetation type and other habitat area mapped during 2015 surveys follows Table 2-1.

Table 2-1. Summary of Vegetation Types and Other Areas from 2015 Surveys

General Vegetation Types	Vegetation Types and Other Areas	Amount on Property (Acres)
Chaparral	southern mixed chaparral	78.18
	Chaparral Subtotal	*78.18*
Scrub	coyote brush scrub	2.79
	mixed sage scrub	17.77
	disturbed mixed sage scrub	1.25
	mixed sage–chaparral scrub ecotone	44.59

General Vegetation Types	Vegetation Types and Other Areas	Amount on Property (Acres)
	mixed sage–cactus scrub	0.29
	Scrub Subtotal	*66.69*
Grassland	annual grassland	0.79
	Elymus grassland	0.05
	needlegrass grassland	0.11
	clustered tarweed field	0.09
	Grassland Subtotal	*1.04*
Barren	cliff/rock	1.56
	Barren Subtotal	*1.56*
Developed/Nonnative	ornamental/developed	2.43
	ruderal	1.00
	disturbed	0.24
	Developed/Nonnative Subtotal	*3.67*
	Total Acreage	***151.14***

Chaparral

Southern Mixed Chaparral

A total of 78.18 acres of southern mixed chaparral occurs on slopes throughout the Preserve and is the predominant vegetation. This vegetation type is dominated by large, evergreen shrubs such as lemonade berry (*Rhus integrifolia*), laurel sumac (*Malosma laurina*), and spiny redberry (*Rhamnus crocea*); vegetative cover is generally very dense. Scattered sage scrub species, such as California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), and coastal prickly pear (*Opuntia littoralis*) are also present. Understory species, where present, include needlegrass (*Stipa* sp.), blue dicks (*Dichelostemma capitatum*), and splendid mariposa lily (*Calochortus splendens*). This vegetation type most closely corresponds to a mix of the *Rhus integrifolia* Shrubland Association and *Malosma laurina* Shrubland Association.

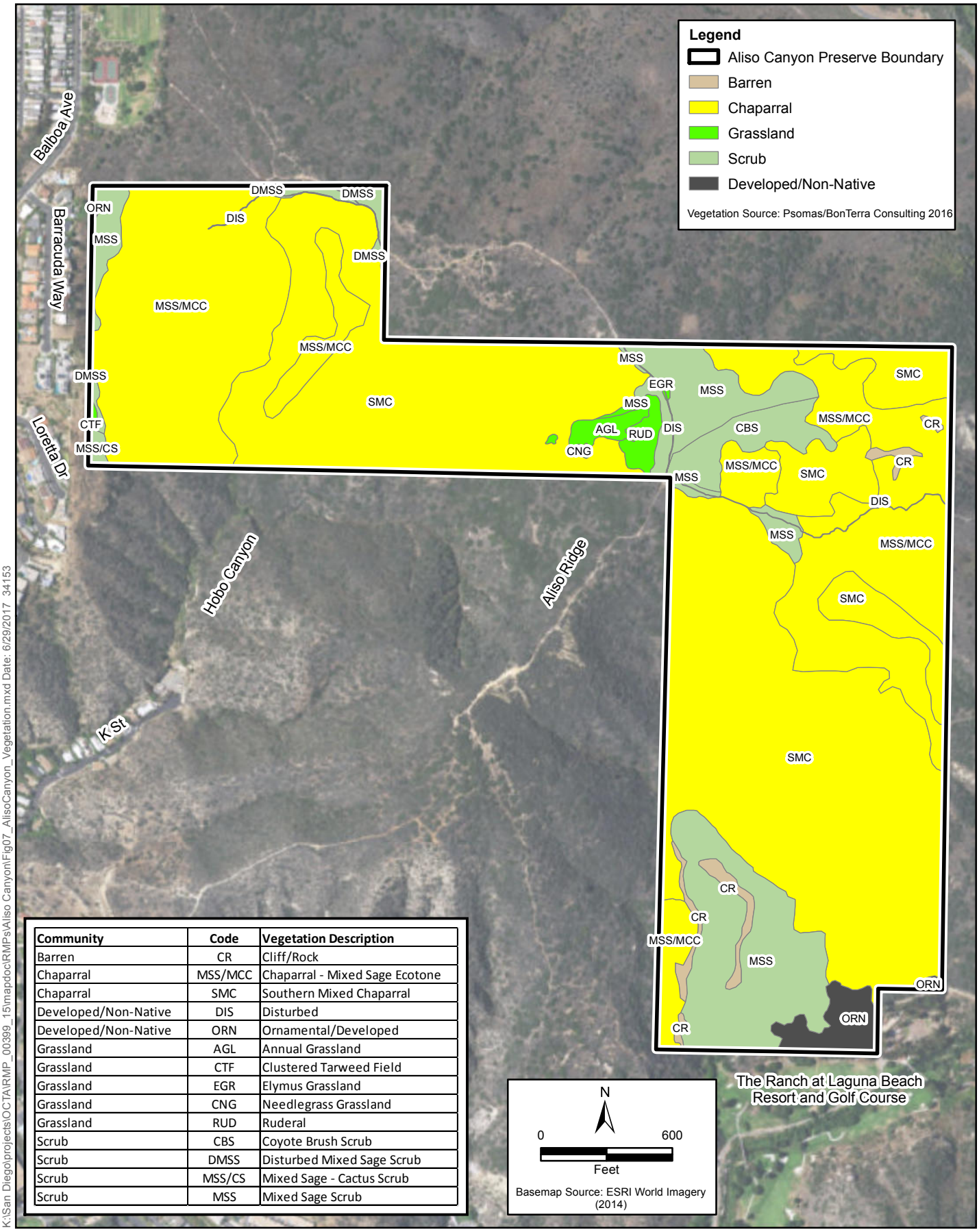
Scrub

Coyote Brush Scrub

A total of 2.79 acres of coyote brush scrub occurs on a southeastern-facing slope near the center of the Preserve. This vegetation type is dominated by coyote brush (*Baccharis pilularis*) with California sagebrush and bush monkeyflower (*Mimulus aurantiacus*) also present. Giant wildrye (*Elymus condensatus*) and cardoon (*Cynara cardunculus*) are present at the top of the slope. This vegetation type most closely corresponds to the *Baccharis pilularis–Artemisia californica* Shrubland Association.

Mixed Sage Scrub

A total of 17.77 acres of mixed sage scrub occurs on slopes throughout the Preserve. This vegetation type is dominated by species such as black sage, California buckwheat (*Eriogonum fasciculatum*),



Community	Code	Vegetation Description
Barren	CR	Cliff/Rock
Chaparral	MSS/MCC	Chaparral - Mixed Sage Ecotone
Chaparral	SMC	Southern Mixed Chaparral
Developed/Non-Native	DIS	Disturbed
Developed/Non-Native	ORN	Ornamental/Developed
Grassland	AGL	Annual Grassland
Grassland	CTF	Clustered Tarweed Field
Grassland	EGR	Elymus Grassland
Grassland	CNG	Needlegrass Grassland
Grassland	RUD	Ruderal
Scrub	CBS	Coyote Brush Scrub
Scrub	DMSS	Disturbed Mixed Sage Scrub
Scrub	MSS/CS	Mixed Sage - Cactus Scrub
Scrub	MSS	Mixed Sage Scrub

K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig07_AlisoCanyon_Vegetation.mxd Date: 6/29/2017 34153

Figure 7
Vegetation Communities
Aliso Canyon Resource Management Plan

and California sagebrush. Some areas have scattered lemonadeberry and laurel sumac. In some places, the shrub cover is dense while other areas are more open. This vegetation type most closely corresponds to a mix of the *Artemisia californica* Shrubland Association and the *Eriogonum fasciculatum–Salvia mellifera* Shrubland Association.

Disturbed Mixed Sage Scrub

A total of 1.25 acres of disturbed mixed sage scrub occurs along the northern edge of the Preserve. This area has a similar species composition of mixed sage scrub, but has encroaching nonnative species such as freeway iceplant (*Carpobrotus edulis*) and Selloa pampas grass (*Cortaderia selloana*). This area is also disturbed by foot-traffic and off-road bicycle use. This vegetation type most closely corresponds to a mix of the *Artemisia californica* Shrubland Association, the *Eriogonum fasciculatum–Salvia mellifera* Shrubland Association, and the *Carpobrotus edulis* Semi-natural Herbaceous Stand.

Mixed Sage-Chaparral Scrub Ecotone

A total of 44.59 acres of mixed sage–chaparral scrub ecotone generally occurs on slopes between the southern mixed chaparral and mixed sage scrub. This vegetation type represents a transition between the two communities instead of an abrupt change in vegetation. It contains a mix of both chaparral and sage scrub species.

Mixed Sage-Cactus Scrub

A total of 0.29 acre of mixed sage–cactus scrub occurs along the ridgeline at the western end of the Preserve. This vegetation type consists of a mix of sage scrub species, such as California sagebrush and California buckwheat, with large patches of coastal prickly pear. There is a discontinuous shrub canopy with bare ground between the shrubs. This vegetation type most closely corresponds to the *Opuntia littoralis*–Mixed Coastal Sage Scrub Association.

Grassland

Annual Grassland

A total of 0.79 acre of annual grassland occurs as a large patch on a western-facing slope in the center of the Preserve. This vegetation type is dominated by wild oat (*Avena fatua*). Towards the bottom of the slope there is an increasing density of native species, such as western blue-eyed-grass (*Sisyrinchium bellum*), blue dicks, needlegrass (*Stipa* sp.), and Catalina mariposa lily (*Calochortus catalinae*). This vegetation type most closely corresponds to the *Avena fatua* Semi-Natural Herbaceous Stand.

Elymus Grassland

A total of 0.05 acre of Elymus grassland occurs on the ridgeline in the center of the Preserve on either side of the trail. This vegetation type is dominated by giant wild rye. California sagebrush is present along the edge of this patch, and nonnative grasses grow below the giant wild rye. This vegetation type most closely corresponds to the *Leymus condensatus* Herbaceous Association.

Needlegrass Grassland

A total of 0.11 acre of needlegrass grassland occurs at the bottom of a western-facing slope below the annual grassland. While the dominant species is soft chess (*Bromus hordeaceus*), this vegetation type is characterized by native needlegrass at approximately 15 percent cover. Other species scattered in this area include blue-eyed grass, Catalina mariposa lily, lemonade berry, and bush monkeyflower. This vegetation type most closely corresponds to one of the *Nassella* (spp.) Herbaceous Alliances.

Clustered Tarweed Field

A total of 0.09 acre of clustered tarweed field occurs along the ridgeline at the western end of the Preserve. At the time of the surveys, this vegetation type was dominated by fascicled tarplant (*Deinandra fasciculata*); however, nonnative grasses likely grow in this area at other times of the year. This vegetation type most closely corresponds to the *Deinandra fasciculata* Herbaceous Alliance.

Barren

Cliff/Rock

A total of 1.56 acres of cliff/rock occurs on the steep slopes at the southern end of the Preserve. These areas consist of exposed, weathered rock face.

Developed/Nonnative

Ornamental/Developed

A total of 2.43 acres of ornamental/developed areas occurs along the northwestern and southern edges of the Preserve. The northwestern area consists of landscaping from the surrounding residential development encroaching within the Preserve boundary. The southern area consists of landscaping associated with The Ranch at Laguna Beach and the Ben Brown Golf Course and includes a stand of gum trees (*Eucalyptus* sp.) and turf grass.

Ruderal

A total of 1.00 acre of ruderal vegetation occurs at the ridgeline and down a slope in the center of the Preserve. This vegetation type is dominated by the nonnative cardoon.

Disturbed

A total of 0.24 acre of disturbed areas occurs throughout the Preserve and consist of dirt trails. These areas lack vegetation and are actively used by hikers and mountain bikers. Erosion is evident on the steeper trails.

2.3.2 Wildlife

The Preserve provides habitat for a wide variety of wildlife species that are characteristic of scrub habitats, chaparral, grassland, cliff and rock habitat, and wetlands. Focused surveys for coastal California gnatcatcher were performed on site for OCTA by CDFW in 2015.

Wildlife species observed or detected on site include reptiles such as western fence lizard (*Sceloporus occidentalis*); birds such as California quail (*Callipepla californica*), western scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), Bewick's wren (Thryomanes bewickii), wrentit (*Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), spotted towhee (*Pipilo maculatus*), California towhee (*Pipilo crissalis*), coastal California gnatchatcher (*Polioptila californica californica*), northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk (*Buteo jamaicensis*); and mammals such as California ground squirrel (*Otospermophilus beecheyi*) and southern mule deer (*Odocoileus hemionus*). Refer to Appendix B (Table A-2) for a complete list of wildlife species observed during 2015 surveys.

Wildlife Movement and Habitat Connectivity

Wildlife movement generally consists of three types of activities: (1) wildlife dispersal, (2) seasonal migration of wildlife species, and (3) wildlife movement related to home range activities. Below are definitions of the terms used to describe the different landscape and physical features that wildlife use to travel from one area to another.

Travel Route: This is a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) in a larger natural habitat area that is used frequently by wildlife for local or regional travel and to provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred by wildlife species because it provides the least amount of topographic resistance in moving from one area to another; it supplies adequate food, water, and/or cover to wildlife moving between habitat areas and provides a relatively direct link between target habitat areas.

Wildlife Corridor: This is a piece of habitat, usually linear in nature that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bordered by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate their movement while in the corridor. Larger landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.

Wildlife Crossing: A wildlife crossing is a small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that would otherwise hinder or prevent movement. Crossings typically are human-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent "choke points" along a movement corridor.

The Preserve contributes to regional biological connectivity and wildlife movement due to its relatively undeveloped landscape both on and surrounding the Preserve (Figure 4 and 5). Wildlife moving across the Preserve are not presently confined to a "corridor," as described above. The Preserve is contiguous with approximately 4,500 acres of undeveloped open space in AWCWP to the north and east. The southern boundary of the western half of the property is contiguous with approximately 171 acres of open space as part of the Driftwood Estates and Pacific Triangle dedications. Wildlife movement is relatively unhindered across these areas, with minimal barbed wire fencing and trails along the property boundary and no major roads or development.

To the south, wildlife movement between the Preserve and the wilderness park on the northern-facing slopes of Aliso Canyon is hindered to some extent by the upper portion of the The Ranch at Laguna Beach and the Ben Brown Golf Course; however, wildlife is still expected to cross this area,

especially at night when the golf course is closed. While there are patches of open space in canyons west of the northern end of the Preserve, these areas are separated by residential development. Wildlife traveling to these canyons would have two options: (1) cross Balboa Avenue in an approximate 150-foot corridor between residences at the northwestern end of the property or (2) move south down Hobo Canyon and across slopes adjacent to residential development to cross Nyes Place.

The Preserve contains multiple ridgelines and canyons (such as the upper end of Hobo Canyon) that provide a variety of travel routes for local wildlife movement. The trails on the property may also be used for movement. Movement is expected to occur on the property as well as between the property and contiguous off-site habitat. Large mammals expected to move across the Preserve include mule deer, mountain lion, bobcats, and coyote. Baseline studies and ongoing Preserve management have detected mule deer at the Preserve.

2.3.3 Jurisdictional Resources

A jurisdictional delineation was performed by BonTerra Psomas on July 7, 2015 and is summarized in the Baseline Biological Surveys Technical Report in Appendix B (BonTerra Psomas 2015a). Thirteen separate drainage areas were identified on the Preserve and are shown on Figure 8. These all appear to convey ephemeral flow, which is supported by the NWI's "temporarily flooded" water regime for on-site drainages. Eight of the on-site drainage features would be considered tributaries of Hobo Canyon and Aliso Creek, which convey flow into the Pacific Ocean southwest of the property. Therefore, these drainages would be considered under the jurisdiction of the USACE.

Five on-site drainage features do not exhibit a connection to Hobo Canyon or Aliso Creek and would therefore not be considered tributaries (i.e., they dissipate at the canyon bottom and do not cross under the paved road east of the property). These isolated drainage features would not be considered under the jurisdiction of the USACE.

The limits of non-wetland "waters of the U.S." were defined by the presence of the ordinary high water mark (OHWM). Evidence of an OHWM for the drainages consists of a break in bank slope, change in vegetation cover and average sediment texture, and the presence of drift deposits. Based on the field observations and data collected, a total of approximately 0.597 acres of non-wetland "waters of the U.S." occurs on the property. No wetland "waters of the U.S." are present on the Preserve.

The RWQCB has authority to take jurisdiction over the drainages that are also under the jurisdiction of the USACE as well as any isolated drainages. Therefore, a total of approximately 1.281 acres of "waters of the State" under the jurisdiction of the RWQCB occur on the Preserve.

The limits of CDFW jurisdiction on the Preserve were mapped according to the top of the stream bank. A total of approximately 1.281 acres of waters under the jurisdiction of the CDFW occurs on the Preserve.

The California Coastal Commission (CCC) wetland boundary is based on a "one-parameter" definition determined by at least one of the following: hydrology, hydric soils, and/or hydrophytic vegetation. The lateral limits of the CCC jurisdiction were determined by evidence of bed, bank, and OHWM. Therefore, approximately 1.281 acres of CCC jurisdictional wetlands occur on the property.

Table 2-2 summarizes the jurisdictional resources on the Preserve.

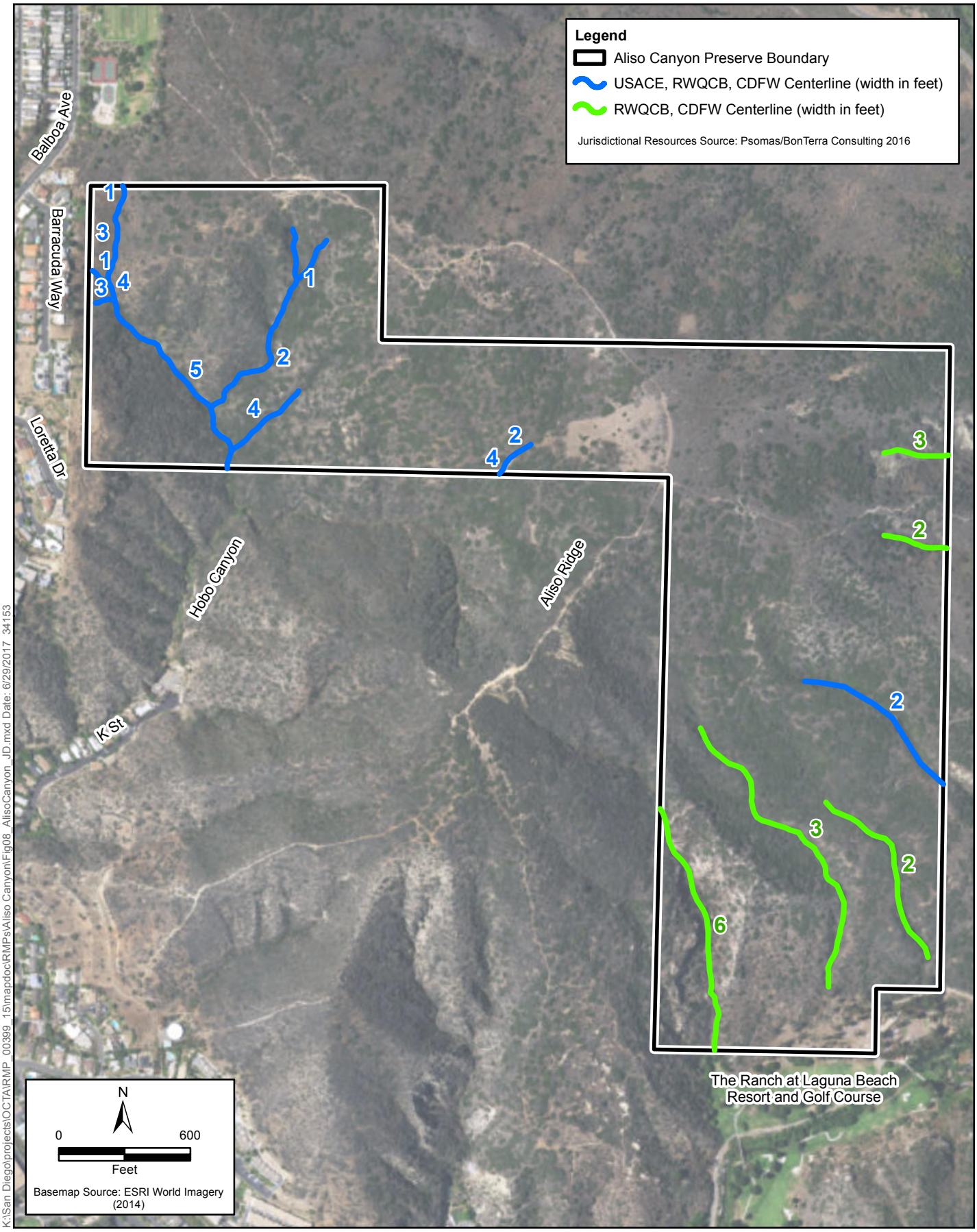


Figure 8
Jurisdictional Resources
Aliso Canyon Resource Management Plan

Table 2-2. Summary of Jurisdictional Resources on the Preserve

Drainage Area	USACE Acres	Isolated Acres	RWQCB Acres[a]	CDFW Acres	CCC Acres
Drainage 1	0.302	–	0.302	0.302	0.302
Drainage 2	0.005	–	0.005	0.005	0.005
Drainage 3	0.013	–	0.013	0.013	0.013
Drainage 4	0.011	–	0.011	0.011	0.011
Drainage 5	0.083	–	0.083	0.083	0.083
Drainage 6	0.077	–	0.077	0.077	0.077
Drainage 7	0.030	–	0.030	0.030	0.030
Drainage 8	–	0.041	0.041	0.041	0.041
Drainage 9	–	0.027	0.027	0.027	0.027
Drainage 10	0.076	–	0.076	0.076	0.076
Drainage 11	–	0.085	0.085	0.085	0.085
Drainage 12	–	0.208	0.208	0.208	0.208
Drainage 13	–	0.323	0.323	0.323	0.323
Total	**0.597**	**0.684**	**1.281**	**1.281**	**1.281**

Notes:

–: not present in this drainage

[a] RWQCB jurisdictional boundaries are defined as those determined for the USACE under "waters of the U.S."; however, the RWQCB also takes jurisdiction over isolated waters.

2.3.4 Special-Status Biological Resources

This section summarizes the special-status biological resources that were observed, reported, or have the potential to occur on the Aliso Canyon Preserve. Special-status biological resources include plant and wildlife species, as well as vegetation types and habitats, that have been afforded special status and/or recognition by the Wildlife Agencies (e.g., USFWS, CDFW, and CDFW's California Natural Diversity Database [CNDDB]), as well as private conservation organizations (e.g., California Native Plant Society [CNPS]). In addition to special-status biological resources, all Covered Species with the potential to occur on the Preserve are addressed in this section. In general, the principal reason an individual taxon (species, subspecies, or variety) is given such recognition is the documented or perceived decline of its population size or geographical extent and/or distribution resulting from habitat loss or degradation or other threats. Protection of special-status biological resources in compliance with State and Federal Wildlife Agencies, as well as local and private conservation organizations, must be addressed during Preserve management activities. Additionally, biological resource protection measures addressed in the M2 NCCP/HCP apply to the ongoing management of special-status resources on the Preserve.

The following biological evaluations have been conducted on the Preserve by BonTerra Psomas in 2015:

- Vegetation and habitat mapping (BonTerra Psomas in 2015).
- Focused surveys for coastal California gnatcatcher (CDFW in 2015).

- Focused special-status plant surveys (BonTerra Psomas in 2015).

BonTerra Psomas prepared a comprehensive Biological Technical Report (Appendix B) for the baseline surveys completed in 2015 (BonTerra Psomas 2015a). The following sub-sections summarize the special-status biological resources identified during the evaluations performed by BonTerra Psomas.

Special-Status Species

Historical reports of the Preserve and surrounding areas have inventoried several special-status plant species on site (Marsh, 1992). The following have been documented and are currently considered special-status plant species: intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), western dichondra (*Dichondra occidentalis*), many-stemmed dudleya (*Dudleya multicaulis*), Laguna Beach dudleya (*Dudleya stolonifera*), Palmer's grappling hook (*Pectocarya palmeri*), Engelmann oak (*Quercus engelmannii*), and big leaved crownbeard (*Verbesina dissita*).

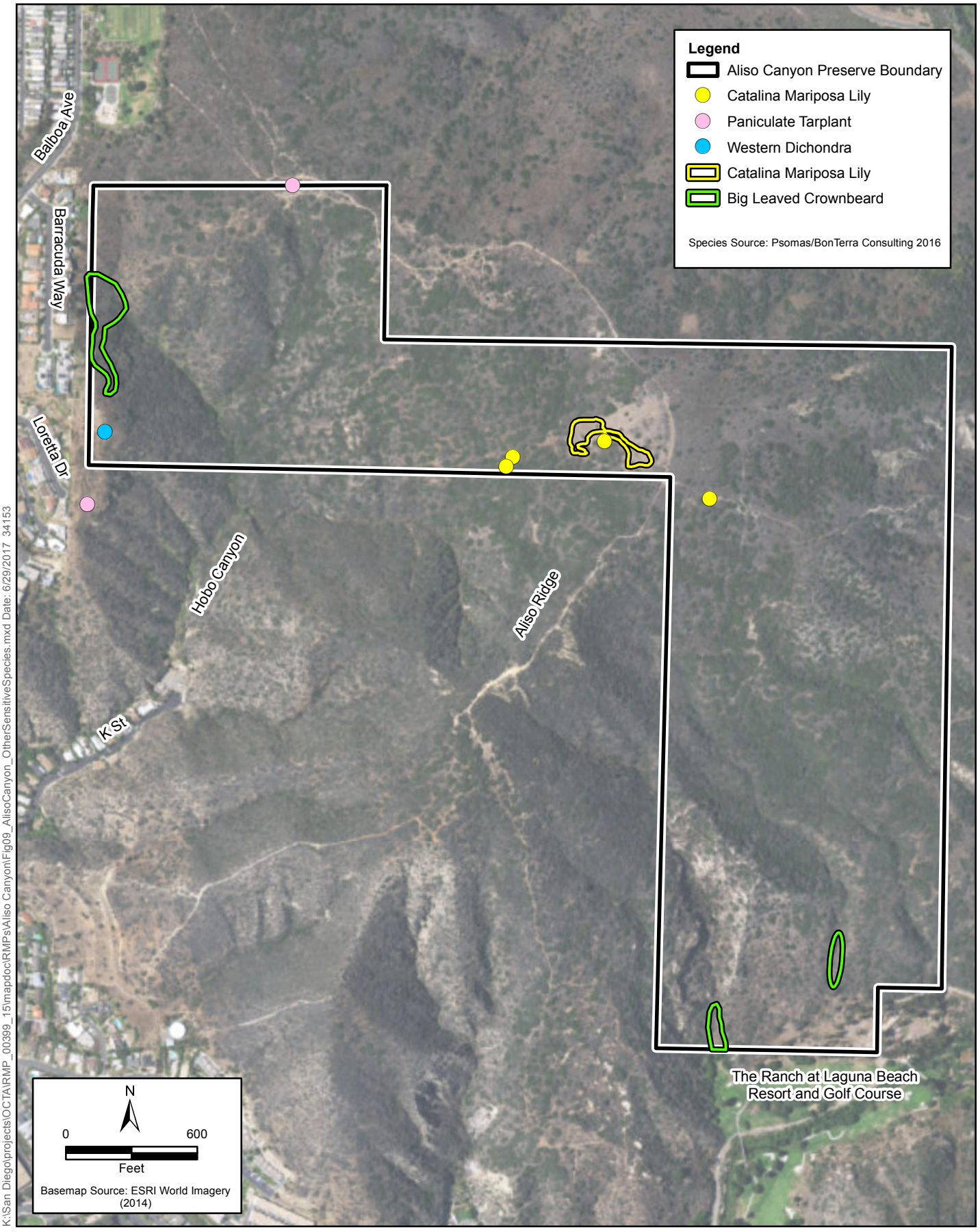
Baseline surveys of the Preserve conducted in 2015 documented the following special-status plant species: Catalina mariposa lily (*Calochortus catalinae*), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), Orange County Turkish rugging (*Chorizanthe staticoides var. chrysacantha*[1]), bushrue (*Cneoridium dumosum*), paniculate tarplant (*Deinandra paniculata* [formerly in *Hemizonia*]), western dichondra (*Dichondra occidentalis*), lance-leaved dudleya (*Dudleya lanceolata*), many-stemmed dudleya (*Dudleya multicaulis*), spiny redberry (*Rhamnus crocea*), and big-leaved crownbeard (*Verbesina dissita*). Special-status wildlife species documented at the Preserve in 2015 include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), and coastal California gnatcatcher (*Polioptila californica californica*).

Tables 2-3 thru 2-5 summarize the listed status of noteworthy species detected or anticipated to occur on the Preserve and provide notes on observations or potential for occurrence. The locations of non-Covered Species known occurrences observed during the baseline surveys are displayed on Figure 9. Refer to Appendix B for additional information on special-status plant and wildlife species known to occur in proximity to the Preserve.

Covered Species

The term "Covered Species" refers to the 13 species included in the permits issued to OCTA by State and Federal governments as part of the M2 NCCP/HCP. The locations of Covered Species known occurrences observed during the baseline surveys are displayed on Figure 10. For each Covered Species, a summary of whether the species has been observed/detected or has potential to occur, status of suitable habitat, and potential threats and stressors within the Preserve is included in Table 2-6.

[1] The variety is not recognized in Jepson Herbarium (2014); Hickman (1993) states that the "ssp. chrysacantha" is a form apparently environmentally induced. Information on blooming, habitat, and range is for the full species.



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig09_AlisoCanyon_OtherSensitiveSpecies.mxd Date: 6/29/2017 34153

Figure 9
Other Sensitive Species
Aliso Canyon Resource Management Plan

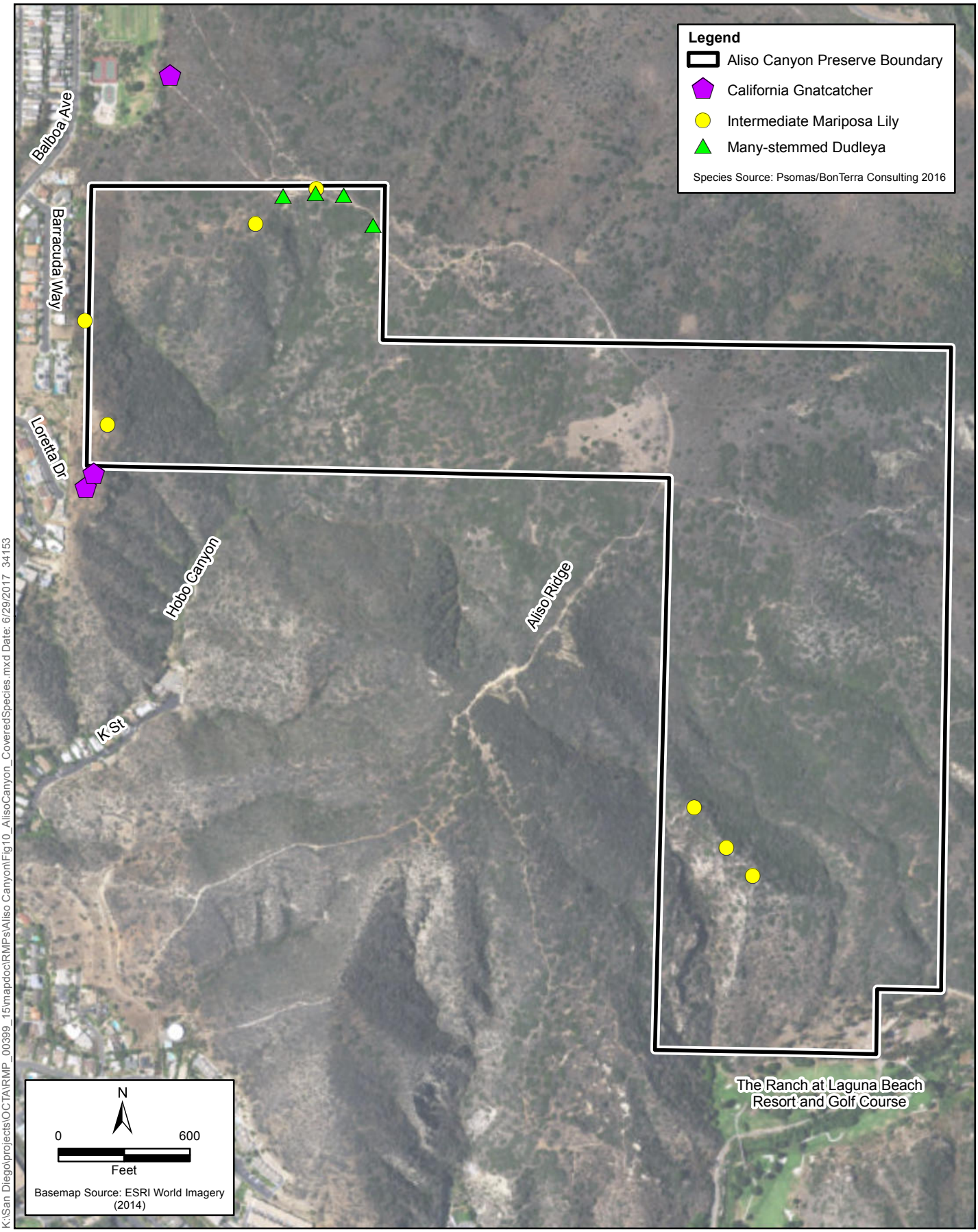


Figure 10
Covered Plants and Animals
Aliso Canyon Resource Management Plan

Table 2-3. Plant Species Observed On Site based on Historic Surveys

Species	Status				Comments [a]
	USFWS	CDFW	CRPR	M2 NCCP/HCP Covered Species	
Calochortus weedii var. *intermedius* intermediate mariposa lily	None	None	1B.2	Yes	Hobo-Aliso ridge.
Dichondra occidentalis western dichondra	None	None	4.2	No	Hobo-Aliso Canyon ridge and south facing slope of Aliso Canyon.
Dudleya multicaulis many-stemmed dudleya	None	None	1B.2	Yes	Hobo-Aliso ridge.
Dudleya stolonifera Laguna Beach dudleya	FT	ST	1B.1	No	Aliso Canyon, both slopes.
Pectocarya palmeri Palmer's grapplinghook	None	None	4.2	No	Hobo-Aliso ridge.
Quercus engelmannii Engelmann oak	None	None	4.2	No	South facing slope of Aliso Canyon.
Verbesina dissita *big-leaved crownbeard*	FT	ST	1B.1	No	Hobo Canyon and south facing slope of Aliso Canyon.

CRPR: California Rare Plant Rank

Legend

CRPR

1B Plants Rare, Threatened, or Endangered in California and Elsewhere

4 Plants of Limited Distribution – A Watch List

CRPR Threat Code Extensions

.2 Fairly Threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

Notes

[a] Location within Preserve where special-status species were documented by Marsh (1992).

Table 2-4. Plant Species Observed On Site during 2015 Surveys

Species	Status				Comments
	USFWS	CDFW	CRPR	M2 NCCP/HCP Covered Species	
Calochortus catalinae Catalina mariposa lily	None	None	4.2	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Calochortus weedii var. *intermedius* Intermediate mariposa lily	None	None	1B.2	Yes	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Chorizanthe staticoides var. chrysacantha Orange County Turkish rugging[ab]	None	None	None	No	Suitable habitat is present on the Aliso Canyon Preserve. Full species observed during baseline surveys.
Cneoridium dumosum Bushrue[c]	None	None	None	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Deinandra paniculata Paniculate tarplant	None	None	4.2	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Dichondra occidentalis western dichondra	None	None	4.2	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Dudleya lanceolata lance-leaved dudleya	None	None	None	No	Suitable habitat is present on the Aliso Canyon Preserve. Undetermined genetic form observed during surveys.
Dudleya multicaulis many-stemmed dudleya	None	None	1B.2	Yes	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Rhamnus crocea spiny redberry[d]	None	None	None	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.
Verbesina dissita big-leaved crownbeard	FT	ST	1B.1	No	Suitable habitat is present on the Aliso Canyon Preserve. Observed during baseline surveys.

Species	Status: USFWS	Status: CDFW	Status: CRPR	Status: M2 NCCP/HCP Covered Species	Comments
CRPR: California Rare Plant Rank					
Legend					
CRPR					
1B	Plants Rare, Threatened, or Endangered in California and Elsewhere				
4	Plants of Limited Distribution – A Watch List				
CRPR Threat Code Extensions					
.2	Fairly Threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)				
.3	Not Very Threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)				
Notes					
[a]	The variety is not recognized in Jepson Herbarium (2014); Hickman (1993) states that the "ssp. chrysacantha" is a form apparently environmentally induced. Information on blooming, habitat, and range is for the full species.				
[b]	Orange County endemic.				
[c]	Northern range edge species.				
[d]	Regionally rare.				

Table 2-5. Wildlife Species Observed On Site during 2015 Surveys

Species	Status: USFWS	Status: CDFW	Status: M2 NCCP/HCP Covered Species	Comments
Accipiter cooperii Cooper's hawk	None	WL	No	Suitable foraging and nesting habitat is present on Aliso Canyon Preserve. Observed foraging during baseline surveys, and may occur for nesting.
Buteo jamaicensis red-tailed hawk[a]	None	None	No	Suitable foraging and nesting habitat is present on Aliso Canyon Preserve. Observed foraging during baseline surveys, and may occur for nesting.
Circus cyaneus northern harrier	None	SSC	No	Suitable foraging and nesting habitat is present on Aliso Canyon Preserve. Observed foraging during baseline surveys, and may occur for nesting.
Polioptila californica californica coastal California gnatcatcher	FT	SSC	Yes	Suitable habitat is present on Aliso Canyon Preserve. Observed during baseline surveys.
Odocoileus hemionus southern mule deer[a]	None	None	No	Suitable habitat is present on Aliso Canyon Preserve. Observed during baseline surveys.
Legend				
State (CDFW)		Federal (USFWS)		
SSC	Species of Special Concern	FT	Federally Threatened	
Notes				
[a]	Local interest			

Table 2-6. M2 NCCP/HCP Covered Species

Common / Scientific Name	Observed/ Detected On Site	Potential to Occur/ Status of Suitable Habitat On Site	Potential Threats / Stressors within Preserve
Plants			
Intermediate mariposa lily / *Calochortus weedii* var. *intermedius*	Yes. A total of 144 individuals were observed in 7 locations during 2015 baseline surveys.	Suitable habitat within the Preserve with known occurrences. Additional individuals/populations may be present.	Response to fire and fire frequency, vegetation management along access roads, direct and indirect impacts (trampling, erosion) from public access and recreational trail use, competition from nonnative plant species.
Southern tarplant / *Centromadia parryi* ssp. *australis*	None detected during 2015 baseline surveys.	No suitable habitat and not expected to occur on this Preserve.	Not applicable.
Many-stemmed dudleya / *Dudleya multicaulis*	Yes. A total of 60 individuals were observed at 4 locations during 2015 baseline surveys.	Suitable habitat within the Preserve. Additional individuals/populations may be present.	Response to fire and fire frequency, direct and indirect impacts (trampling/disturbance) from public access and recreational trail use, competition from nonnative plant species.
Fish			
Arroyo chub / *Gila orcutti*	None detected during 2015 baseline surveys.	No suitable habitat and not expected to occur on this Preserve.	Not applicable.
Amphibians and Reptiles			
Coast horned lizard / *Phrynosoma blainvillii*	None detected during 2015 baseline surveys.	Suitable habitat within the Preserve.	Invasive species, direct impacts (trampling, disturbance) from recreational trail use, intense fire events.

Common / Scientific Name	Observed/ Detected On Site	Potential to Occur/ Status of Suitable Habitat On Site	Potential Threats / Stressors within Preserve
Orangethroat whiptail / *Aspidoscelis hyperythra beldingi*	None detected during 2015 baseline surveys.	Suitable habitat within the Preserve.	Invasive species, direct impacts (trampling, disturbance) from recreational trail use, intense fire events.
Western pond turtle / *Emys marmorata*	None detected during 2015 baseline surveys.	No suitable habitat and not expected to occur on this Preserve.	Not applicable.
Birds			
Southwestern willow flycatcher / *Empidonax traillii extimus*	None detected during 2015 baseline surveys.	No suitable habitat and not expected to occur on this Preserve.	Not applicable.
Least Bell's vireo / *Vireo bellii pusillus*	None detected during 2015 baseline surveys.	No suitable habitat and not expected to occur on this Preserve.	Not applicable.
Cactus wren / *Campylorhynchus brunneicapillus sandiegensis*	None detected during 2015 baseline surveys.	Limited amount of marginally suitable habitat existing on the Preserve.	Response to fire and fire frequency (direct loss of cactus patches), invasive species (loss of foraging habitat), recreational trail use (flushing of nests), predation (nest predation facilitated by taller vegetation adjacent to cactus patches, Cooper's hawk).
Coastal California gnatcatcher / *Polioptila californica californica*	Yes. One male observed on western edge of Preserve during 2015 baseline surveys.	Suitable habitat is within the Preserve. Additional individuals/populations may be present.	Type conversion (reduction of coastal sage scrub habitat due to fire and/or fire frequency), invasive species (out compete native coastal sage scrub), recreational trail use (flushing of nests), unauthorized off-trail use, including native vegetation removal, cowbird parasitism, intense fire events.

Common / Scientific Name	Observed/ Detected On Site	Potential to Occur/ Status of Suitable Habitat On Site	Potential Threats / Stressors within Preserve
Mammals			
Bobcat / *Lynx rufus*	None detected during 2015 baseline surveys.	Suitable habitat within the Preserve.	Fire and fire frequency (direct loss and loss of habitat cover), habitat fragmentation from fencing, human disturbances from onsite recreational trail use and preserve management activities.
Mountain lion / *Puma concolor*	None detected during 2015 baseline surveys.	No longer suitable habitat within the Preserve. Mountain lions are not expected within the Laguna Hills due to lack of regional connectivity.	Fire and fire frequency (direct loss and loss of habitat cover), habitat fragmentation from fencing, human disturbances from onsite recreational trail use and preserve management activities.

Sensitive Vegetation Types

In addition to providing an inventory of special-status plant and wildlife species, the CNDDB also provides an inventory of vegetation types that are considered special status by State and Federal Wildlife Agencies, academic institutions, and various conservation groups (such as the CNPS), giving them a high priority for conservation on the Preserve. Special-status vegetation types observed on the Preserve consist of the following:

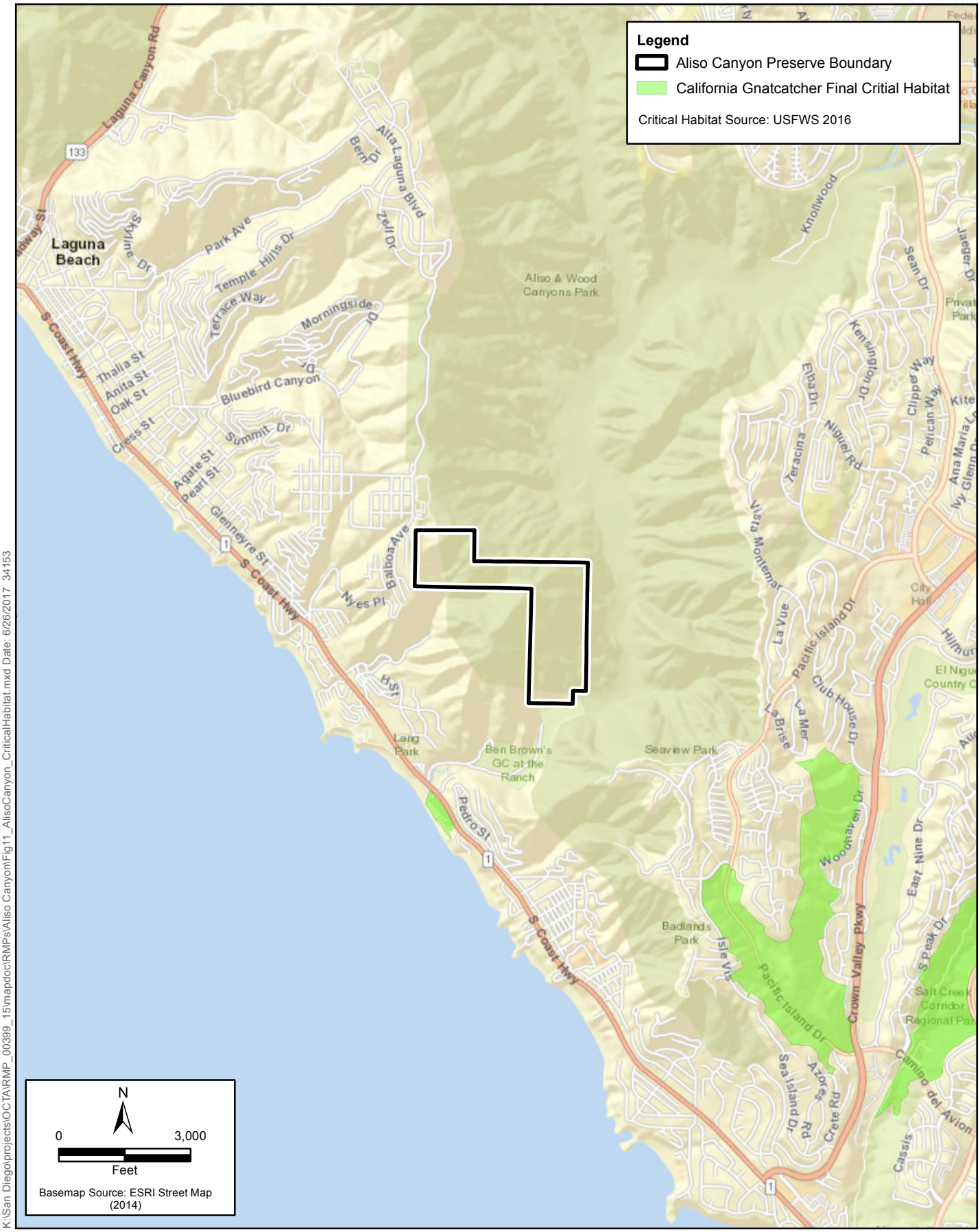
- Chaparral communities, including southern mixed chaparral.
- Scrub communities, including coyote brush scrub, mixed sage scrub, disturbed mixed sage scrub, mixed sage-chaparral scrub ecotone, and mixed sage-cactus scrub.
- Grassland communities, annual grassland, Elymus grassland, needlegrass grassland, and clustered tarweed field.
- Jurisdictional areas, including non-wetlands Waters of the U.S. and Waters of the State.

Critical Habitat

The Aliso Canyon Preserve is not located in proposed or final critical habitat for any federally listed species. Critical habitat for coastal California gnatcatcher is located south and southeast of the Preserve (Figure 11).

2.4 Cultural Resources

An Archaeological Sensitivity Assessment (ASA) was conducted by LSA Associates, Inc. on the Preserve in 2015. The assessment included a records search, Native American coordination, field survey, and report. No archaeological resources were identified within the boundaries of the Preserve during the current study. However, if ground disturbance occurs within certain areas of the Preserve archaeological monitoring may be necessary. This information will be kept confidential and not included in this RMP. The ASA will be utilized in order to help ensure that activities on the Preserve do not impact any cultural resources.



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig11_AlisoCanyon_CriticalHabitat.mxd Date: 6/26/2017 34153

Figure 11
USFWS Critical Habitat
Aliso Canyon Resource Management Plan

Chapter 3
Management and Monitoring

This chapter addresses the specific management and monitoring requirements for the Aliso Canyon Preserve.

Roles and Responsibilities

Successful RMP implementation will depend on the cooperation of several management and implementation entities, as outlined below.

- **Implementing Entity**. OCTA is the NCCP/HCP administrator and the entity that will oversee implementation of conservation measures required to offset impacts from M2 freeway improvement projects, including management of the Aliso Canyon Preserve. OCTA will identify a Preserve Manager who will serve as the long-term manager (and potential title holder) for the Preserve. OCTA will record a conservation easement or some other approved land protection instrument for the Preserve that will provide a legal mechanism to ensure each Preserve is maintained and managed in perpetuity as a habitat Preserve. The land protection instrument will be held by appropriate entities, depending upon the type of entity identified as the Preserve Manager.
- **Preserve Manager**. The Preserve Manager will consist of OCTA (interim) or an outside contractor or entity, as determined during RMP implementation. The Preserve Manager will be responsible for day-to-day Preserve management and operations. The Preserve Manager will coordinate with the OCTA NCCP/HCP Administrator and Wildlife Agencies regarding status and substantial changes to management activities. The Preserve Manager will prepare and submit Annual Progress Reports for the NCCP/HCP Administrator that summarize the results of research and monitoring activities, provide recommendations for future preserve management activities for the Preserve, and discuss anticipated activities for the upcoming year.
- **Monitoring Biologist**. The Monitoring Biologist may be a Preserve staff member or independent contractor. OCTA will select an individual or entity to fulfill this role. The Monitoring Biologist will be responsible for monitoring Covered Species and natural communities. The Monitoring Biologist role will be periodic based on the monitoring schedule established in the Plan. Data collection will follow accepted monitoring methods. The Monitoring Biologist will provide OCTA and Preserve Manager with monitoring reports that include data, results, and recommendations.
- **Laguna Beach Fire Department**. The Laguna Beach Fire Department (LBFD) will provide oversight regarding fire management activities, such as maintenance of fuel modification zones. LBFD will also respond to active fires to prevent the loss of human life and property and other resources. These activities fall into two categories, regular maintenance activities and emergency activities.
- **Supporting Entities**. Supporting entities may include technical consultants, contractors, and volunteers who will assist with implementing various elements of the RMP. Technical experts will include the following.
    - **Biological Research and Monitoring** – Wildlife biologists, botanists, and certified arborists with the appropriate expertise, licenses, and permits (depending on survey requirements).

- **Restoration** – Restoration ecologists will assist with habitat restoration/enhancement planning and monitoring activities. Restoration ecologists and contractors will implement restoration/enhancement programs such as site preparation, plant establishment, and maintenance.
- **General Maintenance** – Other types of contractors may be retained to implement maintenance activities, including minor road maintenance and erosion control.

  Note that the Preserve Manager may use Preserve staff for restoration and general site maintenance tasks. Additionally, volunteers may be used to assist with monitoring and research tasks, specific restoration tasks (e.g., nonnative plant eradication, planting, site maintenance activities), educational and outreach activities, or site patrols, as appropriate.

- **Wildlife Agencies.** Both the USFWS and CDFW will review and approve the RMP and coordinate with OCTA, the Preserve Manager, and supporting biologists regarding the status of preserved natural resources, ongoing monitoring activities, and adjustments to the management program. The Wildlife Agencies will review and provide comments, if necessary, on Annual Progress Reports for the Preserve, which will be included in the NCCP/HCP annual report.

3.1 Management and Monitoring Goals, Objectives and Actions

3.1.1 OCTA M2 NCCP/HCP Goals and Objectives Relevant to the Aliso Canyon Preserve

The M2 NCCP/HCP contains a broad set of biological goals and objectives at the landscape, natural community, and species levels that describe how the conservation actions would occur within areas important for regional conservation purposes. Goals are based on the conservation needs of the resources. Biological objectives describe in more detail the conservation or desired conditions to be achieved and have been designed to collectively achieve the biological goals. The biological goals and objectives indicate how the additional conservation of large blocks of habitat will benefit the biodiversity, natural communities, and habitat connectivity throughout key portions of the Plan Area, and provide for conservation and management of Covered Species. Biological goals for Covered Species are required by USFWS's 5-Point Policy to be included in HCPs (*Federal Register* (FR), Volume 65, Page 35242, June 1, 2000). The NCCP Act (Section 2810 of the Fish and Game Code) specifies the inclusion of conservation goals and objectives in the Planning Agreement. The following biological goals and objectives (documented in the M2 NCCP/HCP) are specifically applicable to the Aliso Canyon Preserve:

Landscape Goal 1: Protect, manage, and enhance natural landscapes that result in conservation of areas large enough to support ecological integrity and sustainable populations of Covered Species, and are linked to each other and/or other areas of protected habitat in or adjacent to the Plan Area.

Landscape Objective 1.1: OCTA will conserve, enhance, and manage natural landscapes within core and linkage areas contiguous with existing protected lands.

Landscape Goal 2: Protect and enhance natural and semi-natural landscapes important to maintain wildlife movement within the Plan Area.

Landscape Objective 2.1: OCTA will acquire, protect, and manage natural landscapes that secure wildlife movement corridors and provide landscape connectivity.

Landscape Goal 3: OCTA will protect, enhance, and/or restore natural landscapes within a range of environmental gradients and contiguous to other protected areas to allow for shifting species distributions in response to catastrophic events (e.g., fire, prolonged drought) or changed circumstances (e.g., climate change).

Landscape Objective 3.1: OCTA will acquire and/or restore natural landscapes within elevation ranges (0–500, 500–1,000, 1,000–1,500, 1,500–2,000 feet). The conservation and restoration of Covered Species habitat in or contiguous with existing Preserve lands will benefit potential shifting species distributions in response to catastrophic events and changed circumstances.

Landscape Goal 4: Protect and enhance habitat in geographically distinct areas across the Plan Area to conserve species by facilitating/promoting genetic exchange.

Landscape Objective 4.1: OCTA will acquire and/or restore natural landscapes within most of the major watersheds (Hydrologic Unit Code 8) and a majority of the core and linkage areas that are contributing to genetic exchange within these areas.

Natural Community Goal 1: Protect, manage, and enhance natural communities to promote native biodiversity.

Natural Community Objectives: OCTA will acquire and/or restore chaparral, grassland, and scrub habitat to promote conservation of native biodiversity and connectivity that benefit Covered Species of these natural community types.

Natural Community Goal 2: Maintain and enhance riparian and wetland function and values to benefit Covered Species and promote native biodiversity.

Natural Community Objective 2.1: OCTA will acquire, restore, and/or enhance areas with aquatic resources (per CDFW jurisdiction). These conservation actions will protect riparian and wetlands functions and values by improving the condition and integrity of the physical streambed, aquatic and riparian habitat, and hydrology.

Species Goal 1: Provide conservation of intermediate mariposa lily within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 1.1: OCTA will acquire Preserves with occurrences of intermediate mariposa lily. OCTA will ensure that appropriate management and monitoring actions are incorporated into the RMPs for each Preserve to support sustainable populations of intermediate mariposa lily.

Species Goal 2: Provide conservation of many-stemmed dudleya within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 2.1: OCTA will acquire a Preserve and/or implement a restoration project resulting in the protection, enhancement, and/or creation of a major population (i.e., 500 individuals) of many-stemmed dudleya.

Species Goal 5: Provide conservation of coast horned lizard within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 5.1: OCTA will acquire Preserves with natural habitat that includes areas with loose, fine soils with high sand fraction, open areas with limited overstory for basking, and other features known to support coast horned lizard and OCTA will ensure that appropriate management monitoring actions are incorporated into the RMPs for each Preserve that include suitable habitat for coast horned lizard.

Species Goal 6: Provide conservation of orangethroat whiptail within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 6.1: OCTA will acquire Preserves that have documented occurrences of orangethroat whiptail. OCTA will ensure that appropriate management and monitoring actions are incorporated into the RMPs for each Preserve to protect and maintain habitat to support sustainable populations of orangethroat whiptail.

Species Goal 9: Provide conservation of coastal California gnatcatcher within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 9.1: OCTA will protect and manage blocks of occupied gnatcatcher nesting habitat to support sustainable populations and maintain habitat linkages between coastal California gnatcatcher populations within the Plan Area.

Species Goal 12: Provide conservation of bobcat within the Plan Area and minimize and mitigate impacts associated with Covered Activities.

Species Objective 12.1: OCTA will acquire natural habitat that includes a combination of land cover types important for wildlife movement of mammals such as bobcat.

3.1.2 Preserve Specific Management Objectives and Actions

The Aliso Canyon Preserve was purchased as part of the EMP because it helps achieve the conservation strategy/biological goals of the M2 NCCP/HCP by providing high quality mitigation for impacts resulting from the M2 covered freeway improvement projects. Conservation of the Aliso Canyon Preserve ensures the preservation and enhancement of regional biological connectivity and the protection of Covered Species as well as non-covered sensitive species and their associated natural habitats. As identified in Section 3.1.1, there are a number of Plan Goals of the M2 NCCP/HCP that specifically apply to the Aliso Canyon Preserve. In addition to the broader Plan Goals, this RMP also identifies Preserve-specific management objectives and actions that support the broader Plan Goals. The Preserve-specific management objectives and actions are summarized in Table 3-1 and described in more detail in this chapter. A summary checklist and annual schedule of ongoing Preserve management and biological monitoring actions is included as Appendix A.

Table 3-1. Preserve Specific Management Objectives and Actions

Category/Goal	Management Objectives	Management Actions
Preserve Management (Section 3.2)		
Public Access (Section 3.2.1)	Offer public access and recreational opportunities within the Preserve that are compatible with the protection of biological resources.	• Identify and demarcate approved trails for recreation use based on existing trail plans and on an evaluation of biological resources, safety and land use opportunities and constraints. • Install signage, fencing (protection of sensitive resources), and obstructions, as appropriate, to educate and control public access. • Monitor and control permitted and unauthorized activities (e.g., use or creation of unauthorized trails). • Implement a public education and outreach program to communicate and regularly reinforce the value and purpose of the Preserve and importance of self-monitoring behavior within it.
Invasive Species Control Plan (Section 3.2.2)	Implement an invasive plant species control program to protect natural communities and Covered Species habitat.	• The Preserve Manager will contract with a Restoration Ecologist to prepare an invasive plant management plan within two years of RMP adoption for review and approval by the Wildlife Agencies. The management plan will prioritize invasive species for control; specify goals (eradication versus control); identify treatment locations, timelines (including potential re-treatments), and removal methods; provide realistic, measurable success criteria and monitoring methodology; and identify areas that may need post-treatment restoration. • Prior to implementation of the invasive plant management plan, the Preserve Manager will map priority invasive species during general stewardship and biological monitoring efforts. • Establish and implement a monitoring schedule to evaluate the success of invasive plant control efforts for five years following implementation or until eradication is maintained for one year without follow-up control activities.

Category/Goal	Management Objectives	Management Actions
Habitat Restoration (Section 3.2.3)	Restore closed trails to 70 percent of native habitat cover.	• During the first five years after adoption of the RMP, the Preserve Manager will monitor conditions of trails identified to be decommissioned using photo monitoring methods to track progress of passive restoration. • After five years, the Preserve Manager, in consultation with the Restoration Ecologist, may determine the need for active (versus passive) restoration, including invasive plant control and supplemental seeding, to improve the cover and quality of native habitat on closed trails.
Vegetation Management (Section 3.2.4)	Minimize impacts to native plants and wildlife habitat resulting from management, maintenance, or other activities on the Preserve.	• Pruning, cutting, or clearing of native vegetation will generally be avoided except for maintenance along approved recreation trails and installation of erosion control measures, if necessary. • The clearing of natural vegetation on the Preserve will be required to comply with the Nesting Bird Policy included in Appendix C.
Fire Management (Section 3.2.5)	Develop a Fire Management Plan (FMP) for the Preserve that maximizes protection of biological resources during fire suppression activities, to the degree feasible.	• Within two years from adoption of the RMP, the Preserve Manager, in coordination with OCTA and the LBFD, will develop a Fire Management Plan (FMP) that establishes policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. • Identify and map environmentally sensitive lands to be included in FMP. • If a fire occurs on the Preserve, the Preserve Manager will inventory the condition of natural communities following the fire, and will coordinate with the Monitoring Biologist, Wildlife Agencies, and Regulatory Agencies as necessary, to determine if habitat restoration is warranted.
Nonnative Animal Species Management (Section 3.2.6)	Control invasive (nonnative) animal species that are known to impact native wildlife species and habitats.	• The Preserve Manager will work towards controlling the spread of invasive ant species. • The Preserve Manager will monitor and address other potential infestations of invasive insects and other pathogens that can threaten native habitat. • Implement and enforce feral and domestic animal restrictions and control.

Category/Goal	Management Objectives	Management Actions
Property Management (Section 3.2.7)	Implement routine and ongoing property management activities to ensure that the Preserve is maintained in good condition.	• Collect and dispose of trash and debris regularly to maintain the Preserve in good condition for visitors and minimize impacts to Covered Species and natural communities. • Implement the public access plan and ensure that operational activities within the Preserve avoid or minimize impacts on Covered Species and natural communities from lighting or noise. • Monitor and maintain fencing (if installed) to control public access from damaging sensitive resources. • Install and maintain signs at key access points to provide visitors with information on the importance of the biological resources, Preserve rules, and recreational features (including trails). • Inspect and identify situations requiring erosion control.
Land Uses within the Preserve (Section 3.2.8)	Allow selected activities on the Preserve that can be managed to minimize impacts to protected biological resources and facilitate ongoing resource preservation.	• Identify and allow only land uses within the Preserve that are conditionally allowed if it can be assured that the activity minimizes or avoids impacts on biological resources and ecosystem functions. • Conduct monitoring of the Preserve to ensure prohibited uses are not occurring with the Preserve.
Lands Uses Adjacent to the Preserve (Section 3.2.9)	Monitor and address negative edge effects from existing land uses adjacent to the Preserve.	• The Preserve Manager will monitor land uses adjacent to the Preserve to identify situations in which edge effects can negatively affect biological resources within the Preserve. • The Preserve Manager will regularly monitor the interface of the Preserve with adjacent land uses. The Preserve Manager will identify situations in which adjacent land uses create negative effects on biological resources and maintain a dialogue with adjacent landowners to discuss and address edge effect issues. • To the extent practicable, the Preserve Manager and OCTA will coordinate with local land use authorities (e.g., for the CEQA public review process) to ensure that new developments adjacent to the Preserve adhere to the applicable adjacency guidelines.
Management of Cultural Resources (Section 3.2.10)	Manage the Preserve in a manner that does not impact sensitive archeological resources.	• Preserve Manager will follow directives set forth in Archeological Sensitivity Assessment (ASA) of how and where cultural resources need to be protected, and the Preserve Manager will use this information to help ensure that activities on the Preserve do not impact any sensitive cultural resources.

Category/Goal	Management Objectives	Management Actions
Public Outreach and Education (Section 3.2.11)	Develop and implement a public outreach and education program to inform and engage the public on Preserve values, goals, and guidelines to promote stewardship of biological resources and compliance with Preserve rules and regulations.	• Hold public meetings. • Develop and maintain website. • Provide educational and interpretative materials. • Develop outreach and volunteer program. • Develop an educational/outreach program focused on adjacent landowners to communicate information regarding Preserve management and obtain information regarding observations or concerns from adjacent landowners. • Encourage trail user groups to participate in "self-monitoring and policing" programs.
Biological Monitoring and Management (Section 3.3)		
Covered Plant Species (Section 3.3.2) **Plants** Plan Species Goal 1 and Species Objective 1.1 and Species Goal 2 and Species Objective 2.1	Ensure the long-term viability of Covered Plants by protecting, managing, and enhancing populations and suitable habitat on the Preserve.	• Identify status, threats, and population trends. • Identify anthropogenic conflicts. • Maintain database of population size of Covered Plants on Preserve. • Protect Covered Plants during property maintenance and/or from public access and recreational activities. • Protect Covered Plants during fire suppression activities. • Enhance populations by invasive plant removal and possibly by planting additional covered plant species.
Non-Covered Sensitive Plant Species (Section 3.3.3)	Manage the Preserve in a manner that protects and enhances habitat for sensitive plant species.	• Identify populations of sensitive plants. • Consider sensitive plant locations when developing and prioritizing invasive species eradication. • Protect sensitive plants during property maintenance and/or from public access and recreational activities. • Protect sensitive plants during fire suppression activities.
Covered Animal Species (Section 3.3.4) **Reptiles** Plan Species Goal 5 and Species Objective 5.1 and Species Goal 6 and Species Objective 6.1	Ensure the long-term viability of Covered Reptiles by protecting, managing, and enhancing suitable habitat on the Preserve.	• Identify status, threats, and population trends. • Identify anthropogenic conflicts. • Protect Covered Reptiles and habitat during property maintenance and/or from public access and recreational activities.

Category/Goal	Management Objectives	Management Actions
Covered Animal Species (Section 3.3.4) **Birds** Plan Species Goal 9 and Species Objective 9.1	Protect and enhance potential habitat of Covered Birds on the Preserve.	• Identify status, threats, and population trends. • Identify anthropogenic conflicts. • Protect potential habitat of Covered Birds during property maintenance and/or from public access and recreational activities. • Protect potential habitat of Covered Birds during fire suppression activities.
Covered Animal Species (Section 3.3.4) **Mammals** Plan Species Goal 12 and Species Objective 12.1	Ensure the long-term viability of Covered Mammals by protecting, managing, and enhancing populations and suitable habitat on the Preserve.	• Within one year from adoption of the RMP, the Preserve Manager will set up and monitor wildlife movement cameras to document wildlife movement on the Preserve. A qualified wildlife biologist will assess camera results to determine wildlife movement and connectivity. • Identify status, threats, and population trends. • Identify anthropogenic conflicts. • If strategic fencing is installed, develop a fencing approach that protects the Preserve while facilitating wildlife movement. • Protect Covered Mammals from hunting/collection. • Protect Covered Mammals from public access and recreational use.
Natural Communities (Section 3.3.5) Plan Natural Communities Goal 1 and Natural Communities Objective (1.1-1.5) and Natural Communities Goal 2 and Natural Communities Objective 2.1	Ensure the long-term viability of natural communities by protecting, managing, and enhancing these resources on the Preserve.	• Maintain updated vegetation map. • Identify operational or public use conflicts. • Establish long-term monitoring plots to identify vegetation condition and trends. • Monitor nonnative invasive species eradication efforts and/or enhancement/restoration actions. • Control invasive pests or disease. • Restore natural communities impacted by altered fire regime or climate change. • Protect natural communities from public access and recreational trail use. • Protect natural communities from erosion. • Protect natural communities from edge effects.

Category/Goal	Management Objectives	Management Actions
Adaptive Management (Section 3.3.6)	Preserve Manager will manage the Aliso Canyon Preserve in accordance with the principles and procedures for adaptive management.	Key issues for a focused adaptive management approach to address uncertainties of preserve management on the Aliso Canyon Preserve include the following: • Public access and wildlife activity. • Covered Plants and vegetation management. • Trails revegetation and/or decommissioning.
Annual Progress Reports (Section 3.3.7)	The Preserve Manager will prepare an Annual Progress Report that summarizes the results of research and monitoring activities, provides recommendations for future preserve management activities for the Preserve, and discusses anticipated activities for the upcoming year.	Annual reports will include updates and anticipated activities for the upcoming year including, but not limited to: • Monitoring of preserved biological resources, including natural communities and Covered Species. • Fire management and control, recreational uses, access, general site maintenance, and encroachment issues. • Habitat restoration and enhancement. • Education and outreach.

3.2 Preserve Management

The primary purpose of the Aliso Canyon Preserve is to help fulfill the preserve acquisition component of the M2 NCCP/HCP Plan conservation strategy. However, the Preserve may also provide recreational benefits and must accommodate site-specific operational and safety activities. This chapter provides information on the Preserve management activities for the following Preserve elements to ensure that biological resources are protected while allowing for compatible uses:

- Public Access (Section 3.2.1)
- Invasive Plant Species Control (Section 3.2.2)
- Habitat Restoration (Section 3.2.3)
- Vegetation Management (Section 3.2.4)
- Fire Management (Section 3.2.5)
- Nonnative Animal Species Management (Section 3.2.6)
- Property Management (Section 3.2.7)
- Land Uses within the Preserve (Section 3.2.8)
- Land Uses Adjacent to the Preserve (Section 3.2.9)
- Management of Cultural Resources (Section 3.2.10)
- Public Outreach and Education (Section 3.2.11)

3.2.1 Public Access

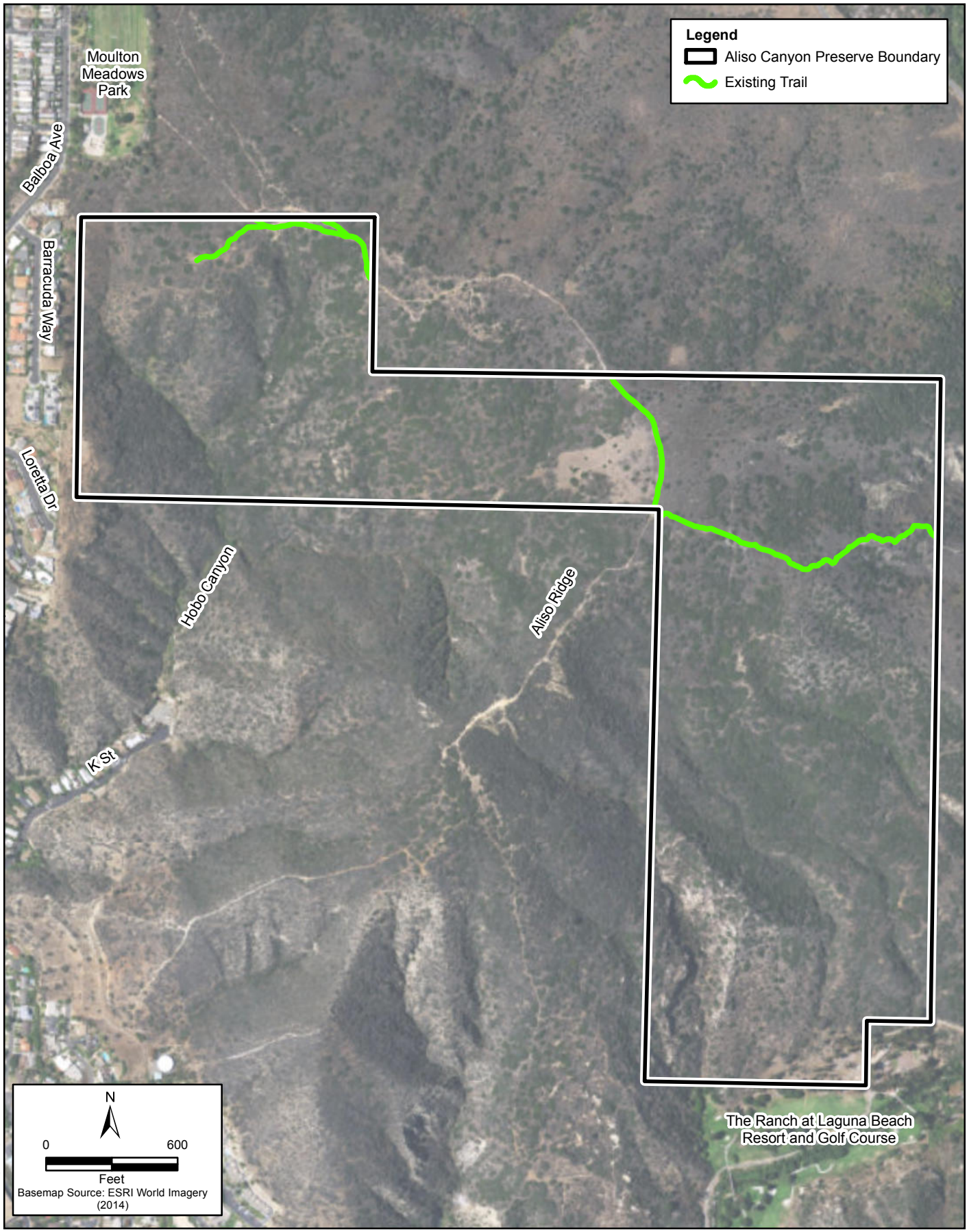
A goal of this RMP is to provide for public access and recreational opportunities within the Preserve that are compatible with the protection of biological resources. The Preserve Manager will be responsible for enforcing access restrictions and biological protection measures as part of ongoing access management.

This section includes a discussion of existing and historic public access on the Preserve, guiding principles for defining a public access plan, elements of the proposed public access and trails system plans, and public education and enforcement guidelines.

3.2.1.1 History of Public Access on the Preserve

Prior to acquisition by OCTA, this Preserve was privately owned and contained existing dirt trails (Figure 12), which have been used by the general public (local hikers and mountain bikers). The Preserve can be accessed via trails from Moulton Meadows Park to the north and from the AWCWP "Moulton Meadows Linkage Trail" to the northeast. A description of the onsite trail segments include:

A. Trails extending from Moulton Meadows and the AWCWP's "Moulton Meadows Linkage Trail" merge together and a portion of this trail traverses across the northern portion of the Preserve before continuing back onto the AWCWP property.



K:\San Diego\projects\OCTA\RMP_00399_15\mapdoc\RMPs\Aliso Canyon\Fig12_AlisoCanyon_Existing Trails.mxd Date: 6/26/2017 34153

Figure 12
ExistingTrails
Aliso Canyon Resource Management Plan

B. The trail from Moulton Meadows continues through the Preserve along the ridge line in the middle of Preserve. This trail segment connects to trails on City-owned lands to the south of the Preserve.

C. An existing trail spur extends from the ridge in the Preserve down very steep terrain towards to the Aliso Creek Trail in the valley east of the Preserve in the AWCWP.

D. An existing trail spur (Segment D) extends from main trail on the Preserve (Segment A) to the western portion of the Preserve and dead ends within the Preserve.

Regional trails have been identified in the Laguna Beach General Plan Open Space/Conservation Element (City of Laguna Beach 2006) and trails within the Preserve as mapped as "trails on private property". In addition, a map of the current approved and accessible trails within the AWCWP is published on the Orange County Parks website (Orange County Parks 2017) and are shown on Figure 13. The existing trail segments A and B are shown in the Laguna Beach General Plan as an approved trail. The Laguna Beach General Plan shows two trail alignments connecting the ridge in the Preserve to the Aliso Creek Trail in the valley east of the Preserve in the AWCWP. However, the existing trail does not align with either of the trail alignments shown in the Laguna Beach General Plan. These two specific trail alignments shown in the Laguna Beach General Plan do not currently exist on the ground. Furthermore, a connection into from the Preserve to the Aliso Creek Trail in the valley east of the Preserve is not shown on the current AWCWP trails map.

3.2.1.2 Guiding Principles for Defining a Public Access Plan

During the OCTA M2 NCCP/HCP Draft Environmental Impact Report/Environmental Impact Statement public comment period between November 2014 and February 2015, OCTA received specific comments relating to public access to the Preserves. In order to develop a public access program that took these public comments into consideration, OCTA convened three stakeholder focus group meetings. These focus group meetings resulted in feedback from regional land managers, Preserve neighbors, user groups, and environmental stakeholders. General principles for public access were drafted that adhered to the M2 EMP objectives and addressed the need to provide complimentary access opportunities. A general framework for public access on the OCTA Preserves was established as part of this outreach effort. These general principles and framework are outlined below.

Adhere to M2 EMP Objectives

a. The M2 freeway projects will potentially impact protected biological resources. State and Federal laws require that impacts on these resources be mitigated. The M2 sales tax includes funding to mitigate for these impacts. In order to provide this mitigation, OCTA is coordinating with the Wildlife Agencies and developing an NCCP/HCP. Undeveloped properties (Preserves) that possess habitat and biological resources that are similar to those potentially affected by the construction of the M2 freeway projects have been purchased and are integrated into the NCCP/HCP[2] as Preserves. These Preserves will remain undeveloped and will be protected in perpetuity.

[2] The M2 EMP has also funded multiple restoration projects. These public access principles and guidelines do not apply to the restoration project areas as they are owned and managed by separate entities.

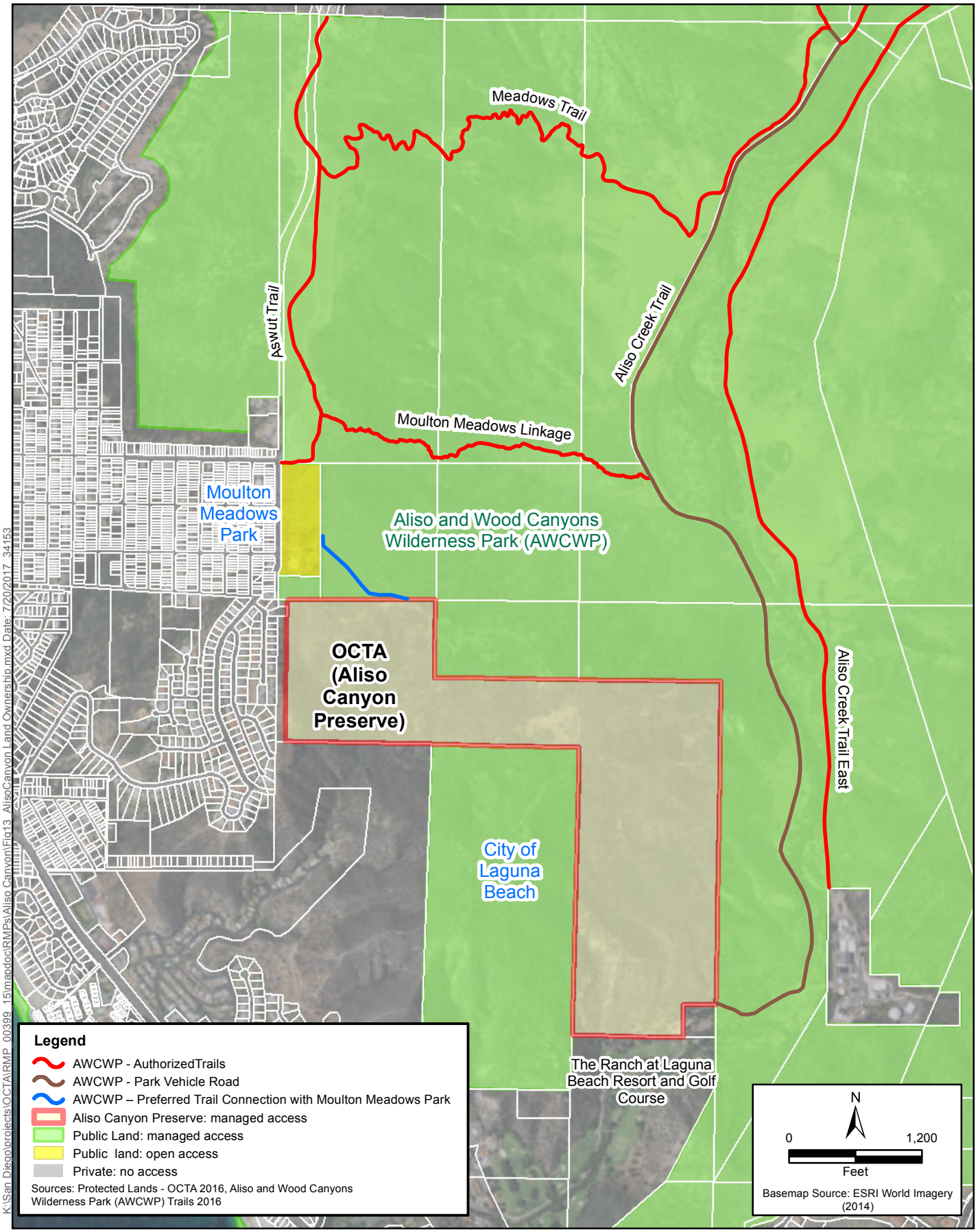


Figure 13
Surrounding Land Ownership and Regional Trails
Aliso Canyon Resource Management Plan

b. OCTA Preserves are conservation properties (required mitigation) that are integrated into the Wildlife Agencies' and regulatory agencies' permitting process to facilitate issuance of permits for the M2 freeway projects.

c. The Preserves will be conserved in perpetuity. The NCCP/HCP and Regulatory Agencies' permits will require that these Preserves have a biologist review the condition of the biological resources (including wildlife movement) on a regular basis to ensure that the resources are protected and that threats are adequately addressed. The biologist will make management recommendations and work with the Wildlife Agencies and Preserve Manager to ensure the resources are not degrading. These required conditions will remain in perpetuity.

d. Permits have been issued by the Wildlife Agencies and a comprehensive permitting process has been initiated with the regulatory agencies. These permits will facilitate with the construction of the covered freeway improvement projects.

Provide Complementary Access Opportunities

- Recreational access is an important co-benefit but not the principle public purpose for which properties are acquired by OCTA under the EMP. Access must be established and managed so as to ensure the permit conditions of the NCCP/HCP and Implementing Agreement, as well as the regulatory permits, are adhered to in perpetuity. The NCCP/HCP stipulates that recreational access be limited to passive activities such as walking, jogging, hiking, bird watching, non-competitive mountain biking, equestrian use, and limited picnicking. Certain inherent dangers exist on the Preserves and include; mountain lions, rattlesnakes, poisonous insects, poison oak, extremes in weather, loose rocks, and steep/rugged terrain.

- Access (including public access programs) should be provided consistent with the constraints of protecting habitat and species resources, historical resources, terrain, surrounding land uses, limits of allowable impacts within Preserves, parking and/or staging area opportunities, suitable trails, access points, management costs, and community support.

- Where public access can be provided while adhering to the goals of the NCCP/HCP, existing fire and utility roads should initially form the core trail system within Preserves while making best efforts to maintain consistency and compatibility with regional trail systems. Trails should be minimized where possible to preserve intact and naturally functioning habitat. Minimizing the amount of trails on the Preserves is important as this will limit the edge effects and the proportion of the property that is exposed to potential disturbance. Single track trails may be utilized if the trail helps to form a core system and/or complete a loop within the Preserve and the use of the trail does not negatively affect sensitive resources. OCTA will be required to ensure that the number, size, and location of the trail system does not increase to more than what is approved by the Wildlife Agencies. Installation of fencing or other barriers may also be necessary along certain trails to discourage off-trail activities. All trails will require maintenance to keep them safe. These tasks will be more realistic to manage if the trail system is smaller and well-defined.

- Partnerships with community and user groups should be developed to help manage and staff access as well as docent activities and responsibilities.

- A robust and sustained public education program should be established to communicate and regularly reinforce the history, purpose and value of the Preserve system. The message should include that preserving these lands in perpetuity not only benefits biological resources, but also provides protection of historical vacant lands and view sheds which add value to the community.

The following is a **Draft Model Public Access Framework** for OCTA Preserves.

1. The default form of public access is managed or structured access by the Preserve Manager, which may include limits on the dates, times, purpose, and amount of access, including some degree of supervision, potentially augmented, as conditions warrant, by:
    a. Docent-led managed access through partnerships with community and user groups;
    b. Self-managed access through partnerships with community and user groups;
    c. A permit system; and/or
    d. Open access days and locations.
2. Public access is scalable and can be actively and adaptively managed by changing the form, frequency, numbers, times of day, days of week and month, and season that activities are conducted depending upon circumstances and status of resource protection, observed impacts, and compatibility of different user groups
3. Some Preserves may have extremely limited public access opportunities because of significant habitat value[3], safety concerns, relative isolation, lack of trails or trail connections, and/or conflicts with surrounding land uses.
4. Enforcement of public access limitations and violations of access rules and policies is progressive and aimed at education and diversion of the activity to other more suitable locations rather than punishment.
5. Repeated violation of access rules and policies and/or evidence of damage or harm to the Preserves may result in fines significant enough to force change in behavior and restricted public access or closures until resource protection can be assured. Fines may vary and, depending on the type and severity of the impact, could result in a per acre cost to restore and offset damage to a Preserve. The Preserve Manager should have the capacity to actively cite repeat violators and pursue damage reimbursements.

3.2.1.3 Aliso Canyon Public Access Plan

In order to properly assess if access is appropriate, each Preserve needs to be individually analyzed to determine what type(s) of access would be compatible. The intention is that each of the OCTA M2 Preserves would result in a specific access program based on the Draft Model Public Access Framework developed as a result of public input and the public outreach focus groups. The framework needs to be applied to each individual Preserve as each Preserve has its own set of limitations and resources. These considerations were factored into the development of the public access plan as described in this section.

Approved Trails

The final design of the Aliso Canyon Preserve approved trails network was determined based on avoidance and minimization of impacts to sensitive biological resources, consideration of trail safety and design, and coordination with OC Parks and the Wildlife Agencies. Currently there are three separate access points into the Preserve from the north. OCTA has coordinated with OC Parks and

[3] Significant habitat value can be defined as habitat that imperiled species are reliant upon in order to help prevent their extinction, fragmentation or reduction in range.

has identified one preferred point of access into the Aliso Canyon Preserve (Figure 14). The other two access points to the west will be decommissioned and actively restored in the future through collaboration with OC Parks and potentially other non-project entities (i.e. Laguna Canyon Foundation). The other two access points and subsequent trails are duplicative and traverse sensitive habitat and will be actively decommissioned in order to restore and protect multiple Covered Species. In addition, the trail spur on the west side of the Preserve (Segment D) includes sensitive plant species and will also be closed and allowed to passively revegetate.

The trails depicted on Figure 14 maintains the existing level of public access on trail segments A and B, the main trail that bisects the Preserve north to south and connects with other regional trails. The existing trail (Segment C) that traverses very steep terrain from the ridge in the middle of the Preserve down to the Aliso Creek Trail in the valley (to the east of the Preserve) will be closed primarily for safety and liability reasons, as well as concerns with sensitive species impacts, ongoing erosion, and habitat destruction. This trail segment crosses into AWCWP and is also an unauthorized point of access pursuant to OC Parks.

A long-term Preserve Manager is anticipated to be in place within the next five years. Once the long-term Preserve Manager is established, the public access program will continue to be refined and adaptively managed based on monitoring of trail use and coordination with AWCWP staff. The level of public access may increase or decrease, depending on whether trail conditions (i.e. trail width, depth and tread) remaining consistent and how biological resources respond to the type, amount, and frequency of access. The public access program will adhere to the Guiding Principles and Framework established in section 3.2.1.2 and will depend on a variety of factors including the management capabilities of the selected Preserve Manager, as well as community partnerships.

The Preserve Manager will monitor the Preserve related to public access. The intensity (e.g. number of days accessible) of the recreational use at the Preserve will be determined based on the demonstrated ability to implement recreational activities in a manner that does not negatively impact the conserved resources and on the availability of funding and volunteer resources to oversee and monitor the recreational use. The Preserve Manager and OCTA, in coordination with the Wildlife Agencies, will revise the Public Access Plan to ensure compatibility with biological resource goals and objectives, as warranted.

Staging and Parking Areas

The Aliso Canyon Preserve is accessible via trails from Moulton Meadows Park. Parking at the park and adjacent streets has been adequate for the existing trail activity on the Preserve. No new staging areas or parking areas are proposed.

3.2.1.4 Public Education and Enforcement of Public Access

Public education and involvement are critical components for ensuring successful management and public support of the Preserve System. If the public is properly informed of the biological values, goals, and activity restrictions within the Preserve, it is more likely that management goals and guidelines will be respected and followed. The OCTA NCCP/HCP Administrator and Preserve Managers will coordinate to determine the most effective methods and materials for educating the public. They may include the following:

- Provide signs, displays, and pamphlets that explain Preserve rules and management goals.

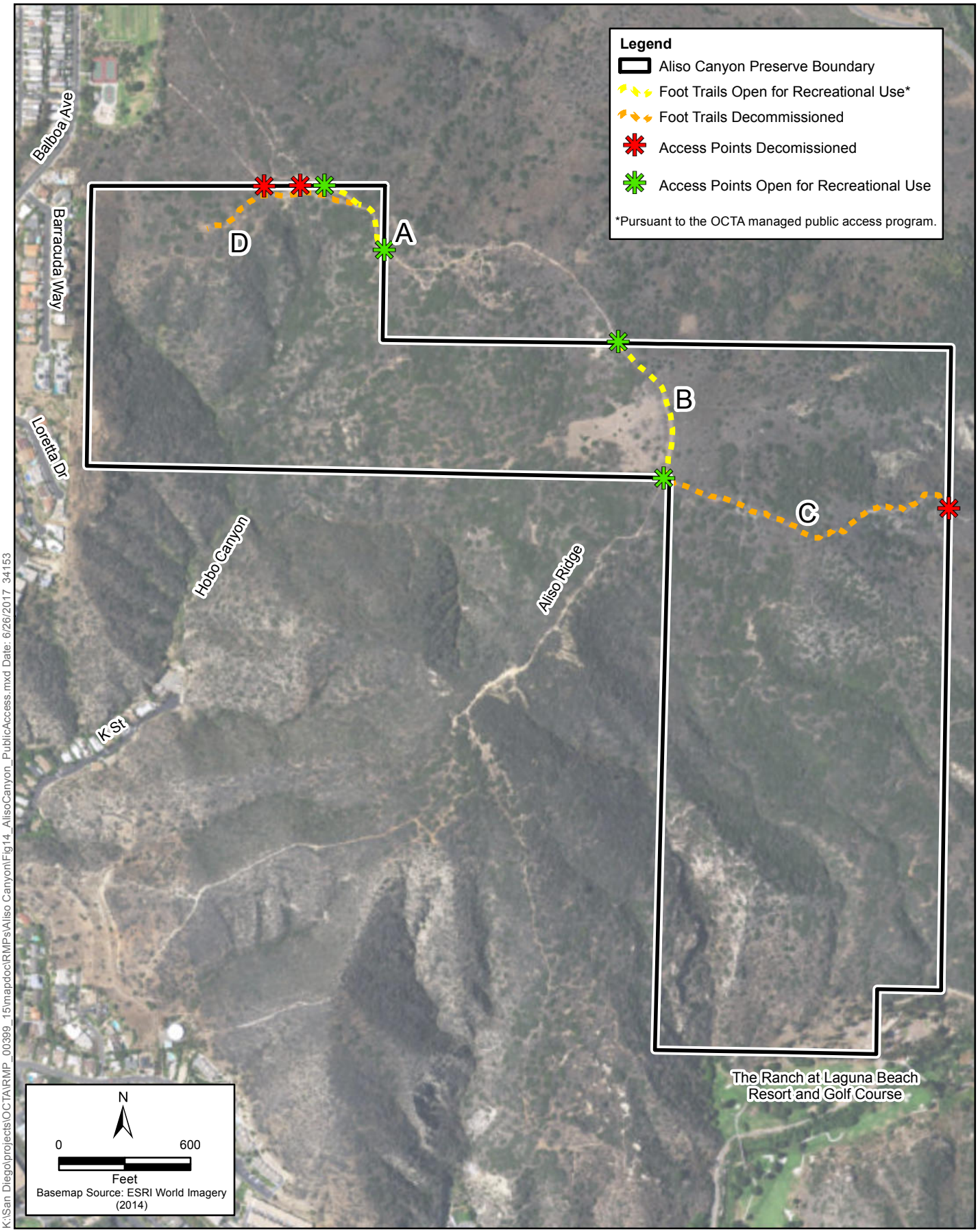


Figure 14
Public Access
Aliso Canyon Resource Management Plan

- Hold annual public meetings to present information regarding Preserve goals, guidelines, restrictions, and compatible uses. These meetings may be held concurrently with the annual NCCP/HCP reporting meeting and a regularly scheduled Environmental Oversight Committee meeting and will be announced with the property public notice.
- Establish information on OCTA's website that provides information on the Preserve, Preserve Manager contact information, and links to additional information on Preserve goals and guidelines.
- Develop or partner with a volunteer program that addresses a variety of education and management issues, including, but not limited to, preparation of educational materials, trail repair, erosion control, invasive species removal, native habitat and plant restoration, trash removal, biological monitoring, and management patrols.
- Prevent and remove illegal trails, trail modifications (e.g., bike jumps), and other intrusions into the Preserve, and enforce land use and recreational activity restrictions.
- Encourage two-way communication with adjacent residents to collect and disseminate Preserve information.

Ongoing management of the Preserve must monitor and control permitted activities and unauthorized activities (e.g., use of closed trails, illegal dumping of waste materials and debris, and encroachment) in sensitive areas to protect biological resources on the Preserve. Damage caused by unauthorized public access is potentially one of the greatest threats to Preserves near urban population centers. Without enforcement, it is often difficult to change human behavior, especially in areas that have been used historically for activities that are not compatible with biological resource protection (e.g., off-road vehicle use).

Preserve monitoring and enforcement will consist of patrols of the Preserve by the Preserve Manager and staff to communicate safety measures, resource protection measures, and recreational use and access guidelines to public users. Enforcement will be challenging until the long term land manager is determined. Public outreach and education, including educational materials, docents, and volunteers will supplement Preserve patrol efforts.

All persons using the Preserve for general access or recreational purposes, as well as persons responsible for authorized management and maintenance activities, will be encouraged to participate in "self-monitoring and policing" programs to minimize impacts on protected biological resources. For example, trail user groups will be encouraged to self-monitor and police their community to minimize off-trail activities and other abuses to habitat resources within the Preserve.

The Preserve Manager will be responsible for enforcing public access guidelines and ensuring that only permitted recreational and general access activities occur within the Preserve. Enforcement of Preserve guidelines falls into two categories of offenses: minor and major infractions.

- **Minor infractions** (e.g., hiking on a closed trail, bringing a dog into the Preserve, unauthorized equestrian use, excess irrigation running onto the Preserve from an adjacent property) shall be handled by the Preserve Manager through discussion and education of the offending party and a warning process. The Preserve Manager can work with other Preserve Managers and local community groups on a public education program to explain goals and regulations as well as educate the public on the area's resources (see Section 3.2.11, "Public Outreach and Education").
- **Major infractions** (e.g., illegal off-road vehicle use, cutting new trails, illegal dumping, vandalism, illegal encampments [itinerant workers and transients], illegal hunting, and

excessive repeat offenders of minor infractions) may require coordination between the Preserve Manager and law enforcement officials. Perpetrators of major infractions are often not caught due to the delay in response time.

If allowed by State and local regulations, the Preserve Manager and staff should be given the authority to issue citations and impose fines for misuse of trails and other Preserve facilities, trespassing, and other unauthorized or illegal activities. Alternatively, the Preserve Manager may involve local law enforcement agencies to enforce biological protection measures and to restrict prohibited activities, including issuing citations and fines. Fines levied for abuse of Preserve facilities resulting in harm to species or sensitive habitat will be sufficient to discourage repeat occurrences (subject to existing laws and regulations).

The Preserve Manager will make adjustments, as needed, to install fencing, barriers, or signage at key access points, as necessary, to restrict public access and limit unauthorized activities thereby protecting resources and facilitating public safety. Repeated offenses (minor and/or major) by the same user or users will provide grounds for permanent loss of access to the entire Preserve as a means of avoiding unacceptable adverse impacts on habitats/species within the Preserve. This will be enforced with the use of local law enforcement as well as public education regarding the reasons for closure and the corrective actions needed to reopen it.

Repeated offenses by multiple users will provide grounds for the temporary closure of trail segments and, when necessary, the entire Preserve as a means of avoiding unacceptable adverse impacts to habitats/species within the Preserve. Such temporary closures, again paired with public education efforts, will also serve to inform users regarding the need and reasons to obey Preserve rules and regulations, thereby reducing future recreational impacts on biological resources of the Preserve.

3.2.2 Invasive Plant Species Control

The Aliso Canyon Preserve has a relatively low percentage of invasive plant species and is generally undisturbed from surrounding development or historical agricultural activities. Even so, there are pockets of invasive species identified during baseline surveys and the potential for invasive plants have been identified as a threat to natural communities and species on the Preserve. Invasive plant control is expected to be a long-term, ongoing management issue.

OCTA has contracted with a Restoration Ecologist to prepare an invasive species management plan (ISMP) for this Preserve. This ISMP is currently under development. Mapping of the invasive species has been conducted (Figure 15). The management plan will be prepared using the Five-Year Invasive Plan Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP (Cal-IPC 2016) as a reference document (attached as Appendix D). The ISMP will prioritize invasive species for control; specify goals (eradication versus control); identify treatment locations, timelines (including potential re-treatments), and removal methods; provide realistic, measurable success criteria and monitoring methodology; and identify areas that may need post-treatment restoration. The ISMP will set forth target-specific control strategies for invasive species control, using an integrated pest management (IPM) approach. The IPM approach uses the least biologically intrusive control methods and is applied at the most appropriate period in the growth cycle to achieve desired control goals. Invasive control strategies may include mechanical and chemical methods.

The ISMP will be reviewed and approved by the Wildlife Agencies and include the following measures.

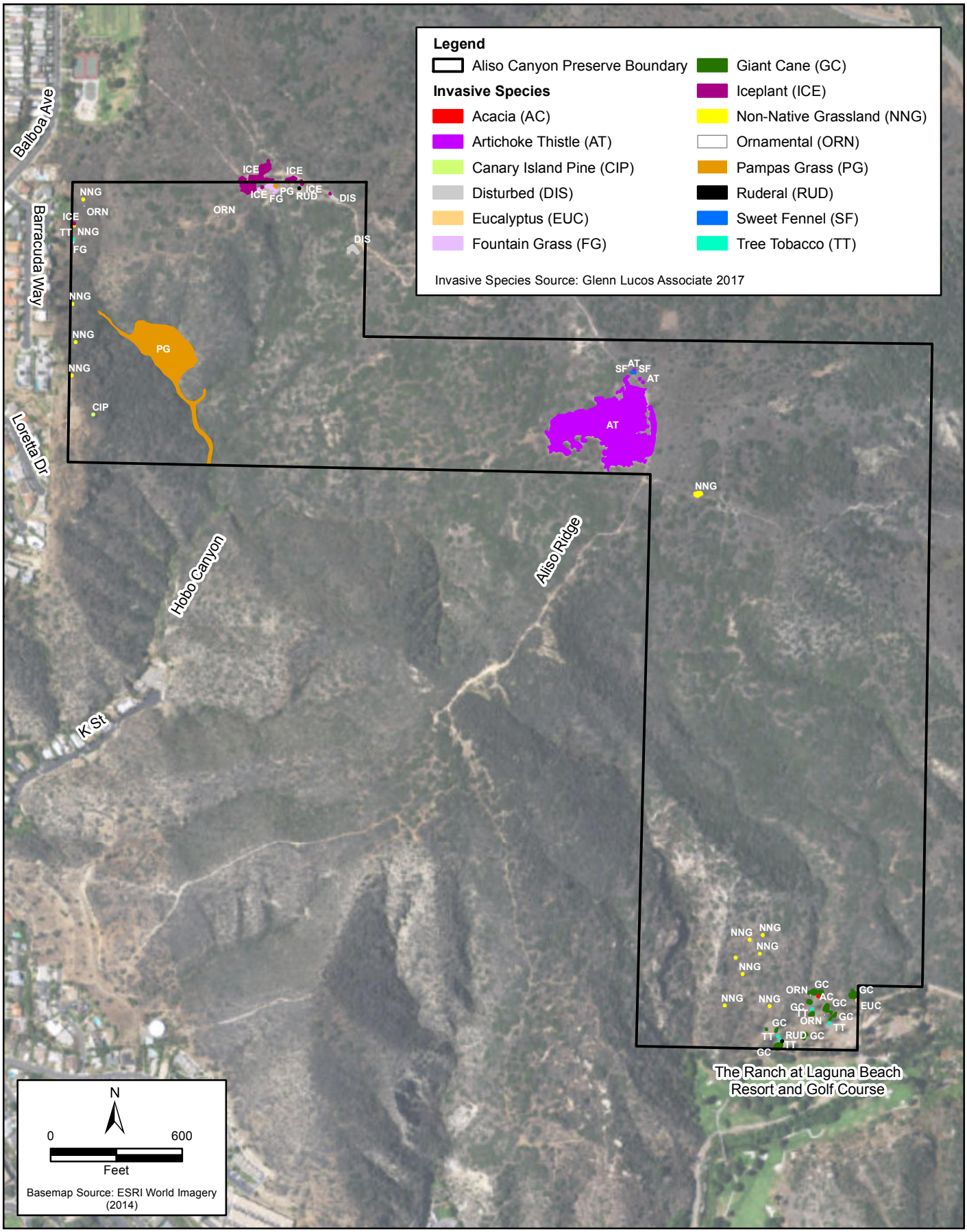


Figure 15
Invasive Species
Aliso Canyon Resource Management Plan

- Development of an accurate mapping of invasive plant species. The Preserve Manager in coordination with the Monitoring Biologist and Restoration Ecologist will map priority invasive species and create a spatial dataset of invasive species locations. The mapping of invasive plant species will be maintained over time through surveys completed by the Preserve Manager, Monitoring Biologist, or volunteers, focusing on areas that function as natural conduits for dispersal (trails, streams, disturbed areas). Surveys will be conducted during general stewardship monitoring, biological monitoring, or volunteer patrols. The invasive species map will be updated yearly based on mapping results.
- Chemical control will be conducted using herbicides compatible with biological goals and objectives. Pest control applicators qualified and licensed under the California Department of Pesticide Regulations will provide recommendations for chemical control.
- Best Management Practices (BMPs) will be identified for the disposal of invasive plant materials removed from the Preserve at a landfill or secure, onsite location to avoid spreading invasive seeds or propagules. Onsite storage may include chipping, mulching, and periodic spot-treatment of compost piles with herbicide to kill any germinating or re-sprouting invasive plants.
- A monitoring schedule will be established to evaluate the success of invasive plant control efforts for five years following implementation or until eradication is maintained for one year without follow-up control activities. Monitoring will be conducted by the Preserve Manager during stewardship monitoring and by the Restoration Ecologist during initial removal activities and then annually for up to five years following initial activities. Regular monitoring and annual assessments will evaluate re-growth of target species (giant reed, salt cedar, pampas grass, and cardoon), unauthorized encroachment, and related vandalism and damage.
- Situations where the implementation of habitat restoration should be implemented in conjunction with invasive plant removal to improve native habitat cover and quality will be identified.
- If weed treatment is proposed within or near habitat for sensitive resources, careful planning and training will be completed in order to avoid take of these sensitive resources.

The Preserve Manager will implement remedial actions where necessary, based on monitoring results. These may include re-treatments, adjustments to invasive plant control methods or timing, and modifications to site protection measures. The Preserve Manager will continue to collaborate with the Restoration Ecologist to receive input regarding site conditions, changes in control methods or timing of actions, and adjustments to monitoring frequencies. Results of the implementation and monitoring of the invasive plant species control plan will be included in the Annual Reports.

3.2.3 Habitat Restoration

Habitat restoration activities may be required and/or desirable in response to different threats, stressors, and habitat conditions. This RMP identifies habitat restoration as a potential activity within the Aliso Canyon Preserve associated with trail closures (Section 3.2.1), invasive plant species control (Section 3.2.2), response to fire events (Section 3.2.5), and biological monitoring and management (Section 3.3). At this point in time, specific habitat restoration activities have been identified for trail closures and enhancement of known occurrences of many-stemmed dudleya. Additional restoration activities associated with other priorities may be warranted in the future based on monitoring and future conditions.

3.2.3.1 Habitat Restoration of Closed Trails

Existing trail segments C and D on the eastern and western portions the Preserve will be closed for public access (see Section 3.2.1 and Figure 14) and initially allowed to passively restore back to natural habitat. During the first five years after adoption of the RMP, the Preserve Manager will monitor conditions at these locations using photo monitoring methods to track progress of passive restoration. After five years the goal will be to have native plant cover of at least 70 percent of the closed trails. Results of the effectiveness of passive restoration of closed trails will be reported in the Annual Report. After five years, the Preserve Manager, in consultation with the Restoration Ecologist, may determine the need for active (versus passive) restoration, including invasive plant control and supplemental seeding, to improve the cover and quality of native habitat on closed trails.

Active restoration is anticipated for the two western entry points on the northern boundary of the Preserve. These areas as well as other potential degraded areas may require active restoration. If determined necessary, the Preserve Manager will have the Restoration Ecologist develop a Trail Restoration Plan. This plan will include a fine-scale map of treatment area(s), along with guidelines for (1) site preparation, including any needed soils treatments, grading, supplemental water, and weed control; (2) plant establishment, including planting and seeding palettes and methods; and/or (3) follow-up maintenance, including weed control, supplemental water, pest control, and re-planting/re-seeding. The Trail Restoration Plan should consider current site conditions, including soils, hydrological conditions, accessibility, proximity to municipal water sources, existing invasive plant species, and existing onsite and adjacent biological resources. The Restoration Ecologist will monitor active trail restoration on a quarterly basis for a minimum of one year following implementation. Monitoring will include a qualitative assessment of native plant cover, including progress towards meeting the 70-percent coverage goal; identification of invasive plant species establishment; documentation of unauthorized encroachment and related vandalism and damage; and identification of necessary remedial actions, including additional native seeding, adjustments to invasive plant control methods and timing, and modifications to site protection measures.

3.2.3.2 Habitat Enhancement of Many-Stemmed Dudleya Population

The M2 NCCP/HCP includes the goal to conserve and manage many-stemmed dudleya and an objective to, at a minimum, protect, enhance, and/or establish a major population (i.e., 500 individuals) of many-stemmed dudleya. This threshold can be accomplished through the protection, enhancement, and/or establishment of many-stemmed dudleya populations at multiple locations or at a single location.

Baseline biological surveys of the Aliso Canyon Preserve, documented 4 occurrences and 60 individuals (Bonterra Psomas 2015; see Appendix B). In 2017, biological monitors documented approximately 240 individuals at the same 4 locations (Figure 10). The increase in individuals was most likely due to the increased rainfall in the winter of 2017. All of these occurrences are located in disturbed mixed sage scrub immediately adjacent to an existing unauthorized trail (see photo) and just south of the two access points that have been identified for closure (Segment D). Past and present unauthorized trail modifications and uses are likely impacting this population of many-stemmed dudleya. These negative impacts include trampling, erosion, and being covered in soil. In addition, invasive species mapping conducted in 2017 (Figure 15) documented that this area

contains nonnative invasive species (iceplant, fountain grass, pampas grass, and Russian thistle) that further threaten and jeopardize this many-stemmed dudleya population. If left unmanaged, it is expected that the anthropogenic impacts and invasive species will continue to overtake this portion of the Preserve, outcompeting the native vegetation (including many-stemmed dudleya).

Many-stemmed dudleya in bloom (2017) (adjacent to the blue pen) located along an unauthorized trail.

OCTA will implement appropriate management actions to protect and enhance these occupied areas of the Preserve and for any future locations found on the Preserve. Management activities, described in Section 3.2.3.1, will occur along the unauthorized trail (Segment D) to protect and enhance the many-stemmed population on the Aliso Canyon Preserve. To facilitate further establishment of this species, the potential translocation of many-stemmed dudelya, as appropriate, will be evaluated as well. The Aliso Canyon Preserve supports suitable habitat (e.g., heavy clay soils) in areas without authorized public access; however, these areas are currently degraded and would require active restoration. This RMP currently proposes to decommission access to this section of trail (while still accommodating through access on the Preserve). Decommissioning this trail along with active restoration implementation is expected to benefit many-stemmed dudleya.

Ongoing Preserve management may improve habitat suitability (e.g., reduction of invasive species) that results in the expansion of the existing population on Aliso Canyon Preserve and/or establishment/detection of new populations on the other OCTA Preserves. The Preserve Manager will closely monitor the health, vitality, threats, and stressors to the existing many-stemmed dudleya population and track how the population changes over time. If there is documented enhancement and expansion of the many-stemmed population on the Preserve, this will help OCTA meet the Plan objective for establishing a major population (i.e. 500 individuals) of this species. If the objective is not met within 10 years, OCTA will fund a restoration project focused on expanding or creating a new population of many-stemmed dudleya. The Aliso Canyon Preserve will be a candidate location for these efforts.

3.2.4 Vegetation Management

Pruning, cutting, or clearing of native vegetation will generally be avoided except for maintenance along access approved recreation trails and installation of erosion control measures, if necessary. The clearing of natural vegetation on the Preserve will be required to comply with the Nesting Bird Policy included in the NCCP/HCP (a version of the policy has been slightly edited to be applicable for preserve management and is included as Appendix C). The Preserve Manager will be responsible for ensuring all staff working within the Preserve understands and follow procedures set forth for vegetation management.

The Preserve Manager will have General Maintenance staff to perform vegetation management along the designated access roads within the Preserve to allow for vehicle access for preserve

management and fire protection activities. Vegetation management will be a combination of physical trimming of vegetation and application of herbicide treatment along the edges of access roads. Impacts on narrow endemic plant populations, including many-stemmed dudleya and intermediate mariposa lily, will be avoided by flagging known occurrences and avoiding herbicide treatments 10 feet from known occurrences.

3.2.5 Fire Management

The LBFD is responsible for fire control within the Preserve, and their first priority will be to protect life and property. It should be noted that based on CalFire data, this Preserve has not burned in over 100 years (CalFire data goes back to the 20th century). OCTA will work closely with the LBFD to identify fire management guidelines, including specific fire and brush maintenance zone specifications and access route locations that minimize impacts on sensitive biological resources, and will identify areas that should be avoided to preserve sensitive biological resources.

3.2.5.1 Fire Management Plan

Within two years from adoption of the RMP, the Preserve Manager, in coordination with OCTA and the LBFD, will develop a Fire Management Plan (FMP) that establishes policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. The FMP will identify environmentally sensitive lands (ESLs) that should be avoided to minimize irreparable impacts on biological and cultural resources during fire suppression activities. The ESLs will include Covered Species locations and sensitive natural communities. A map will be prepared that shows fire management and ESLs consistent with the LBFD regional fire management program and will include the following.

- Preferred access points and access routes on the Preserve and potential staging areas for fire suppression activities.
- Covered Species, sensitive species, and sensitive natural communities that are highly susceptible to fire or fire suppression activities (e.g., coast prickly pear scrub, and locations of previously recorded rare plant observations). The ESL map should distinguish between areas that should be protected from fire versus areas that should be protected from surface disturbance (e.g., grading) based on the ability of target resources to recover from these impacts.
- Location of bulldozer lines, if these are a potential component of the fire suppression strategy for the Preserve.

3.2.5.2 Strategy and Approach

The FMP will emphasize a fire suppression strategy of controlling any smaller fires on site, where feasible. Larger fires that originate outside the Preserve and move across the Preserve may require suppression tactics within the Preserve. In these cases, LBFD will establish defenses within and nearby any adjacent homes to protect life and property. The final suppression tactics are anticipated to be derived from current or predicted fire weather, topography, fuels (fire behavior), and the surrounding resources (lives and property) that are at risk. Once these have been identified LBFD will develop a strategy for suppressing the fire and should coordinate with OCTA and keep OCTA informed as to the course of action necessary. It is anticipated that LBFD will engage OCTA to gain concurrence or an understanding of what actions are necessary. The Preserve Manger, OCTA, and LBFD will collaborate to define the least damaging suppression strategies within the FMP and

delineate this preferred area(s) graphically. Strategies should avoid ESLs during fire suppression activities, to the degree feasible.

Public and firefighter safety will be the primary consideration before and during a wildfire. Accordingly, the following measures will be implemented at the Preserve.

- Close trails during a red flag warning or when an active fire threatens the Preserve[4].
- Post fire danger signs at trail heads.
- Post signs with phone numbers for Preserve users to call and report suspicious activity or fires to the 911 dispatch center.
- Post signs instructing Preserve users to immediately report fire activity to the 911 dispatch center or fire agency. The contact information for LBFD headquarters is (949) 497-0700.
- In the event of a fire on the Preserve or a fire approaching the Preserve, the Preserve Manager will provide assistance to LBFD, as necessary.

3.2.5.3 Post-Fire Response

The Preserve Manager will inventory the condition of natural communities following a fire on the Preserve, and will coordinate with the Monitoring Biologist, and Wildlife Agencies as necessary, to determine if habitat restoration is warranted. The NCCP/HCP Administrator and Preserve Manager will work with the Wildlife Agencies and LBFD, as necessary, to determine if fire severity and frequency meet the requirements of a Changed Circumstance as defined in the NCCP/HCP and utilize funding as appropriate to implement post-fire restoration. Options for funding this restoration include (1) using funds allocated for adaptive management, (2) reallocating funds from existing management priorities, as appropriate, (3) pursuing outside funding sources, or (4) seeking authorization to use Changed Circumstance funding.

Post-fire management activities may include, but are not limited to the following.

- Conduct emergency post-fire erosion control, where necessary.
- Repair/restore damaged fences, roads, or other official Preserve structures to pre-fire conditions.
- Monitor post-fire recovery closely. Implement control measures to remediate any resulting erosion, sedimentation, and invasion by nonnative plant species.
- Coordinate with LBFD to recontour any dozer lines created within the Preserve. Restoration or dozer lines by LBFD will include, but not be limited to, recontouring lines, removing berms, scattering previously cut brush over lines, and potentially replanting available cactus pads. These activities will be agreed upon and coordinated between LBFD and the Preserve Manager.
- Plan all post-fire actions (e.g., habitat restoration, invasive species removal, erosion control, or trail stabilization) in consultation with the Wildlife Agencies prior to project initiation and permitted if necessary by State and Federal regulation programs. The Preserve Manager will use

[4] The Preserve Manager is not anticipated to physically close trails during a red flag warning or when an active fire threatens the Preserve. Signage will be posted to communicate that the Aliso Canyon Preserve will be closed during the same times as the AWCWP (including during and after inclement weather).

current information on best approaches and strategies for post-fire restoration, including erosion control, seeding, and success criteria.

3.2.6 Nonnative Animal Species Management

Nonnative animal species are potential threats and stressors to wildlife protection and productivity on the Preserve. The Preserve Manager will be responsible for the following measures specific to nonnative animal species management, including nonnative species control and feral and domestic animal restrictions and control.

3.2.6.1 Invasive Nonnative Species Control

The Preserve Manager will work towards controlling the spread of invasive ant species as follows.

- Inspect irrigation/supplemental water runoff from adjacent landowners onto the Preserve and taking steps to educate landowners or rectify the problems by other means such as coordination with local governments regarding irrigation or other urban runoff ordinances or capturing runoff in a vegetated swale on site to contain and limit adverse effects on the Preserve.
- Control irrigation/supplemental water application used for onsite restoration activities to avoid any overflow, which may attract and sustain nonnative ants by increasing soil moisture.
- Ensure that native plant materials used for habitat restoration do not contain invasive ant or other species by inspecting all container stock before it enters the Preserve.

The Preserve Manager will also need to monitor and address other potential infestations of invasive insects and other pathogens that can threaten native habitat. The Preserve Manager will stay current on the latest information and science of invasive insects or other pathogens (e.g. goldspotted oak borer) and monitor for signs of infestations as part of general stewardship monitoring. If an infestation is identified, the Preserve Manager will coordinate with the NCCP/HCP Administrator and the Wildlife Agencies on any appropriate control actions.

3.2.6.2 Feral and Domestic Animal Restrictions and Control

Although dogs are permitted in Moulton Meadows Park, dogs are not permitted within the Preserve. In order to protect biological resources and be consistent with other local jurisdictions, dog walking will not be allowed, even when leashed within the Preserve. This is due to the negative impacts that dogs cause to the Covered Species and other sensitive biological resources. In general, control of feral and domestic animals will be gradual and consist of the following:

- Conduct public outreach to the community (this could entail signage and/or the distribution of flyers) to help communicate why allowing dogs on the Preserve is detrimental to the habitat and species.
- Documentation of feral or domestic animal activity. Establishment of a removal program or refer the infraction to the local animal control agency if a problem with feral animals or animal control is identified.
- Prohibit Preserve Management personnel from housing or allowing domestic pets on the Preserve.

3.2.7 Property Management

Property management includes routine and ongoing property management activities conducted by the Preserve Manager and staff or contractors to ensure that the Preserve is maintained in good condition.

3.2.7.1 Lighting and Noise

The Preserve Manager will be responsible for implementation of the public access plan and ensuring operational activities within the Preserve avoid or minimize impacts on Covered Species and natural communities from lighting or noise. To the degree feasible, lighting in or adjacent to the Preserve will be eliminated except where essential for roadway use, facility use, safety, or security purposes. The Preserve Manager will work with adjacent land owners and the City of Laguna Beach to shield light sources adjacent to conserved habitat so that lighting is focused downward. The Preserve will be closed during nighttime hours, which will reduce the need for additional lighting within the Preserve. As part of the public outreach efforts, the Preserve Manager will prepare and disseminate informational materials to adjacent neighbors and Preserve visitors to educate the public about the importance of minimizing edge effects such as nighttime lighting and noise.

3.2.7.2 Fencing

If necessary for the protection of biological resources, OCTA will install fencing (i.e. three strand smooth wire) around authorized trails and/or the exterior of the property. Fence type and placement will be designed to limit human access but maintain wildlife movement. The Preserve Manager will be responsible for monitoring and maintaining fencing to control public access and trespassing. Fencing should be inspected on a regular basis (a minimum of two times per year). Damaged or missing fencing or locks should be replaced as soon as possible, but not more than one month after detection.

The Preserve Manager will identify situations that warrant the installation of additional fencing or natural barriers within the Preserve around areas that require enhancement control of public access. Natural barriers may include dense plantings of prickly, thorny, or rash-inducing plant species such as California wild rose (*Rosa californica*), cactus (*Opuntia* sp.), or poison oak (*Toxicodendron diversilobum*), as well as large rocks or logs.

The Preserve Manager will identify interior fencing that should be removed and develop a plan for removal methods.

3.2.7.3 Signage

The Preserve Manager will be responsible for installing and maintaining signs at key access points to provide visitors with information on Preserve rules, recreational features (including trails), and biological and cultural resources (as appropriate). The Preserve Manager should install signs at Preserve boundaries, and natural features to indicate permitted and prohibited uses in the Preserve, including appropriate visitor behavior, trail use, safety, and resource protection. Signage may include (but is not limited to) the following:

- Road/trail map signs that indicate trails that are open to the public, as well as trail closures.
- Interpretative signs or kiosks that provide information on protected resources.

- Temporary signage indicating active habitat restoration/enhancement areas.
- Rules and regulations signs that indicate prohibited activities including (but not necessarily limited to) hunting, dumping, and dog walking.

The Preserve Manager should inspect all signage on a regular basis to ensure that signs are still in place and not damaged. Damaged or missing signs should be replaced as soon as possible after detection.

3.2.7.4 Hydrology and Erosion Control

The Preserve Manager will complete all management and operations of the Preserve in a manner designed to maintain natural hydrologic processes to the extent possible. This includes avoiding water contamination or excessive erosion that could affect hydrological systems. Minimizing impacts on hydrological systems will preserve natural ecosystem structure and function.

The Preserve Manager will inspect and identify situations requiring erosion control. Using erosion control BMPs, the Preserve Manager will install appropriate erosion control measures during regular maintenance and operation activities. These may include rice straw wattles, hay bales, silt fencing, sediment traps, and/or sandbags. These devices will be used on slopes below newly graded roads or fuel management/fire control areas to prevent erosion and deposition of materials in sensitive habitat areas, as necessary. These BMPs will also be used as necessary to reduce bank erosion (excess scour and undercutting) or sedimentation in existing streams or aquatic resources caused by changes in hydrology due to upstream/off-Preserve development activities. These activities will utilize stream bioengineering practices utilizing native materials and biodegradable structures with the goal of achieving long-term self-sustainable conditions or dynamic equilibrium.

The Preserve Manager will inspect vulnerable areas (e.g., trails, streams or aquatic resources, and fuel maintenance areas) immediately after a heavy rain storm to identify problems with erosion and sedimentation. Where erosion or sedimentation is identified, the Preserve Manager will follow BMPs (e.g., install control devices) as soon as possible to avoid further damage. In addition, access will be restricted to limit further damage or where required for safety purposes.

3.2.8 Land Uses within the Preserve

Permitted activities include those shown to have a minimal impact on biological resources and ecosystem functions, while prohibited activities are those expected to have a detrimental effect on those resources.

3.2.8.1 Allowed Uses

The following land uses are conditionally allowed if it can be assured that the activity minimizes or avoids impacts on biological resources and ecosystem functions, while allowing certain recreational, operational, and safety uses within the Preserve.

- Allow limited passive recreational activities within the Preserve (e.g., hiking and mountain biking uses) on designated trails during daylight hours; refer to Section 3.2.1, “Public Access”, for additional information on conditionally allowed recreational uses within the Preserve.

- Provide access onto the Preserve for Preserve management, public services (e.g., fire management to prevent the loss of human life or property), or law enforcement in response to violations of Preserve rules and regulations.
- Allow restoration and enhancement of native plant communities, including the removal of nonnative species, planting or seeding native trees, shrubs and herbaceous vegetation.
- Allow for the restoration and stabilization of streambeds and banks using native bio-engineering practices using natural and biodegradable material if necessary following fire, flood, or other natural disaster or unauthorized anthropogenic activities causing unnatural degradation.

3.2.8.2 Prohibited Uses

This Preserve has been accessible to the public for many years. Some recreational activities are not compatible with Preserve management and have a high potential to adversely affect biological resources. In order to balance the recreational uses with the needs of the biological resources, the following conditions shall be prohibited and enforced at the Aliso Canyon Preserve:

- The creation or expansion of new trails or roads for the purposes of off-road vehicle use, mountain biking, or other recreational or other uses without prior authorization by the Wildlife Agencies.
- Residential, commercial, industrial, institutional, or landfill development; agricultural uses such as row crops, orchards, improved pastures, nurseries, greenhouses, and feedlots; livestock grazing (unless part of a habitat management strategy); itinerant worker camps; and mineral extraction.
- Recreational activities within the Preserve such as the following.
    - Active recreation, including ball fields, golf courses, improved park facilities, off-road vehicle use, or any other recreational activity that requires conversion of native habitats (e.g., clearing, grubbing, or planting of nonnative vegetation or turf grasses), facility construction (e.g., buildings or paved pathways), or that otherwise negatively affects natural vegetation or wildlife habitat values.
    - Mountain bike riding in excess of 10 miles per hour (MPH).
    - Minors (under 18 years) unaccompanied by an adult.
    - Use of motorized vehicles and equipment.
    - Shooting, target practice, hunting.
    - Paint-ball.
    - Off-road vehicle use.
    - Dog walking, whether leashed or unleashed.
    - Geocaching.
    - Littering.
    - Smoking.
    - Unmanned aerial vehicle (recreational drones).

3.2.9 Land Uses Adjacent to the Preserve

The Preserve Manager will monitor land uses adjacent to the Preserve to identify situations in which edge effects can negatively affect biological resources within the Preserve. The types of adjacency issues that will be monitored will include, but are not limited to, off trail use, drainage, lighting, noise, invasive planting, pet and livestock control, and fuel modification zones. The Preserve Manager will enforce regulations and prevent and remove illegal intrusions into the Preserve. Barriers (fencing, rocks/boulders, appropriate vegetation) and/or signage will be installed where necessary to protect the Preserve's sensitive biological resources and direct public access to appropriate locations. Additionally, educational information will be disseminated to adjacent residents and landowners to heighten their awareness of the Preserve's role in achieving the M2 NCCP/HCP biological goals, and provide information regarding approved access, fire management, and other adjacency issues.

OCTA will coordinate with adjacent landowners and local jurisdictions to address edge effect issues primarily through public outreach, education, and dialogue. OCTA does not have land use authority, and if legal or enforcement actions are deemed necessary, OCTA and/or the Preserve Manager will coordinate with the local jurisdictions or enforcement entities as appropriate. For new development adjacent to the Preserve, OCTA and/or the Preserve Manager will, to the extent practicable, provide input and direction through the public review process (e.g., the California Environmental Quality Act [CEQA] and permitting process) on appropriate adjacency guidelines.

3.2.9.1 Existing Land Use

The Preserve Manager will develop and implement a public awareness program within two years of the RMP approval to educate existing property owners in the vicinity of the Preserve of the Preserve's goals and objectives and steps they can take to protect the biological resources. In coordination with the NCCP/HCP Administrator, the Preserve Manager will develop flyers and other education materials that describe the types of activities that can occur on an adjacent property that can have negative effects on biological resources. OCTA will provide information on how an adjacent property owner can minimize these impacts. The types of issues that will be addressed will include, but not be limited to the following:

- Drainage – adjacent property owners will be encouraged to monitor drainage and irrigation that flows from their property onto the Preserve. Excessive irrigation can promote invasive plant and animal species (e.g., argentine ants) to expand into the Preserve.
- Lighting – lighting of properties adjacent to the Preserve should be directed away from the Preserve wherever feasible and consistent with public safety. Adjacent property owners will be encouraged to use low-pressure sodium lighting whenever possible.
- Invasive plant species – certain types of landscaping can introduce invasive nonnative plant species into the Preserve. Adjacent property owners will be provided with information on ways that they can landscape with species less likely to negatively impact the Preserve or use native species that reflect the adjacent native habitat.
- Invasive pests – recently native and nonnative trees in Orange County were identified as being affected by the pest invasive shot hole borer (ISHB; *Euwallacea* sp.). In addition, the invasive goldspotted oak borer beetle was also found within the county. These pests and diseases damage trees and shrubs and are a serious threat to the Preserve ecosystem. OCTA will continue to partner with other land managers in the region for the latest survey methodology to help

ensure early detection of these species. OCTA is currently a member of the Orange County Invasive Tree Pests group administered by the University of California system. This multi-agency group shares information and resources related to the ongoing research, education, and outreach activities for the ISHB, goldspotted oak borer beetle and other invasive pest/pathogen tree mortality issues specific to Orange County.

As part of general stewardship monitoring, the Preserve Manager will regularly monitor the interface of the Preserve with urban/residential areas. The Preserve Manager will identify situations in which adjacent land uses create negative effects on biological resources and will identify possible solutions. The Preserve Manager will maintain a dialogue with adjacent landowners to discuss and address edge effect issues. The Preserve Manager may make suggestions on ways to minimize effects, but OCTA does not have land use authority of the adjacent properties and cannot directly enforce actions on the adjacent properties. If circumstances arise where legal or enforcement actions are deemed necessary, OCTA and/or the Preserve Manager will coordinate with the local jurisdictions or enforcement entities as appropriate.

3.2.9.2 Future Land Use

To the extent practicable, the Preserve Manager and OCTA will coordinate with local land use authorities (e.g., for the CEQA public review process) to ensure that new developments adjacent to the Preserve adhere to the following adjacency guidelines.

- Drainage – all developed and paved areas must prevent the release of toxins, chemicals, petroleum products, excess water, exotic plant materials, and other elements that might degrade or harm the natural environment or ecosystem processes within the Preserve. This will be accomplished using a variety of methods, including natural detention basins, grass swales, or mechanical trapping devices.
- Lighting – lighting of all developed areas adjacent to the Preserve should be directed away from the Preserve wherever feasible and consistent with public safety. Low-pressure sodium lighting should be used whenever possible.
- Noise – uses adjacent to the Preserve should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas and any other use that may introduce noises that could affect or interfere with wildlife utilization of the Preserve.
- Invasive species – invasive nonnative plant or animal species should not be introduced into areas immediately adjacent to the Preserve. All open space slopes immediately adjacent to the Preserve should be planted with native species that reflect the adjacent native habitat.
- Fuel modification zones – fuel modification zones should be fully contained on adjacent properties for all new development. Prior to implementing new developments adjacent to the Preserve, the local fire authority should review and approve proposed fuel modification treatments to ensure that no new fuel modification will be required within the Preserve.

3.2.10 Management of Cultural Resources

An ASA was conducted by LSA Associates, Inc. on the Preserve in 2015. No archaeological resources were identified within the boundaries of the Preserve during the study. However, if ground disturbance occurs within certain areas of the Preserve archaeological monitoring may be

necessary. The ASA will be utilized in order to help ensure that activities on the Preserve do not impact any cultural resources.

3.2.11 Public Outreach and Education

Public outreach and education are critical components to ensuring successful management and public support of the Preserve. A public that is informed of the Preserve's biological values, goals, and activity restrictions is more likely to respect and follow Preserve guidelines. The OCTA NCCP/HCP Administrator and Preserve Manager will coordinate the most effective methods and materials for educating the public, which may include management tasks described below.

- Hold Public Meetings – the Preserve Manager will hold annual public meetings to present goals, guidelines, restrictions, and compatible uses. These meetings may be held concurrently with the annual M2 NCCP/HCP reporting meeting and a regularly scheduled Environmental Oversight Committee meeting.
- Develop and Maintain Website – the Preserve Manager, in coordination with OCTA, will post information on the OCTA website regarding Preserve goals and guidelines, public outreach and volunteer activities, contact information, and links to other relevant Preserve information.
- Provide Educational and Interpretive Materials – the Preserve Manager will provide signs, displays, and pamphlets that explain Preserve rules and management goals and provide interpretive information on the natural resources found onsite.
- Develop Outreach and Volunteer Programs – the Preserve Manager will, to the extent feasible, develop a volunteer program that addresses education and management needs including (but not limited to) preparation of educational materials, trail repair, erosion control, invasive species removal, habitat restoration and enhancement, trash removal, biological monitoring, and management patrols.
- Develop an Educational/Outreach Program to Inform the Public and Adjacent Landowners – the Preserve Manager will implement a program that may include distributing brochures in surrounding neighborhoods, working with homeowner's associations in the vicinity, developing an informational website, installing educational kiosks, providing outdoor experiences, etc. The Preserve Manager will coordinate with stakeholders and the Wildlife Agencies to encourage volunteer opportunities, such as trash pick-up and invasive species removal, to support RMP goals and objectives. Other activities to encourage on the Preserve include the Audubon Christmas bird counts that could supplement Preserve monitoring data and inform management strategies.
- Encourage Trail User Groups to participate in "Self-Monitoring and Policing" Programs – the Preserve Manager will collaborate with local and regional trail user groups to minimize instances of off-trail activities and other abuses to habitat resources within the Preserve.

The Preserve Manager will also collaborate with local entities to encourage scientific research on the Preserve and accommodate scientific research within the Preserve by allowing access to researchers, students, and other external conservation entities. Scientific research projects are subject to approval by the Preserve Manager, who will informally discuss the costs and benefits of the proposed work with the Wildlife Agencies as necessary. Potential research includes (but is not limited to) Covered Species biological or ecological studies, wildlife movement studies, climate change studies, habitat restoration, or nonnative species control.

3.3 Biological Monitoring and Management

3.3.1 Introduction

The primary purpose of the Preserve is to meet biological preservation requirements of the M2 NCCP/HCP Plan. However, the Preserve will also provide recreational opportunities and must accommodate site-specific operational and safety activities. This section provides goals, objectives, and management tasks to ensure that biological resources are protected. Biological monitoring and management are critical to protection and long-term viability of biological resources and ecosystem functions on the Preserve, and are guided by all management goals (Table 3-1). Monitoring indicates status, threats, and trends of biological resources, including Covered Species and natural communities, while management provides measures to minimize adverse impacts on these resources.

Types of Monitoring

There are several types of monitoring that may potentially occur on the Preserve. Refer to the M2 NCCP/HCP Plan (Sections 7.1 and 7.2.7.4) for a full discussion of monitoring types. These types are summarized below.

- **Baseline (Inventory) Monitoring.** Identifies and characterizes the status of conserved resources, including threats and stressors, for management planning and future comparisons (e.g., trend analysis). Baseline surveys of the Aliso Canyon Preserve were completed in 2014, and the results are summarized in Appendix B (Psomas 2015).
- **General Stewardship Monitoring.** Identifies general management issues and documents whether management actions are completed. This monitoring is conducted in perpetuity by the Preserve Manager during regular monitoring visits (monthly or as appropriate). The Preserve Manager may be assisted by biologists and other technical experts, as needed; monitoring personnel may record incidental data on observations, status, and threats to biological resources.
- **Effectiveness Monitoring.** Assesses status, trends, and threats to biological resources. This monitoring is conducted by the Monitoring Biologist(s) in perpetuity, according to the frequency and protocols in Table 4-1, and requires expertise in wildlife biology, botany, and, possibly, restoration ecology (Table 4-2).
- **Targeted Monitoring.** Answers specific management questions (hypotheses) and determines the effect of management actions on Covered Species and natural communities. Targeted monitoring is conducted by the Preserve Manager and/or Monitoring Biologist with input from outside sources (e.g., sampling design, data collection, analyses), as needed. Results are used to develop or refine management actions and BMPs. Targeted monitoring needs will be identified and prioritized as a result of baseline, stewardship, or effectiveness monitoring.
- **Regional Monitoring.** Identifies threats and trends to biological resources at the regional or landscape-level. OCTA may contribute Preserve monitoring data to regional assessments, as appropriate/feasible, but will not collect data outside the Preserve. OCTA will coordinate data collection methods with the Wildlife Agencies and other regional land managers to facilitate regional comparisons. OCTA will provide access for other entities to collect biological monitoring data on the Preserve, as appropriate, and will submit Preserve data to an

appropriate data repository, such as the Biogeographic Information and Observation System, CNDDB, or other regional databases. OCTA will encourage scientific studies and surveys on the Preserve by academic institutions and other external conservation entities where these activities contribute to the understanding and management of Covered Species and natural communities.

Monitoring Methods

Monitoring and adaptive management on the Preserve will ensure that OCTA is in compliance with M2 NCCP/HCP Plan requirements. Monitoring establishes baseline conditions, identifies threats and trends, measures the effectiveness of conservation and management actions, and provides information to adaptively manage biological resources and improve the health and stewardship of the Preserve. Refer to the M2 NCCP/HCP Plan (Section 7.2.7.4) for an expanded discussion of monitoring guidelines. Modifications to monitoring methods will require consultation with the Wildlife Agencies as necessary, and will be documented in Annual Reports.

Adaptive management provides a strategy to improve future management actions through monitoring to evaluate management effectiveness. Where success criteria are not met, adaptive management provides a structured approach to improve management outcomes. Monitoring and adaptive management on the Preserve will be a cooperative effort between OCTA, the Preserve Manager, Monitoring Biologist and other supporting biologists, external entities conducting research on the Preserve, and the Wildlife Agencies. Refer to the M2 NCCP/HCP Plan (Sections 7.2.7.2 and 7.2.7.3) for an expanded discussion of the adaptive management approach and guidelines. Adaptive management is built into Preserve management through the use of phased monitoring and evaluation to modify management actions based on monitoring results. Adaptive management measures will be coordinated with the Wildlife Agencies for approval prior to implementation.

Management Goals, Objectives, and Implementation Strategies

Goals and objectives guide decision-making and provide a standard for measuring management effectiveness and, ultimately, the biological success of the M2 NCCP/HCP Plan (Atkinson et al. 2004, Lewison and Deutschman 2014). Goals are "broad, concise visionary statements that set the overall direction for monitoring and management, while objectives are concrete, measurable statements that detail how a specific goal can be attained" (Lewison et al. 2011). A single goal may have multiple objectives. Further, each objective may require one or more implementation strategies (management tasks) (Lewison et al. 2011).

Plan goals and objectives applicable to the Preserve are presented in Section 3.1.1, while Preserve-specific goals, objectives, and management tasks are summarized in Table 3-1 and detailed in Sections 3.2 and 3.3. Preserve-level objectives are based on current information (Chapter 2, "Site Description"). Additional refinement of objectives to ensure they meet SMART criteria (see below) should be included in Annual Work Plans, based on site evaluations and monitoring results. SMART criteria (Adamcik et al. 2004, Lewison et al. 2011, SDMMP 2017, Lewison and Deutschman 2014) are defined as follows.

- **Specific** – objectives will be detailed, clear, concise, and unambiguous.
- **Measurable** – objectives will include criteria for measuring progress.
- **Achievable** – objectives will not be unrealistic to achieve nor below acceptable standards.

- **Results-oriented** – objectives will specify an end result.
- **Time-fixed** – objectives will specify an end-point for being met.

Management Prioritization

All management actions will be identified as either Priority 1 or Priority 2 objectives. Priority designations establish a logical stepwise process and do not necessarily infer differences in importance, as described below. Refer to the M2 NCCP/HCP Plan (Section 7.2.7.3, "Adaptive Management Guidelines") for additional information on prioritization of management actions.

- **Priority 1 Actions.** These actions identify threats and negative trends that may require management and are, thus, a predecessor to Priority 2 (management) actions. Priority 1 objectives are ongoing and generally accomplished through stewardship monitoring, effectiveness monitoring, and general Preserve management. These actions are funded through the established Preserve management budget.
- **Priority 2 Actions.** These actions identify specific management actions recognized through Priority 1 actions. Priority 2 actions will be implemented in consultation with the Wildlife Agencies as necessary, and will be further prioritized based on (1) alignment with Plan goals and objectives, (2) regional context (e.g., value or importance of a Preserve for a given resource), (3) level of threat, (4) expected effectiveness of proposed action (e.g., availability of proven methods to effect change), (5) logical sequencing (e.g., invasive species control may precede restoration), (6) catastrophic events (e.g., wildfire may necessitate a shift in priorities), (7) funding and staffing, and (8) SMARTness of objectives (i.e., well-defined objectives are easier to achieve than poorly defined objectives). In general, Priority 2 actions will be funded by using adaptive management funds, reallocating stewardship monitoring and Preserve management funds, or obtaining outside funding (e.g., grants).

Biological Monitoring Protocols

Monitoring and management objectives and management tasks for Covered Species and natural communities are described below. Table 3-2 indicates frequency and methods for monitoring Covered Species on the Preserve, while Table 3-3 indicates required qualifications for monitoring personnel. Monitoring and management objectives and tasks that influence biological resources occur under other Preserve management elements, as well. These elements are referenced in the following sections, as appropriate.

Pursuant to Chapter 7 of the NCCP/HCP, OCTA will not be responsible for collecting additional biological monitoring data (outside of their Preserves) for regional assessments but may contribute to such efforts, as appropriate/feasible, through the collection of comparable data. Data comparability will be facilitated through regular interaction with the Wildlife Agencies and Preserve Managers in other NCCP/HCP areas to support the use of similar methods, coordination of survey schedules, and other relevant efforts regarding monitoring issues. OCTA will provide access to Preserves for other entities to collect regional biological monitoring data, as appropriate, and will submit Preserve data to an appropriate data repository, such as the Biogeographic Information and Observation System (BIOS), California Natural Diversity Database (CNDDB), or other regional databases.

Table 3-2 provides protocols and a timeline for effectiveness monitoring of biological resources on the Preserve. Protocols may be refined or updated based on new information or to ensure

consistency with regional monitoring efforts. OCTA will coordinate regularly with the Wildlife Agencies and Preserve Managers in other NCCP/HCP areas to ensure the most current, established protocols are used. The Preserve Manager and Monitoring Biologist, in consultation with the Wildlife Agencies and other species experts, will review and select the most appropriate monitoring method(s) to address resource-specific management questions. Targeted monitoring will likely require development of an experimental approach and quantitative or semi-quantitative sampling, and will be designed on an as-needed basis.

Table 3-2. Effectiveness Monitoring for Aliso Canyon Preserve

Type	Frequency	Protocols/Methods
Vegetation		
Comprehensive	10 Years	Conduct comprehensive vegetation mapping using the classification system from *A Manual of California Vegetation,* second edition,[a] and *Vegetation Classification Manual for Orange County* (release pending).
Invasive Species	Annually	Conduct invasive plant surveys along natural conduits for dispersal (trails, creeks and streams, disturbed areas) during general stewardship or biological monitoring, or through volunteer patrols.
Statistical Sampling	4 years	Conduct quantitative vegetation sampling to detect changes in species composition, cover, and structure using a sampling design and data collection protocols developed in conjunction with the Natural Communities Coalition (formerly known as Nature Reserve of Orange County [NROC]).[b] Sampling design will include stratified random sampling that considers habitat of various types and sizes, and includes adequate replication for statistical analyses.
Covered Species		
Plants		
Rare Plant Surveys	3 to 5 years, depending on precipitation conditions	Conduct special-status plant surveys following CNPS and CDFW survey guidelines.[c] In addition to population counts or estimates, collect covariate data on vegetation composition and cover, invasive nonnative plants and other threats, and map the perimeter of the population or suitable habitat. Conduct surveys during the appropriate blooming periods for each target plant species, which will vary depending on rainfall and temperature. Monitor reference populations will to determine appropriate survey times (generally between March and July).
Reptiles		
Coast horned lizard	4 years	Conduct focused visual encounter surveys for terrestrial reptiles during the peak activity period for the species, following the time-constrained search methodology.[d] Devote enough time to each survey area to allow for complete coverage. Expend equal effort (staff hours) in each search area.

Type	Frequency	Protocols/Methods
Orangethroat whiptail	4 years	Conduct focused visual encounter surveys for terrestrial reptiles during the peak activity period for the species, following the time-constrained search methodology.[d] Devote enough time to each survey area to allow for complete coverage. Expend equal effort (staff hours) in each search area.
Birds		
Coastal California gnatcatcher	4 years	Conduct two surveys in suitable habitats with at least one week between site visits; conduct surveys in late winter/early spring. Conduct all visits during the morning hours, and survey no more than 100 acres of suitable habitat per visit. With the exception of timing and number of visits, surveys will follow USFWS coastal California gnatcatcher protocol, which includes playing tape vocalizations.[e]
Mammals		
Bobcat	4 years	Set up and monitor wildlife movement cameras for at least six months prior to effectiveness monitoring to document wildlife movement on the Preserve. A qualified wildlife biologist will assess camera results to determine wildlife movement and connectivity.

[a] Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens 2009. *A Manual of California Vegetation*, second edition. California Native Plant Society. Sacramento CA.

[b] Deutschman, D., S. Strahm, D. Bailey, J. Franklin and R. Lewison 2008. *Improving Statistical Sampling and Vegetation Monitoring for Open Space in Central Orange County*. Prepared for The Nature Reserve of Orange County (NROC).

[c] California Native Plant Society (CNPS). 2001. *CNPS Botanical Survey Guidelines*. Sacramento CA. Available: <http://www.cnps.org/cnps/rareplants/pdf/cnps_survey_guidelines.pdf>. Accessed: August 29 2012.

[d] Corn, P. S., and R. B. Bury. 1990. *Sampling Methods for Terrestrial Amphibians and Reptiles*. USDA Forest Service, General and Technical Report PNW-GTR-256, 34 pp.

[e] USFWS. 1997. *Coastal California Gnatcatcher* (Polioptila californica californica) *Presence/Absence Survey Guidelines.* Report from Carlsbad, California, Field Office, Dated July 28, 1997.

[f] USFWS. 2001. *Least Bell's Vireo Survey Guidelines.* Report from Carlsbad, California, Field Office, dated January 19, 2001. 3 pp.

Table 3-3 defines the skills and experience for qualified biologists to complete effectiveness monitoring. Baseline monitoring will require a biologist with at least three years of experience with the general biological resources of Orange County to identify and evaluate threat to Covered Species and habitats.

Table 3-3. Qualified Biologist Skills and Expertise Requirements

Type	Task	Skills and Expertise
Vegetation		
	Comprehensive Mapping, Invasive Species Mapping, Statistical Sampling	Botanist with at least three years of experience mapping southern California vegetation communities; working knowledge of the classification system used in *A Manual of California Vegetation,* second edition.[a] and *Vegetation Classification Manual for Orange County* (release pending).
Covered Species		
Plants		
Rare Plant Surveys	Effectiveness Monitoring	Botanist with experience conducting floristic field surveys; knowledge of plant taxonomy and plant community ecology and classification; familiarity with plants of the area, including special-status and locally significant plants; familiarity with appropriate State and Federal statutes related to plants and plant collecting; and experience analyzing impacts of a project on native plants.[b]
Reptiles		
Coast horned lizard	Effectiveness Monitoring	Biologist with at least two years of independent experience conducting herpetological surveys; should have demonstrated experience in handling coast horned lizard.
Orangethroat whiptail	Effectiveness Monitoring	Biologist with at least two years of independent experience conducting herpetological surveys; should have demonstrated experience in handling orangethroat whiptail.
Birds		
Coastal California gnatcatcher	Effectiveness Monitoring	Trained ornithologist with at least 40 hours of observation in the field of the target species and documented experience locating and monitoring nests of the target species; must have a current a USFWS Section 10(a)(1)(A) permit for coastal California Gnatcatcher.
Mammals		
Bobcat	Effectiveness Monitoring	Trained wildlife biologist with at least five years of independent experience evaluating wildlife movement and habitat connectivity.

[a] Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens 2009. *A Manual of California Vegetation*, second edition. California Native Plant Society. Sacramento CA.

[b] California Native Plant Society (CNPS). 2001. *CNPS Botanical Survey Guidelines*. Sacramento CA. Available: <http://www.cnps.org/cnps/rareplants/pdf/cnps_survey_guidelines.pdf.> Accessed: August 29 2012.

3.3.2 Covered Plant Species

Covered Plant Species considered in this section include many-stemmed dudleya and intermediate mariposa lily, both of which has been detected on the Preserve. These species have similar threats and management needs and thus, are addressed together. Identified threats include off-road hiking and mountain biking activity (Appendix B); additional threats may include invasive plant species, other recreational activities, and trail maintenance. Refer to Section 3.3.3 (Table 3) of Appendix B

and the M2 NCCP/HCP Plan (Section 7.2.8.1) for additional information on the onsite status, habitat requirements, and threats to these species.

The following preserve-specific management objectives and tasks have been developed to address Species Goal 1 and Species Objective 1.1 and Species Goal 2 and Species Objective 2.1 from the M2 NCCP/HCP (see Section 3.1.1).

Management Objective: Ensure the long-term viability of Covered Plants by protecting, managing, and enhancing populations and suitable habitat on the Preserve.

Management Task 4.1.1.a: Identify Status, Threats, and Population Trends (Priority 1)

- Utilize baseline surveys to identify and map Covered Plants on the Preserve.
- Conduct effectiveness monitoring every three to five years to determine status and threats to Covered Plants, using survey methodology outlined in Table 4-1. Refine the Covered Species map based on survey results.
- In addition to population counts or estimates, collect covariate data on vegetation composition and cover and invasive plants and other threats. Map the perimeter of the population or suitable habitat.
- Summarize monitoring results (including findings and recommendations) in Annual Reports. Share data with other regional Preserve Managers to help decipher regional trends. Revise Conceptual Model (M2 NCCP/HCP, Section 7.2.8.1), as appropriate.

Management Task 4.1.1.b: Identify Anthropogenic Conflicts (Priority 1)

- Conduct general stewardship monitoring at specified intervals (e.g., monthly, quarterly) to record and/or track impacts on Covered Plants from vegetation management along access roads, trail use, and other potential disturbance activities. Record incidental observations of Covered Plants.
- Refine Covered Species map, based on monitoring results.

Management Task 4.1.1.c: Maintain Database of Population Size of Covered Plants on Preserve (Priority 1)

- Per requirements outlined in Section 5.6.2.2 of the M2 NCCP/HCP, "Covered Plant Species Policy," the NCCP/HCP Administrator is responsible for maintaining a ledger-type accounting system to track credits and debits for Covered Plants conservation and impacts. Using the results from the baseline surveys and subsequent surveys as part of general stewardship and/or effectiveness monitoring, the Preserve Manager will maintain a database of Covered Plant occurrences (locations) and population (number of individuals). Surveys must be completed by a qualified biologist (see Table 4-2) and include appropriate documentation (e.g., completing form for CNDDB). The Preserve Manager will keep track of the data of each observation and make sure surveys are not double-counting previous observations. Whenever there are updates to this dataset, the Preserve Manager will provide the information to the NCCP/HCP Administrator, who will provide documentation to the Wildlife Agencies (during submission of the Annual Report) for review and approval to receive additional credits under the Covered Plant Species Policy.

Management Task 4.1.1.d: Protect Covered Plants during Property Maintenance and/or from Public Access and Recreational Activities (Priority 1)

- Implement specific management actions where baseline surveys indicate Covered Plant populations are directly or indirectly impacted by anthropogenic (operational or recreational) threats. Specific management actions may include (but are not limited to) modifications to vegetation management activities along access roads, invasive plant control, public access, and trail use management.
- Where impacts are detected, protect Covered Plant populations by fencing, signage, or possibly, trail closures or realignment, as appropriate.

Management Task 4.1.1.e: Protect Covered Plants during Fire Suppression Activities (Priority 1)

- Include Covered Plant populations on the ESL map to ensure that impacts are avoided or minimized during fire suppression activities. Update the ESL map based on stewardship or effectiveness monitoring.
- Include strategies to minimize direct impacts on Covered Plants in the FMP.

Management Task 4.1.1.f: Augment Populations (Priority 1)

- Restore/enhance/expand many-stemmed dudleya population within the Preserve (see Section 3.2.3.2, "Habitat Enhancement of Many-Stemmed Dudleya Population."
- Restore/expand Covered Plant populations where monitoring indicates declines due to fire, disturbance, or other factors. Methods may include population augmentation through introduction of propagules (e.g., seed, bulb) collected on site or from a site in proximity, and invasive plant control. Site selection for population expansion should consider suitable habitat parameters (vegetation, soils, topography), as determined through monitoring or focused studies (e.g., soil sampling).
- The Preserve Manager will coordinate with the Monitoring Biologist and Restoration Ecologist to determine feasibility of augmentation and BMPs for implementation.
- Develop a species-specific restoration plan that specifies propagule source, augmentation methods, monitoring methods, and success criteria.
- Implement targeted monitoring to determine success of restoration/expansion efforts. Monitoring may include quantitative methods, an experimental design, and success criteria.
- Implement adaptive management (e.g., remedial measures, alternative introduction strategies) where success criteria are not met.
- Fund restoration efforts through (1) funds allocated for adaptive management, (2) reallocation of existing management priorities as appropriate, and/or (3) funds set aside for Changed Circumstances, if appropriate.

3.3.3 Non-Covered Sensitive Plant Species

Non-covered sensitive plant species detected on this Preserve are discussed in this section and include Catalina mariposa lily, paniculate tarplant, western dichondra, and big leaved crownbeard (Figure 9). Additionally, Laguna Beach dudleya, Palmer's grapplinghook, and Engelmann oak have been historically identified on this Preserve. Although these plant species were not detected during the 2012 baseline surveys, they have been included for reference. These species have similar threats

and management needs and thus, are addressed together. Identified threats include off-trail hiking and mountain biking activity (Appendix B); additional threats may include invasive plant species, other recreational activities, and trail maintenance.

These species are not included as Covered Species within the NCCP/HCP. However, because these species are considered rare and/or regionally important they have been included in this management plan. For example, Laguna Beach contains the largest extant stand of big-leave crownbeard in the United States. However, development has expanded closer to the big-leaved crownbeard populations. These populations (as well as the other non-covered special-status plant species) are at risk and threatened by fuel modification, fire, climate change, competition with nonnative plants, and genetic effects of small populations (CDFW 2014).

3.3.4 Covered Animal Species

Reptiles

Covered Reptile Species considered in this section include coast horned lizard and orangethroat whiptail. These species have potential suitable habitat on the Preserve and have similar habitat requirements, threats, and management needs and, thus, are addressed together. Identified threats include mortality and habitat destruction from illegal off-road vehicle use, recreational trail use activity, and nonnative ant species (coast horned lizard) (Appendix B); additional threats may include invasive plant species and road maintenance. Refer to Section 3.3.4 (Table 8) of Appendix B and the M2 NCCP/HCP Plan (Section 7.2.8.4) for additional information on status, habitat requirements, and threats.

The following preserve-specific management objectives and tasks have been developed to address Species Goal 5 and Species Objective 5.1 and Species Goal 6 and Species Objective 6.1 from the M2 NCCP/HCP (see Section 3.1.1).

Management Objective: Ensure the long-term viability of Covered Reptiles by protecting, managing, and enhancing suitable habitat on the Preserve.

Management Task 4.1.2.1.a: Identify Status, Threats, and Population Trends (Priority 1)

- Utilize baseline surveys to identify and map Covered Reptiles on the Preserve.
- Conduct effectiveness monitoring surveys once every four years, using survey methodology outlined in Table 4-1. Develop or refine the Covered Species map based on survey results.
- In addition to population counts or estimates, collect covariate data on vegetation composition and cover and invasive plants and other threats.
- Refer to vegetation mapping and invasive species mapping to inform the assessment of habitat condition for Covered Reptiles.
- Summarize monitoring results (including findings and recommendations) in Annual Reports. Share data with other regional Preserve Managers to help decipher regional trends. Revise Conceptual Model (M2 NCCP/HCP Plan, Sections 7.2.8.4), as appropriate.

Management Task 4.1.2.1.b: Identify Anthropogenic Conflicts (Priority 1)

- Conduct general stewardship monitoring at specified intervals (e.g., monthly, quarterly) to record and/or track impacts on Covered Reptile habitat from trail use, illegal off-road vehicle

activity, vegetation management along access roads, and other potential disturbance activity. Record incidental observations of Covered Reptile Species.

- Evaluate the need to implement targeted monitoring to assess potential conflicts with vegetation management along roads and/or with public access and recreational trail use. Monitoring targets may include (but are not limited to) observations of trampling species and/or presence of juveniles. Monitoring may include quantitative methods and an experimental design.
- Refine Covered Species map, based on monitoring results.

Management Task 4.1.2.1.c: Protect Covered Reptiles and Habitat during Property Maintenance and/or from Public Access and Recreational Activities (Priority 1)

- Evaluate vegetation management methods along access roads within five years of RMP adoption to determine if modifications are needed to protect Covered Reptiles.
- Evaluate public access and recreational trail use along roads and trails within five years of RMP adoption to determine if modifications are needed to protect Covered Reptiles.
- Implement specific management actions where surveys indicate anthropogenic threats in or adjacent to suitable habitat. Specific management actions may include (but are not limited to) vegetation management along access roads, invasive plant and animal control, and public access and trail use management, and habitat restoration.
- Where impacts are detected, protect Covered Reptiles and habitat by fencing, signage, or possibly, trail closures or realignment, as appropriate.

Birds

Covered Bird Species considered in this section include coastal California gnatcatcher which were detected during presence/absence surveys in 2015. Identified threats include habitat loss, degradation, and fragmentation (Appendix B); additional threats may include altered fire regime, invasive plant and animal species, edge effects, small population size, drought, and pesticides. Refer to Section 3.3.4 (Table 8) of Appendix B and the M2 NCCP/HCP Plan (Sections 7.2.8.5 and 7.2.8.6) for additional information on status, habitat requirements, and threats for these species.

Other Covered Bird Species (cactus wren, least Bell's vireo, and southwestern willow flycatcher) are not addressed in this RMP because these species were not detected during baseline surveys and it was determined that there is no potential habitat on the Preserve. If these species are observed on the Preserve, it will necessitate development of species-specific management objectives and management tasks; guidance for these additional species, if necessary, is provided in the M2 NCCP/HCP Plan (Section 7.2.8.7).

The following preserve-specific management objectives and tasks have been developed to address Species Goal 9 and Species Objective 9.1 from the M2 NCCP/HCP (see Section 3.1.1).

Management Objective: Ensure the long-term viability of Covered Birds by protecting, managing, and enhancing suitable habitat on the Preserve.

Management Task 4.1.2.2.a: Determine Status, Threats and Population Trends (Priority 2)

- Utilize baseline surveys to identify and map potential habitat for Covered Birds on the Preserve.

- Conduct effectiveness monitoring every four years to determine if Covered Birds are using the Preserve using survey methodology outlined in Table 4-1. In addition to population counts, collect covariate data on threats. Refine Covered Species map based on survey results.
- Refer to vegetation mapping and invasive species mapping to inform the assessment of coastal sage scrub habitat.
- Summarize monitoring results (including findings and recommendations) in Annual Reports. Share data with other regional Preserve Managers to help decipher regional trends. Revise Conceptual Models (M2 NCCP/HCP, Sections 7.2.8.5 and 7.2.8.6), as appropriate.

Management Task 4.1.2.2.b: Identify Anthropogenic Conflicts (Priority 1)

- Conduct general stewardship monitoring at specified intervals (e.g., monthly, quarterly) to record and/or track impacts on coastal sage scrub habitat from trail use, vegetation management along access roads, and other potential disturbance activity. In addition, record incidental observations of Covered Birds.
- Refine Covered Species map, based on monitoring results.

Management Task 4.1.2.2.c: Protect Covered Birds and Habitat during Property Maintenance and/or from Public Access and Recreational Activities (Priority 1)

- Implement specific management actions where surveys indicate anthropogenic threats in or adjacent to suitable habitat or where surveys show a decline in Covered Bird populations or habitat; assess attribute and climatic data for potential causal effects (e.g., type conversion of coastal sage scrub to another vegetation type, surface disturbance). Specific management actions may include (but are not limited to) invasive plant and animal control, public access and trail use management, and habitat restoration.
- Evaluate the need of targeted monitoring to identify significant impacts on bird populations or habitat from invasive animal species (e.g. cowbirds), vegetation management along trails, or from public access and recreational trail use. Monitoring targets may include (but are not limited to) vegetation cover and composition, invasive species cover, bird presence or absence, or nesting success. Monitoring may include quantitative methods and an experimental design.
- Where impacts are detected, protect Covered Birds and habitat by fencing, signage, or, possibly, trail closures or realignment, as appropriate.

Management Task 4.1.2.2.d: Protect Covered Birds and Habitat during Fire Suppression Activities (Priority 1)

- Include Covered Bird locations, if detected, on the ESL map to ensure that impacts are avoided or minimized during fire suppression activities. Update the ESL map based on stewardship or effectiveness monitoring.
- Include strategies to minimize direct impacts on Covered Birds in the Fire Management Plan.

Mammals

Covered Mammal Species considered in this section include bobcat, which has potential habitat on the Preserve. Identified threats include habitat loss and illegal hunting (Appendix B); additional threats may include vehicular mortality, altered fire regime, human disturbances from onsite recreational trail use, and edge effects. Refer to Section 3.3.4 (Table 8) of Appendix B, and the M2

NCCP/HCP Plan (Section 7.2.8.8) for additional information on status, habitat requirements, and threats.

The following Preserve-specific management objectives and tasks have been developed to address Species Goal 12 and Species Objective 12.1 from the M2 NCCP/HCP (see Section 3.1.1).

Management Objective: Ensure the long-term viability of Covered Mammals by protecting, managing, and enhancing populations and suitable habitat on the Preserve.

Management Task 4.1.2.3.a: Conduct Baseline Photo Monitoring of Wildlife Movement (Priority 1)

- Within one year from adoption of the RMP, the Preserve Manager will set up and monitor wildlife movement cameras to document wildlife movement on the Preserve. A qualified wildlife biologist will assess camera results to determine wildlife movement and connectivity.

Management Task 4.1.2.3.b: Determine Status, Threats, and Population Trends (Priority 2)

- Utilize results from stewardship monitoring (tracks, scat, and/or incidental observations) to potentially coordinate with local researchers conducting regional wildlife movement assessments as well as other regional land managers or wildlife entities (i.e., Natural Communities Coalition) to evaluate the role of the Preserve in facilitating large mammal presence and movement.
- Summarize monitoring results (including findings and recommendations) in Annual Reports. Share data with other regional Preserve Managers to help decipher regional trends. Revise Conceptual Models (M2 NCCP/HCP, Section 7.2.8.8), as appropriate.

Management Task 4.1.2.3.c: Identify Anthropogenic Threats (Priority 2)

- Conduct general stewardship monitoring at specified intervals (e.g., monthly, quarterly) to record and/or track impacts on natural habitat used by Covered Mammals from trail use, vegetation management, and other potential disturbance activity. In addition, record incidental observations of Covered Mammals.
- Refine Covered Species map, based on monitoring results.

Management Task 4.1.2.3.d: Develop a Fencing Plan that Protects the Preserve While Facilitating Wildlife Movement (Priority 2)

- Inventory and map existing fencing as part of general stewardship monitoring and identify future fencing needs. Use fencing mapping and signs of wildlife trail use (general stewardship monitoring) to determine if fencing modifications are needed for the Preserve within two years of the adoption of the RMP.
- Ensure that all installed fencing is wildlife friendly (i.e., allows for wildlife movement; e.g., remove bottom strand of exterior fence along key areas of the Preserve that are actively used by wildlife, thereby improving wildlife movement while retaining access control functions). Monitor to ensure that the fencing remains in good condition and is tight.

Management Task 4.1.2.3.e: Protect Covered Mammals from Public Access and Recreational Use (Priority 2)

- The Preserve Manager, Monitoring Biologist, and OCTA will evaluate wildlife movement monitoring data in conjunction with public access and recreation uses within two years of RMP

adoption to determine whether these uses should be limited within the Preserve to minimize human-wildlife interactions.

- Implement specific management actions where surveys indicate anthropogenic threats in or adjacent to movement corridors or when coordination shows a decline in Covered Mammal presence or movement within the region. Specific management actions may include (but are not limited to) property management, public access and trail use management, and habitat restoration.

3.3.5 Natural Communities

Natural communities considered in this section include scrub, chaparral, and grassland habitats. Threats to these communities are varied and include invasive species, pests and disease, habitat degradation (altered fire regime, drought), public uses (including recreation), erosion, and edge effects. This section provides guidelines for monitoring and managing these communities. Refer to Section 3.3.2 of Appendix B and the M2 NCCP/HCP Plan (Section 7.2.8.9) for additional information on sensitive natural communities.

The following Preserve-specific management objectives and tasks have been developed to address Natural Communities Goal 1 and Natural Communities Objectives 1.1, 1.2, 1.4, and Natural Communities Goal 2 and Natural Communities Objective 2.1 from the M2 NCCP/HCP (see Section 3.1.1).

Management Objective: Ensure the long-term viability of natural communities by protecting, managing, and enhancing these resources on the Preserve.

Management Task 4.1.3.a: Update Vegetation Map (Priority 1)

- Utilize vegetation map developed during baseline surveys (2014) as initial vegetation map for management and monitoring.
- Conduct comprehensive vegetation mapping according to the schedule and methods in Table 4-1 as part of effectiveness monitoring. Refine a vegetation map for the Preserve.
- Compare updated vegetation mapping results with the vegetation baseline or most recent vegetation map to identify vegetation changes, including natural communities in decline. Assess the Preserves for threats to natural communities during vegetation mapping and updates.
- Include vegetation mapping results and management recommendations in the Annual Report; incorporate management recommendations into Annual Work Plans, as appropriate.

Management Task 4.1.3.b: Identify Operational or Public Use Conflicts (Priority 1)

- Conduct general stewardship monitoring at specified intervals (e.g. monthly, quarterly) to record and/or track impacts on natural communities from trail use, erosion, invasive species, or unauthorized activities.
- Implement management actions to offset impacts, as appropriate. Where impacts are extensive, develop detailed plans (e.g., restoration, invasive plant eradication, erosion control) prior to implementation, in consultation with the Wildlife Agencies.

Management Task 4.1.3.c: Establish Long-term Monitoring Plots to Identify Vegetation Condition and Trends (Priority 1)

- Supplement vegetation mapping with quantitative data collection to assess vegetation condition and habitat quality for Covered Species. Within two years from the adoption of the RMP, identify vegetation survey locations and implement baseline surveys. Conduct quantitative vegetation monitoring in established plots every four years to detect changes in species composition, cover, and structure (Table 4-1). Conduct monitoring using a sampling design and data collection protocols developed in conjunction with Natural Communities Coalition. Sampling design will include stratified random sampling that considers habitat of various types and sizes, and includes adequate replication for statistical analyses.
- Use sampling results to detect vegetation trends on the Preserve by habitat type, and assess habitat conditions for Covered Species. Assess attribute and climatic data for potential causal effects. Where sampling indicates a decline in habitat quality that can be attributed to anthropogenic threats, identify and implement specific management actions including (but not limited to) vegetation management, invasive species control, habitat restoration, erosion control, public access and trail use management, fire management, and enforcement of policies related to the wildland/urban interface.
- Share data with other regional Preserve Managers to help decipher regional trends. Regional results will inform status and management priorities for natural communities at the Plan level.

Management Task 4.1.3.d: Monitor Nonnative Invasive Species Eradication Efforts and/or Enhancement/Restoration Actions (Priority 1)

- Monitor nonnative invasive species efforts to ensure that success criteria (as specified in the eradication plans) are met (Section 3.2.2). Additional eradication effort and/or enhancement/restoration actions will be recommended in Annual Reports, as warranted. Eradication and restoration plans will be developed and implemented by a qualified Restoration Ecologist.
- The Restoration Ecologist will be responsible for coordinating with the Preserve Manager or staff members and Restoration Contractor regarding site conditions and required remedial measures. It is anticipated that habitat enhancement/restoration monitoring activities may include monitoring one or more of the following activities:
    - Site preparation
    - Weed control
    - Plant establishment
    - General site conditions
- Specific monitoring activities and frequencies will be identified in site-specific restoration/enhancement plans and Annual Reports (management recommendations) in coordination with the Wildlife Agencies. It is anticipated that monitoring for some activities will occur only in the early phases of implementation, and others will occur throughout the restoration program.
- Implement targeted monitoring to evaluate habitat restoration success. Success criteria may include habitat structure, cover, and composition. Where success criteria are not met, modified or alternative management strategies may be required.

Management Task 4.1.3.e: Control Invasive Pests or Disease (Priority 1)

- The Preserve Manager or Monitoring Biologist will inventory natural communities at risk from invasive pests or disease (e.g., oak woodlands), and will coordinate with the Wildlife Agencies, Monitoring Biologist, and other entities to identify appropriate actions and BMPs to eliminate or reduce the threat from these species (e.g., treatment, removal, and restoration).
- OCTA and the Preserve Manager will work with the Wildlife Agencies to develop and implement an invasive species pest/disease control plan that includes both treatment and post-treatment restoration, if needed. Treatment and restoration will be funded by (1) using funds allocated for adaptive management, (2) reallocating funds from existing management priorities as appropriate, (3) pursuing outside funding sources, or (4) seeking authorization to use Changed Circumstance funding. Habitat restoration will be implemented using current information on best approaches and strategies for restoration.
- Implement targeted monitoring to evaluate the success of pest or disease control actions. Success criteria may include number of plants without disease. Where success criteria are not met, modified or alternative management strategies may be required.

Management Task 4.1.3.f: Restore Natural Communities Impacted by Altered Fire Regime or Climate Change (Priority 2)

- The Preserve Manager will coordinate with the Monitoring Biologist and Wildlife Agencies to determine if habitat restoration is warranted for natural communities that have been altered due to habitat type conversion or prolonged drought to the degree that they can no longer support Covered Species at levels that existed at Preserve acquisition. Where restoration is warranted, implement per guidelines in Section 3.2.3, "Habitat Restoration", as appropriate.
- The Preserve Manager and OCTA will work with the Wildlife Agencies to conduct restoration efforts where determined necessary and appropriate by (1) using funds allocated for adaptive management, (2) reallocating funds from existing management priorities as appropriate, (3) pursuing outside funding sources, or (4) seeking authorization to use Changed Circumstance funding. Habitat restoration will be implemented using current information on best approaches and strategies for restoration, and restoration will be appropriate for current climatic conditions.

Management Task 4.1.3.g: Protect Natural Communities from Public Access and Recreational Trail Use (Priority 1)

- Evaluate the effects of public access and recreational trail use on natural communities within five years of RMP adoption to determine if modifications are needed to protect sensitive natural communities.
- Implement targeted monitoring, as warranted, to assess potential conflicts with public access and recreational trail use. Monitoring targets may include (but are not limited to) vegetation cover and composition and invasive species cover. Monitoring may use quantitative or semi-quantitative methods and an experimental design, and will be conducted in conjunction with other non-quantitative efforts to monitor trail use and activity (stewardship monitoring).
- Where recreational impacts are identified, protect sensitive natural communities by limiting and adjusting access during the certain seasons, trail closures, or trail realignments, as appropriate.

Management Task 4.1.3.h: Protect Natural Communities from Erosion (Priority 1)

- The Preserve Manager will inspect and identify areas vulnerable to erosion within two years of RMP adoption.
- The Preserve Manager and Restoration Contractor will identify and implement management actions to reduce erosion, including erosion control BMPs (e.g., sand bags, swales), closure of trails within and adjacent to creeks and streams, and improvements to flood control features.

Management Task 4.1.3.i: Protect Natural Communities from Edge Effects (Priority 1)

- The Preserve Manager will implement policies to minimize edge effects and encroachment from urban development to the Preserve. These include feral and domestic animal restrictions and control, trespassing, illegal intrusions, illegal off-road vehicle use, runoff, and vegetation management.
- The Preserve Manager will install signage and implement monitoring, patrols, and enforcement within the first year of Preserve management and in perpetuity thereafter to reduce impacts on natural communities at the wildland-urban interface. The frequency of patrols will depend upon the level and type of disturbances in and adjacent to the Preserve.

3.3.6 Adaptive Management

Adaptive management provides a strategy to improve future management actions through monitoring to evaluate management effectiveness. Where success criteria are not met, adaptive management provides a structured approach to improve management outcomes. Monitoring and adaptive management on the Preserve will be a cooperative effort between OCTA, the Preserve Manager, Monitoring Biologist and other supporting biologists, external entities conducting research on the Preserve, and the Wildlife Agencies. Refer to the M2 NCCP/HCP Plan (Sections 7.2.7.2 and 7.2.7.3) for an expanded discussion of the adaptive management approach and guidelines. Adaptive management is built into Preserve management through the use of phased monitoring and evaluation to modify management actions based on monitoring results.

Adaptive management deals with reducing uncertainty and improving management effectiveness through iterative monitoring and evaluation. Some of the key issues for a focused adaptive management approach to address uncertainties of preserve management on the Aliso Canyon Preserve include the following.

- **Covered Plants and Vegetation Management.** Closely monitor the response of Covered Plant Species (e.g., many-stemmed dudleya) to trail use and closures.
- **Trails Revegetation**. Collect photo monitoring of the revegetation of closed trails to determine if passive restoration was successful. If not, determine if active restoration is needed.

The accumulation of understanding and subsequent adaptation of a management strategy depends on feeding information obtained from monitoring results back into the decision-making process. The link between the technical and decision-making steps requires regular interaction and an exchange of information between the technical staff and decision-makers. This will be accomplished by bi-annual meetings involving the Preserve Managers from each of the OCTA M2 Preserves, Monitoring Biologists, NCCP/HCP Administrator, and the Wildlife Agencies where both policy and technical expertise can be integrated into revising goals and objectives, refining conceptual models, adjusting management and/or monitoring activities, or allocating funding. Meetings should be timed

such that any new information discussed assists with the planning of upcoming seasonal work (i.e., invasive species control, vegetation management, or biological surveys). Timing some meetings to coordinate with other regional conservation planning meetings is encouraged to maximize communication and cooperation in the region.

3.3.7 Annual Progress Reports

The M2 NCCP/HCP requires that Annual Progress Reports documenting the status of the EMP open space properties be submitted to the NCCP/HCP Administrator for incorporation into the M2 NCCP/HCP annual report each year. The Preserve Manager will prepare an Annual Progress Report that summarizes the results of research and monitoring activities, provides recommendations for future preserve management activities for the Preserve, and discusses anticipated activities for the upcoming year. Status updates and anticipated activities for the upcoming year will be provided for one or more of the following, depending on specific activities performed each year.

- Monitoring of preserved biological resources, including natural communities and Covered Species.
- Fire management and control, recreational uses, access, general site maintenance, and encroachment issues.
- Habitat restoration and enhancement.
- Education and outreach.

Depending on the results of monitoring activities, recommendations for adjustments to the management of resources and activities will be summarized in the Annual Progress Reports. Any adjustments to the management of resources and activities will be identified in coordination with supporting biologists, and Wildlife Agencies. Depending on the results of ongoing management and evaluations, adjustments to annual management activities may include, but are not limited to, the following.

- Modifications of existing, or the addition of new, monitoring and survey activities.
- Modifications to resource-protection measures, including the designation of restricted areas of the Preserve.
- Site-specific habitat restoration and enhancement activities, including restoration of disturbed areas and control of specific invasive plant species.
- Control of nonnative animal species.
- Specific fire-management activities, including site-specific fuel-modification efforts, staging areas, and access.
- As-needed site-maintenance activities, including site-specific erosion control, and debris clean-up, among other activities.
- Modification of educational and outreach activities, including additional site tours, new signage, interpretive handout materials, and additional community coordination and outreach efforts.
- Changes to the frequency of managed access events consistent with the Public Access Plan.

Chapter 4
Financial Section

4.1 Financial Requirements

As described and outlined in this RMP, OCTA will be required to fund the following types of management and monitoring activities on Aliso Canyon.

- **Start-up Expenditures**. These will include preparation of Invasive Plant Species Management Plan, preparation of a Fire Management Plan, and installation and/or removal of fencing for public access control and wildlife movement.
- **Preserve Management.** This includes all general Preserve management activities such as access control, enforcement, fencing, maintenance, signage, public outreach, vegetation management, invasive species control, erosion control, and fire management. In addition, this includes periodic and ongoing biological assessments, a comprehensive annual assessment to identify major threats, Preserve-specific biological monitoring above and beyond effectiveness biological monitoring, Preserve-level data management, and Preserve-level annual reporting.
- **Adaptive Management.** The Preserve Manager will be expected to manage, and be responsible for managing, the Aliso Canyon Preserve following the principles and procedures of adaptive management. A separate budget line-item will be set aside to fund additional and specific adaptive management actions that are above and beyond the general adaptive management steps undertaken by the Preserve Manager. The adaptive management funding is estimated to be five percent of the Preserve Management budget.
- **Effectiveness Biological Monitoring.** Comprehensive biological monitoring (following established protocols) will occur every four years for Covered Species and every 10 years for comprehensive vegetation mapping.
- **Changed Circumstances.** Events that meet the triggers of a Changed Circumstance as set forth in the M2 NCCP/HCP will be managed as they arise.

OCTA has developed initial estimates of the financial requirements for the long-term Preserve management and monitoring based on an accumulated experience with the costs and responsibilities associated with OCTA's interim management role for the Aliso Canyon Preserve. Using these initial estimates, OCTA has developed an initial estimate of the endowment funding requirements. The final endowment funding requirements will be based on a Property Analysis Report (PAR) or PAR-like analysis that will be completed by OCTA. This analysis will itemize and define the long-term obligations using the Preserve-specific information detailed in this RMP. It is expected that additional years of interim habitat management would provide a database and sounder basis for estimating the cost of long-term management costs. The final endowment funding level will be based upon actual negotiated long-term management contracts for the Preserve. OCTA will coordinate with the Wildlife Agencies for the review and approval for the PAR analysis and determination of the permanent endowment funding requirements.

4.2 Funding Sources

OCTA will establish and manage a permanent, non-wasting endowment to provide funding for the long-term commitments of Preserve management and monitoring. There will be an endowment that will cover the annual expenses for all Preserve management and monitoring, and program management. OCTA will, most likely, contract with local management entities and biological firms for Preserve management and biological monitoring services.

OCTA will accumulate funding for the endowment using the ongoing revenue generated for the M2 EMP. OCTA estimates it will take approximately 10 years, but no longer than 15 years, from the signing of the Implementing Agreement (IA) to accumulate sufficient funding for the endowment using unappropriated funds from the annual revenue stream.

Once OCTA has established a permanent, non-wasting endowment and the endowment has been reviewed and approved by the Wildlife Agencies the endowment will be deemed as adequate funding to carry out the obligations under the Plan, and the Wildlife Agencies will not require additional funding from OCTA.

Chapter 5
References

Adamcik, R. S., E. S. Bellantoni, D. H. DeLong, Jr., J. H. Schomaker, D. B. Hamilton, M. K.Laubhan, and R. L. Schroeder. 2004. *Writing Refuge Management Goals and Objectives: A Handbook*. Washington, D.C.: U.S. Fish and Wildlife Service, National Wildlife Refuge System.

Atkinson, A. J., P.C. Trenham, R. N. Fisher, S. A. Hathaway, B. S. Johnson, S. G. Torres, and Y. C. Moore. 2004. *Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans.* U.S. Geological Survey Technical Report. USGS Western Ecological Research Center, Sacramento, CA. 69 pp.

BonTerra Psomas. 2015a (September). *Baseline Biological Surveys Technical Report for the Aliso Canyon Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation.* Irvine, CA: BonTerra Psomas.

California Department of Fish and Game (CDFG). 2009 (November 24). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. Sacramento, CA: CDFG.

California Department of Fish and Wildlife (CDFW). 2014 (January 15). *Big-Leaved Crownbeard (Verbesina dissita)*. Sacramento, CA: CDFW. Available: https://www.wildlife.ca.gov/Conservation/Plants/Endangered/Verbesina-dissita

California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory Database (Cal-IPC Publication 2006-02). Berkeley, CA: Cal-IPC. http://www.cal-ipc.org/ip/inventory/weedlist.php.

———. 2016. Five-Year Invasive Plant Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP. Report for the Natural Communities Coalition.

California Native Plant Society (CNPS). 2001. *Inventory of Rare and Endangered Vascular Plants of California* (6th ed.) (D.P. Tibor, Ed.). Sacramento, CA: CNPS, Rare Plant Scientific Advisory Committee.

California Wetlands Monitoring Workgroup (CWMW). 2012 (March). *California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas* (Version 6.0).

Conservation Biology Institute (CBI). 2009. *Conservation Assessment of Orange County*. December. Prepared for the Orange County Transportation Authority. 54 pp.

Elvin, M. A., and A.C. Sanders. 2009. Nomenclatural changes for *Monardella* (Lamiaceae) in California. *Novon* 19:315–343.

ICF Jones & Stokes. 2010. (October). *OCTA M2 NCCP/HCP General Monitoring and Management Guidelines,* Irvine, CA: ICF Jones & Stokes.

Irvine Ranch Conservancy. 2011. *An Efficient Monitoring Framework and Methodologies for Adaptively Managing Human Access on NCCP Lands and Other Reserves in Southern California*.

Lewison, R. L. and D. H. Deutschman 2014. *Framework Management Plan: Guidelines for Best Practices with Examples of Effective Monitoring and Management*. Prepared for San Diego Association of Governments (SANDAG). Contract 5001562. Prepared by Department of Biology and Institute for Ecological Monitoring and Management, San Diego State University.

Lewison, R. L., D. H. Deutschman, E. Marnocha, C. Tredick, and P. McIntyre. 2011. *Developing and Refining Goals and Objectives for Monitoring and Management: Building and Implementing an Integrated Framework for Monitoring and Management in San Diego County*. Prepared for San Diego Association of Governments, MOU # 5001562. Prepared by Institute for Ecological Monitoring and Management, San Diego State University.

LSA Associates, Inc. 2015. *Archaeological Sensitivity Assessment, Aliso Canyon Preserve Property,* Irvine, CA: LSA Associates, Inc.

LSA Associates, Inc. and Irvine Ranch Conservancy. 2010. (June). *Draft Irvine Ranch Northern Open Space Recreation & Resource Management Plan. Irvine, CA:* LSA Associates, Inc. and Irvine Ranch Conservancy.

Marsh, Karlin G. 1992. *South Laguna Biological Resources Inventory.* Prepared for the City of Laguna Beach.

Orange, County of. 1997 (as amended). *Silverado-Modjeska Specific Plan*. Santa Ana, CA: County of Orange Environmental Management Agency.

Orange County Transportation Authority (OCTA). 2012a (February). *Draft Environmental Mitigation Program Chronicles*. Orange, CA: Orange County Transportation Authority.

San Diego, City of. 2010 (November). *Draft Black Mountain Open Space Park Natural Resource Management Plan.* San Diego, CA: the City.

San Diego Management and Monitoring Program (SDMMP). 2017. *Management Strategic Plan for Conserved Lands in Western San Diego County*. Prepared for San Diego Association of Governments (SANDAG). Prepared by San Diego Management and Monitoring Program (SDMMP). Final. Available: http://sdmmp.com/reports_and_products/Management_Strategic_Plan.aspx.

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. *A Manual of California Vegetation (Second Edition)*. Sacramento, CA: CNPS.

U.S. Environmental Protection Agency (EPA). 2006. *Application of Elements of a State Water Monitoring and Assessment Program for Wetlands*. Washington, D.C.: Wetlands Division, Office of Wetlands, Oceans and Watersheds, EPA. Available: http://www.epa.gov/owow/wetlands/pdf/Wetland_Elements_Final.pdf.

U.S. Fish and Wildlife Service (USFWS). 2011 (February 9). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. *Federal Register* 76(27): 7245–7467. Washington, D.C.: USFWS.

———. 2009 (October 13). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad (*Anaxyrus californicus*); Proposed Rule. *Federal Register* 74(196): 52611–52664. Washington, D.C.: USFWS.

———. 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

———. 2005 (April 13). Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Arroyo Toad (*Bufo californicus*); Final Rule. *Federal Register* 70(70): 19561–19633. Washington, D.C.: USFWS.

———. 1997 (July 28). *Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Protocol.* Washington, D.C.: USFS

This page intentionally left blank.

Appendix A

Checklist and Annual Schedule of Ongoing Preserve Management and Biological Monitoring Actions

This page intentionally left blank

Table A-1 - Checklist for Ongoing Preserve Management and Biological Monitoring Actions

Category	Management Action	Frequency	Preserve Management	Stewardship Monitoring	Effectiveness Monitoring	Targeted Monitoring
Preserve Management (Section 3.2)						
Public Access (Section 3.2.1)	Install, monitor, and maintain signage and obstructions, as appropriate, to control public access.	Part of monthly visits		○		
	Monitor and control permitted and unauthorized activities (e.g., use or creation of unauthorized trails).	Part of monthly visits		○		
	Implement a public education and outreach program focused on public access.	Ad hoc	○			
Invasive Species Control Plan (Section 3.2.2)	Evaluate the success of invasive plant control efforts for five years following implementation of invasive species control management plan or until eradication is maintained for one year without follow-up control activities.	Per invasive species control management plan				○
Habitat Restoration (Section 3.2.3)	During the first five years after adoption of the RMP, the Preserve Manager will monitor conditions at 3 to 5 representative trail locations using photo monitoring methods to track progress of passive restoration.	Quarterly				○
Vegetation Management (Section 3.2.4)	Pruning, cutting, or clearing of native vegetation will generally be avoided except for maintenance along approved recreation trails, and installation of erosion control measures, if necessary.	As needed, but following nesting bird policy and seasonal restrictions	○			
Nonnative Animal Species Management (Section 3.2.6)	The Preserve Manager will work towards controlling the spread of invasive ant species.	Part of monthly visits		○		
	The Preserve Manager will monitor and address other potential infestations of invasive insects and other pathogens that can threaten native habitat.	Part of monthly visits		○		
	Implement and enforce feral and domestic animal restrictions and control.	Part of monthly visits		○		

Table A-1 - Checklist for Ongoing Preserve Management and Biological Monitoring Actions

Category	Management Action	Frequency	Preserve Management	Stewardship Monitoring	Effectiveness Monitoring	Targeted Monitoring
Property Management (Section 3.2.7)	Implement routine and ongoing property management activities to ensure that the Preserve is maintained in good condition.	Ad hoc and part of monthly visits	○	○		
Land Uses within the Preserve (Section 3.2.8)	Conduct monitoring of the Preserve to ensure prohibited uses are not occurring with the Preserve.	Part of monthly visits and enforcement patrols	○	○		
Lands Uses Adjacent to the Preserve (Section 3.2.9)	The Preserve Manager will monitor land uses adjacent to the Preserve to identify situations in which edge effects can negatively affect biological resources within the Preserve.	Part of ad hoc visits		○		
	Prior to implementation of the public awareness program, the Preserve Manager will regularly monitor the interface of the Preserve with urban/residential areas. The Preserve Manager will identify situations in which adjacent land uses create negative effects on biological resources and maintain a dialogue with adjacent landowners to discuss and address edge effect issues.	Ad hoc and part of monthly visits	○	○		
	To the extent practicable, the Preserve Manager and OCTA will coordinate with local land use authorities (e.g., for the CEQA public review process) to ensure that new developments adjacent to the Preserve adhere to the following adjacency guidelines.	Ad hoc	○			
Management of Cultural Resources (Section 3.2.10)	Manage the Preserve in a manner that does not impact sensitive archeological resources.	Ad hoc	○			
Public Outreach and Education (Section 3.2.11)	Hold public meetings.	Annual	○			
	Provide educational and interpretative materials and maintain website.	Ongoing	○			
	Implement outreach and volunteer program.	Ongoing	○			

Table A-1 - Checklist for Ongoing Preserve Management and Biological Monitoring Actions

Category	Management Action	Frequency	Preserve Management	Stewardship Monitoring	Effectiveness Monitoring	Targeted Monitoring
	Encourage trail user groups to participate in "self-monitoring and policing" programs.	Ad hoc and part of monthly visits	○	○		
Biological Monitoring and Management (Section 3.3)						
Covered **Plant** Species (Section 3.3.2)	Conduct periodic monitoring and assessment of Covered Plant Species known populations and search for new occurrences.	Part of monthly visits		○		
	Conduct protocols surveys of Covered Plant Species.	Every 3-5 years, depending on rainfall			○	
	Update and maintain database of population size of Covered Plants on Preserve.	Annual	○			
Covered **Reptile** Species (Section 3.3.4)	Conduct periodic monitoring and assessment of Covered Reptile Species and their habitat.	Part of monthly visits		○		
	Conduct protocols surveys of Covered Reptile Species.	Every 4 years			○	
Covered **Bird** Species (Section 3.3.4)	Conduct periodic monitoring and assessment of Covered Bird Species and their habitat.	Part of monthly visits		○		
	Conduct protocols surveys of Covered Bird Species.	Every 4 years			○	
Covered **Mammal** Species (Section 3.3.4)	Within one year from adoption of the RMP, the Preserve Manager will set up and monitor wildlife movement cameras to document wildlife movement on the Preserve. A qualified wildlife biologist will assess camera results to determine wildlife movement and connectivity.	Ad hoc during first year from adoption of the RMP		○		
	Conduct periodic monitoring and assessment of Covered Mammal Species and their habitat.	Part of monthly visits		○		

Table A-1 - Checklist for Ongoing Preserve Management and Biological Monitoring Actions

Category	Management Action	Frequency	Preserve Management	Stewardship Monitoring	Effectiveness Monitoring	Targeted Monitoring
	Conduct protocols surveys of Covered Mammal Species.	Every 4 years			○	
	Monitor fencing to evaluate ways to facilitate wildlife movement while maintaining control of unauthorized access.	Part of monthly visits		○		
Natural Communities (Section 3.3.5)	Conduct comprehensive update of vegetation map.	Every 10 years			○	
	Monitor vegetation plots/transects to identify vegetation condition and trends.	Every 4 years			○	
	Monitor threats to natural communities from nonnative species, invasive pests or disease, unauthorized public access, erosion, and/or edge effects.	Part of monthly visits		○		
Adaptive Management (Section 3.3.6)	Monitor public access and wildlife activity.	Quarterly				○
	Monitor success of revegetation of closed trails through photo monitoring to determine if additional habitat restoration is warranted.	Quarterly				○
Annual Progress Reports (Section 3.3.7)	The Preserve Manager will prepare an Annual Progress Report that summarizes the results of research and monitoring activities, provides recommendations for future preserve management activities for the Preserve, and discusses anticipated activities for the upcoming year.	Annual	○			

Table A-2 – Annual Schedule for Preserve Management and Biological Monitoring Actions

Action	Frequency / Schedule	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Adopt RMP								X																						
Preserve Management																														
Prepare Invasive Species Management Plan	Within two years of RMP adoption						X																							
Implement and monitor success of invasive species control actions	Five years after invasive species management plan							X	X	X	X	X																		
Prepare Fire Management Plan	Within two years of RMP adoption								X																					
Effectiveness Monitoring																														
- Rare Plants	Three to five years				B					X				X				X				X				X				X
- Reptiles	Four years				B					X				X				X				X				X				X
- Birds	Four years				B		X				X				X				X				X				X			
- Mammals	Four years						B			X				X				X				X				X				X
- Natural Communities Quantitative [1]	Four years						B			X				X				X				X				X				X
- Natural Communities Comprehensive	10 years				B										X										X					
Targeted Monitoring																														
Monitor public access and wildlife activity	Five years after beginning of access plan							X	X	X	X	X																		

Table A-2 – Annual Schedule for Preserve Management and Biological Monitoring Actions

Action	Frequency / Schedule	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Monitor effectiveness of Preserve management and trail closures to enhance many-stemmed dudleya population	Ten years after adoption							X	X	X	X	X	X	X	X	X	X													
Monitor success of passive revegetation of closed trails through photo monitoring to determine if additional habitat restoration is warranted	Five years after RMP adoption							X	X	X	X	X																		

B = Baseline Survey

[1] Methodologies to complete quantitative monitoring of natural communities are currently being reviewed with the other regional conservation entities and the Wildlife Agencies. Pilots programs have been initiated at other OCTA Preserves. This monitoring will initiated at the Hayashi Preserve once methodologies are finalized.

Appendix B

Baseline Biological Surveys Technical Report Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation for the Aliso Canyon Property in Orange County, California

This page intentionally left blank

BonTerra PSOMAS

Baseline Biological Surveys Technical Report for the Aliso Canyon Property

Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation in Orange County, California

Prepared for

Lesley L. Hill
Project Manager, Environmental Programs
Orange County Transportation Authority
600 South Main Street, 9th Floor
Orange, California 92868

Prepared by

Ann M. Johnston
Vice President, Resource Management
BonTerra Psomas
3 Hutton Centre Drive, Suite 200
Santa Ana, California 92707
T: (714) 751-7373

October 2015

TABLE OF CONTENTS

Section **Page**

TABLES

Table **Page**

EXHIBITS

APPENDICES

1.0 INTRODUCTION

This Biological Technical Report has been prepared to support California Environmental Quality Act (CEQA) documentation and resource management planning for the Measure M2 Freeway Environmental Mitigation Program (EMP) Acquisition Properties Evaluation Project. The EMP project originally included five separate Orange County Transportation Authority (OCTA) acquisition properties (Hayashi, Ferber Ranch, O'Neill Oaks, Hafen, and Saddle Creek South). Two additional acquisitions were made: the MacPherson property, located in unincorporated Orange County, and the Aliso Canyon property, located in the City of Laguna Beach, California. This report is limited to the Aliso Canyon property; separate reports were previously prepared for the other properties.

This information has been reported in accordance with accepted scientific and technical standards that are consistent with the requirements of the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW).

1.1 BACKGROUND

1.1.1 Project Description

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half-cent sales tax in the County from April 2011 to March 2041. Renewed Measure M (or Measure M2) will continue to provide funding for transportation projects and programs in the County, including select freeway and roadway improvements, transit programs, and two environmental programs.

The OCTA's M2 Freeway EMP provides comprehensive mitigation measures to offset the environmental impacts of the 13 Measure M2-funded freeway projects. The EMP is spearheaded by the Environmental Oversight Committee (EOC), which is made up of OCTA Board members and representatives from the California Department of Transportation (Caltrans), resource agencies, environmental groups, and the public.

Instead of mitigating the natural resource impacts of Measure M2 freeway projects on a project-by-project basis, the EMP presents a comprehensive mitigation approach that not only replaces habitat, but also provides the opportunity to improve the overall functions and values of sensitive biological resources throughout Orange County. Working collaboratively with the resource and regulatory agencies, the OCTA ultimately decided that creation of a Natural Community Conservation Plan (NCCP)/Habitat Conservation Plan (HCP) and a programmatic wetland permitting program would best serve as the EMP's main implementation tools.

As one of the key components of the conservation strategy for the NCCP/HCP and wetlands permitting, the OCTA has undertaken a systematic approach to identifying and acquiring habitat preserves to meet the goals and objectives of the NCCP/HCP and wetland mitigation programs. A formal conservation assessment was completed by Conservation Biology Institute (CBI) for Orange County, which resulted in the identification of Priority Conservation Areas (PCAs); these included candidate parcels and properties that could be considered for habitat and wildlife conservation purposes. The OCTA solicited willing sellers and evaluated each property using standardized criteria and a prioritization process to rank properties for purchase. Properties for acquisition were selected based on conservation values, policy considerations, mitigation credits, mitigation plan review, and adoption and real estate value/economics.

The Aliso Canyon property was selected and acquired on April 22, 2015. Baseline biological surveys were completed in 2015 with the following purposes:

- A general biological assessment was completed to establish the baseline biological value of the property and to identify any biological threats that have the potential to reduce the long-term biological value. In addition, information on the overall condition of the property will guide the development of a site-specific Resource Management Plan (RMP).
- Comprehensive surveys of vegetation types were completed to provide detailed knowledge of the natural habitat and a quantification of habitat type credits on the property.
- Focused surveys for OCTA M2 NCCP/HCP Covered Species and their habitats were completed to establish a baseline of the property's status and conditions. Results of future biological monitoring will be compared to the baseline results to evaluate habitat and Covered Species trends.

1.2 PROJECT LOCATION AND PHYSICAL ENVIRONMENTAL SETTING

1.2.1 Property Location and Physical Condition

The approximate 150-acre Aliso Canyon property is located east of Pacific Coast Highway in the City of Laguna Beach in Orange County (Exhibit 1). The northwestern edge of the property is adjacent to residential development along Barracuda Way and Loretta Drive, while the southeastern edge of the property is adjacent to the Aliso Creek Inn and Golf Course. The northern and eastern boundaries abut open space in Aliso and Wood Canyons Wilderness Park. The property is located on the U.S. Geological Survey's (USGS') Laguna Beach and San Juan Capistrano 7.5-minute topographic quadrangle maps in Sections 31 and 32 of Township 7 South, Range 8 West (Exhibit 2).

Topography on the property is hilly, with the main ridgeline running through the middle of the property and canyons draining steep slopes to either side. Elevations range from approximately 40 feet above mean sea level (msl) at the southeastern edge of the property to 840 feet above msl at the northwestern edge. Two unnamed blueline streams occur in the northwestern portion of the property, with smaller drainage features present in the canyon bottoms. Soil types mapped on the property consist of Alo clay (25 to 30 and 30 to 50 percent slopes), Capistrano sandy loam (2 to 9 percent slopes), Chesterton loamy sand (2 to 15 and 15 to 30 percent slopes), Cieneba sandy loam (15 to 30 and 30 to 75 percent slopes, eroded), Cieneba-Rock outcrop complex (30 to 75 percent slopes), Soper loam (30 to 50 percent slopes), and Soper gravelly loam (15 to 30 and 30 to 50 percent slopes) (Exhibit 3).

1.2.2 Regional Environmental Setting

The Aliso Canyon property is located in the steep, coastal hills of South Laguna (Exhibit 4). It is the most coastal of the acquisition properties. The property is part of the "Laguna Greenbelt", which encompasses 10,000 acres of largely undeveloped land surrounding the City. The City of Laguna Beach considers Hobo Canyon, particularly its surrounding ridges, including the Moulton Meadows marine terrace and the continuous south-facing slope of Aliso Canyon down to the golf course, to be the single-most significant habitat block in Laguna (Laguna Beach 2006).

Predominant topographic features of the area are Hobo Canyon and its flanking ridges and the south-facing slopes above Aliso Canyon, which is located just east of the property. These canyons are part of the 498-square-mile Aliso-San Onofre Watershed. The upper reaches of

Aerial Source: Aerials Express 2009

D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\ex_ProjLocation.mxd

Project Location

Exhibit 1

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

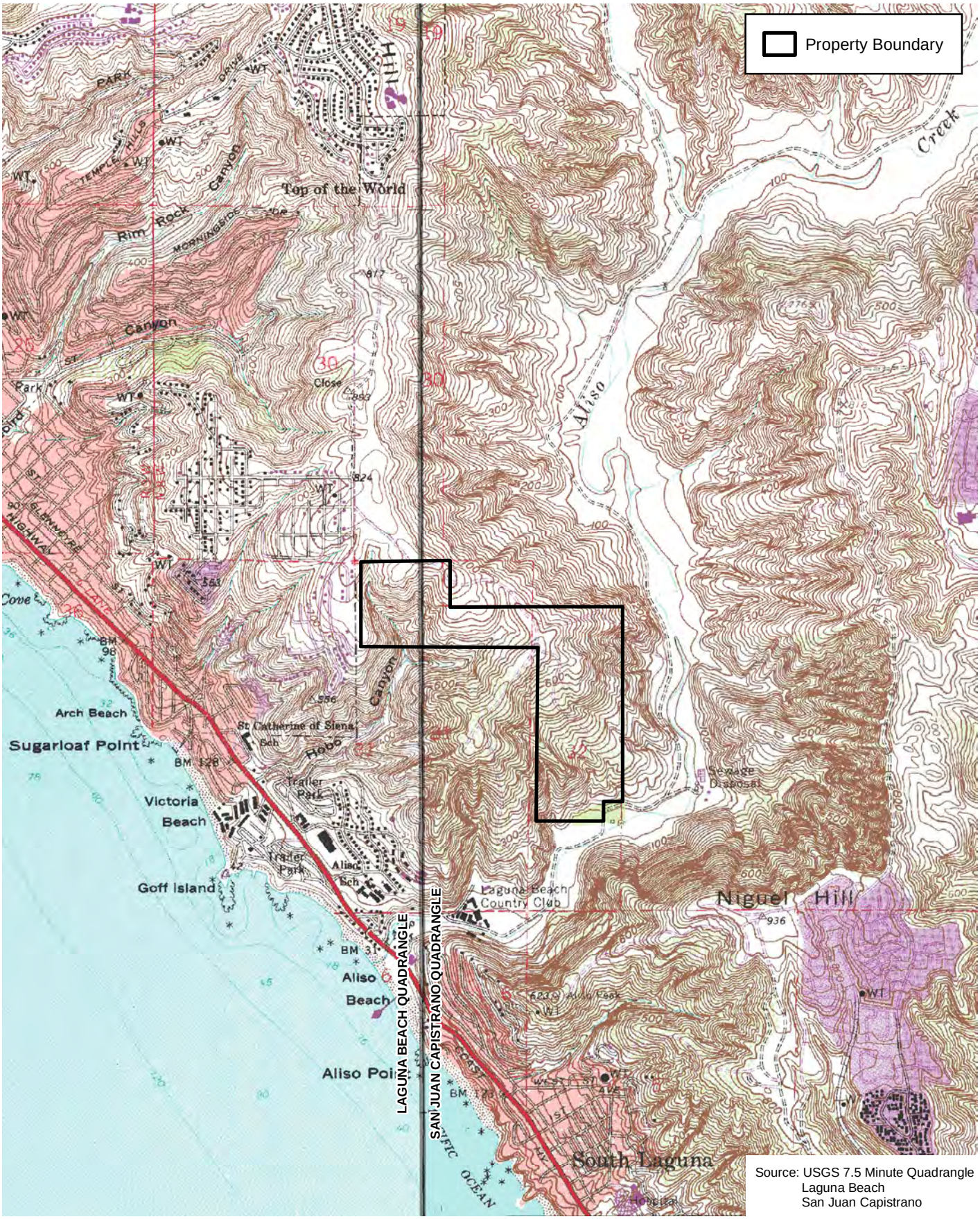
N W E S

1,000 500 0 1,000

Feet

BonTerra PSOMAS

(Rev: 6-22-2015 JAZ) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\ex1_ProjLocation.pdf



D:\Projects\OCTAJ008\MXD\AlisoCyn\BioTech\Ex_USGS_20150922.mxd

USGS 7.5-Minute Quadrangle

Exhibit 2

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

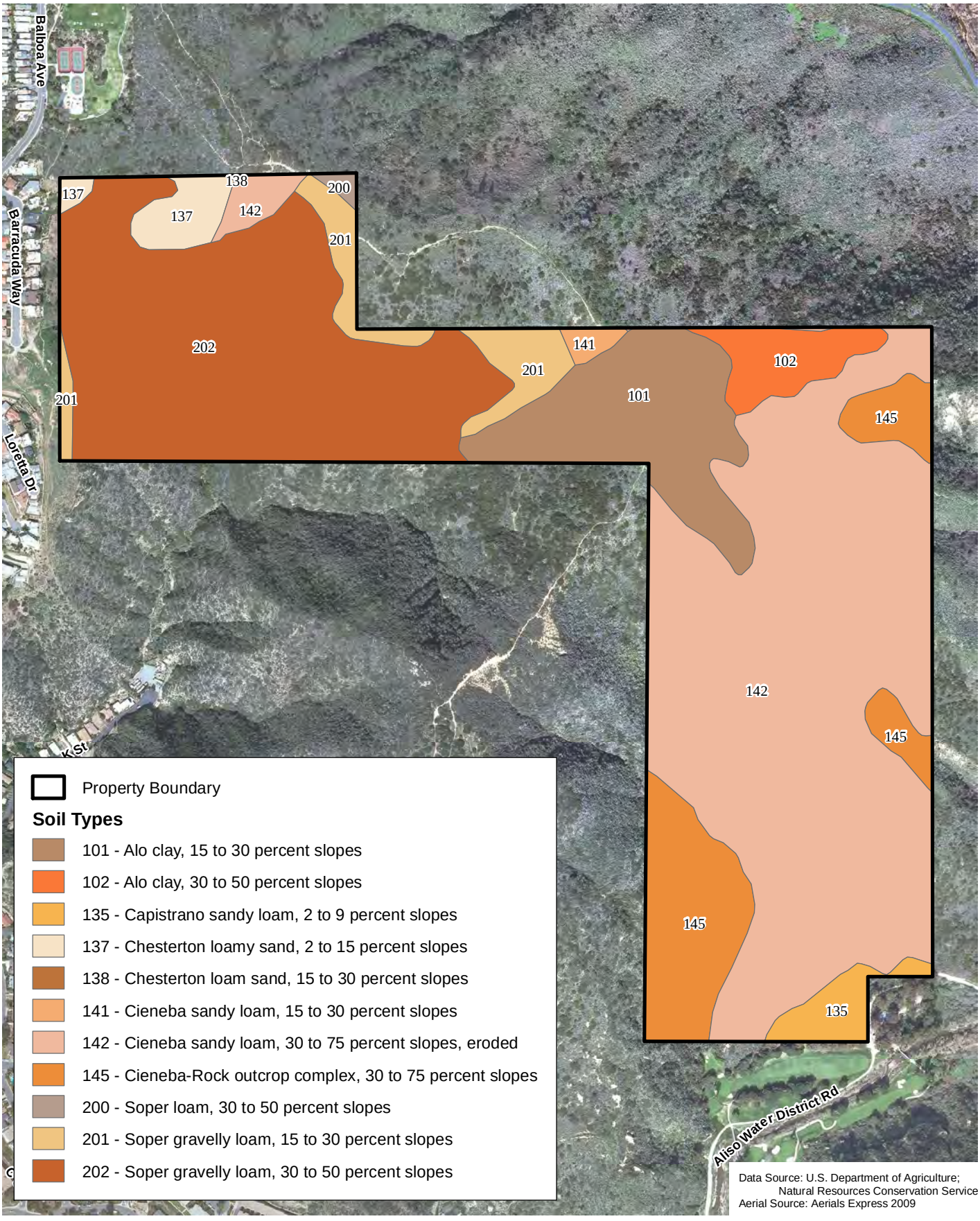
N W E S

2,000 1,000 0 2,000

Feet

BonTerra PSOMAS

(Rev: 09-22-2015 LEW) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\Ex2_USGS_20150922.pdf



D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\ex_Soils.mxd

Soil Types

Exhibit 3

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

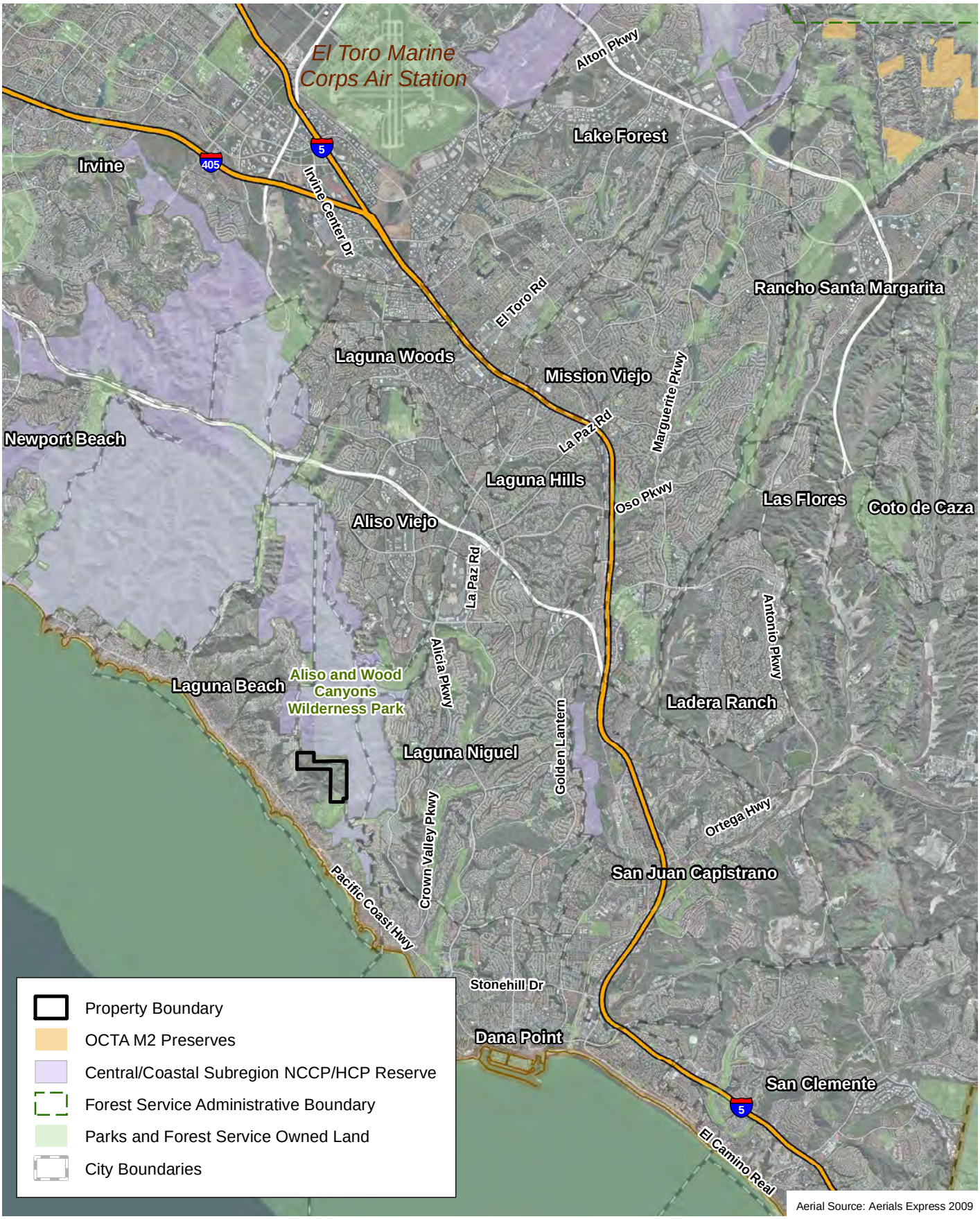
N W E S

600 300 0 600

Feet

BonTerra PSOMAS

(Rev: 6-22-2015 JAZ) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\ex3_Soils.pdf



D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\ex_RegionalEnvironmentalSetting.mxd

Regional Environmental Setting

Exhibit 4

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

N W E S

2 1 0 2 Miles

BonTerra PSOMAS

(Rev: 6-29-2015 JAZ) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\ex4_RegionalEnvironmentalSetting.pdf

Hobo Canyon are mapped by the National Wetlands Inventory as temporarily flooded Riverine and Palustrine wetlands (USFWS 2006). The property is within the Orange County Central-Coastal Subregion NCCP/HCP; the northern and eastern property boundaries abut the NCCP/HCP reserve.

1.2.3 Fire History

There are various hypotheses regarding the fire history of Southern California, what constitutes a "natural" fire regime, and the role of fire for chaparral plant species. Traditionally, the fire season in Southern California is from May through September (OCFA 2007). In the past, fires were started by lightning and typically moved down slopes due to falling brands and coals. According to one school of thought, fires only occasionally formed the hot runs on steep slopes that are typical of today's fires, and large, intense fires were uncommon (Howard 1992). This fire regime resulted in a mosaic of numerous small burns. New fires were limited by recently burned regions with very little fuel; dead wood and other fuels could not accumulate for long. However, an opposing hypothesis is that large, high-intensity chaparral fires were regular occurrences in the 19th century, often driven by severe weather that involved high temperatures, low humidity, and high winds (Keeley and Zedler 2009).

Mediterranean shrub communities, including those types found on the property, are resilient to infrequent wildfires and historically burned at a frequency of every 30 to 150 years (Halsey 2005). Many plant species associated with chaparral and scrub communities exhibit characteristics that constitute adaptations to fire. A new fire will typically burn hot and high into the canopy, killing much of the aboveground biomass. These canopy fires facilitate seed establishment by removing shrub cover and eliminating competing species. In the first few years after a fire, herbs and herbaceous shrubs—such as deerweed (*Acmispon glaber*), lupines (*Lupinus* spp.), paintbrushes (*Castilleja* spp.), and phacelias (*Phacelia* spp.)—are abundant. Because chaparral fires burn nitrogenous compounds in plant tissues and detritus, there is a large loss of nitrogen from the ecosystem. This allows species equipped with nitrogen-fixing bacteria to grow quickly after a fire.

While herbaceous species are establishing, the previously dominant chaparral species are also returning. Many chaparral species rely on fire to release and germinate seeds. Others resprout from roots or buds at the base of the stem. As the shrub canopy closes, whether due to resprouting of individuals burned by the fire or due to seedling growth, these herbaceous species decrease in abundance.

Although fires are a natural part of chaparral and scrub communities, both unnatural increases and decreases in fire frequency can have a negative impact. Now, nearly all wildfires are started by humans, either through arson or accidents (Schoenherr 1992). While the fire season traditionally occurred from May through September, in the past 15 years, Orange County has experienced its most devastating wildfires from October through April (OCFA 2008). Drought conditions contribute to an increase in dead fuels, drier and more explosive fuels, and more intense fire behavior. In addition, sustained Santa Ana Winds increase the speed of fire and magnify the effects on the available fuel bed. Santa Ana Winds are strong, warm, and dry and flow down into the valleys when stable; during these conditions, high-pressure air is forced across and then down the lee-side slopes of a mountain range. The descending air is warmed and dried, which produces critical fire weather conditions.

Anthropogenic increases in fire frequency can change the natural resilience of native communities. With a high frequency of fires, plants may not store enough energy between fires to resprout from roots or buds. In general, when an area burns too often for the community to mature, native plants may not be able to maintain dominance, often resulting in a habitat type conversion. Ruderal species, including annual grasses and invasive forbs, often thrive in post-

fire conditions. As a result, fires often promote the spread of non-native species into native habitats. In turn, this high degree of non-native grass and forb cover can lead to more frequent fire return intervals (e.g., intervals of less than eight years have been reported) (Minnich and Dezzani 1998).

A decrease in fire frequency may also hinder reproduction of fire-adapted species. In the past, government agencies tried to prevent and stop the spread of wildfires through a policy of fire suppression. These efforts were found to be unsuccessful, and they occasionally resulted in larger and more catastrophic fires. While they are less frequent, unnaturally large fires may burn so hot and intense that the canopy, roots, and even the seeds of fire-adapted plants are destroyed. Habitat type conversion may occur in scrub and chaparral communities where fire suppression allows oaks to increase in density (McCreary 2004). When fire is not allowed to regenerate the understory of oak savannahs, the shrub component increases and more severe, crown-consuming fires may result.

Over the past 60 years, Orange County has experienced a number of major (i.e., burned greater than 2,000 acres, burned for an extended period or time, and/or resulted in extraordinary property loss) wildland fires, including 20 that burned over 2,000 acres (OCFA 2008). However, no significant fire has been reported in Aliso and Wood Canyons Wilderness Park according to the California Department of Forestry and Fire Protection (CAL FIRE).

1.2.4 Climate

Southern California experiences a Mediterranean climate characterized by mild, rainy winters and hot, dry summers. There can also be dramatic differences in rainfall from year to year. Consequently, the vegetation types in the Southern California area consist of drought-tolerant, woody shrubs and trees and annual, fall/winter-sprouting grasses.

The temperature in Southern California is moderated by the coastal influence of the Pacific Ocean, which creates mild conditions throughout most of the year. The stable atmosphere creates cloudless conditions, producing dry summers and a subtropical climate with many days of sunshine (Ritter 2006). The most distinguishing characteristic of a Mediterranean climate is its seasonal precipitation. In Southern California, precipitation is characterized by brief, intense storms generally between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms over a close span of time. Rainfall patterns are subject to extreme variations from year to year and longer-term wet and dry cycles.

In the region, the average daily temperature in the summer[1] is approximately 69 degrees Fahrenheit (°F). The average daily temperature in the winter is approximately 56°F. The region receives an average of 13.8 inches of rain per year; the majority of this rain falls in the winter months, which receive an average of 8.5 inches; summer rain is approximately 0.20 inch (WRCC 2015).

1.2.5 Anthropogenic Uses of the Property

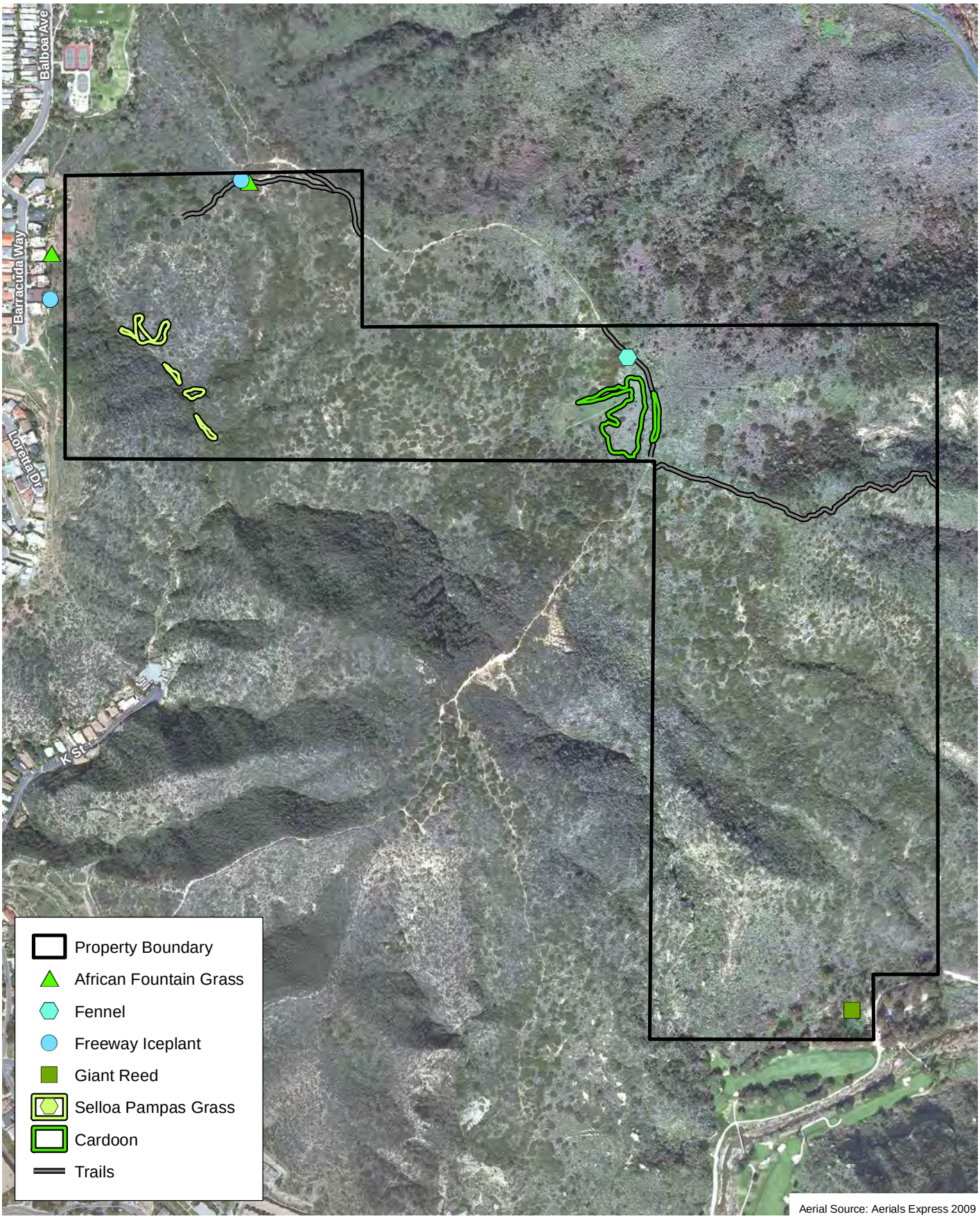
The Tongva Native Americans originally inhabited the Aliso Creek and Laguna Lakes area (LBHS 2015). Juan Rodriguez Cabrillo arrived in 1542, but the land did not undergo significant change until the establishment of the California missions by Junipero Serra and a ranching culture. According to the City of Laguna Beach General Plan Open Space/Conservation Element (Laguna Beach 2006), the city was one of the only coastal Southern California areas excluded from the Mexican land grants of the 1840s, which resulted in it being subject to

[1] Seasons are climatological; winter is considered to be December, January and February, and summer is considered to be June, July, and August.

homestead claims in the 1880s. In the late 1880s and early 1900s, it became popular as a vacation and resort town, and much of the flatter property was subdivided. Development in the late 1950s and mid-1960s primarily occurred in the more accessible ridgelines, hilltops, and hillsides.

A review of historic aerial photographs of the property shows that, in general, vegetation communities have not significantly altered since 1939. The residential development at the northern end of the property is in the process of being built in aerial photographs from 1967. Structures in Aliso Canyon at the southern end of the property are evident in 1963 aerials. Buildings or otherwise significant structures are not identified in the historic aerials on the property.

Anthropogenic features on the property are shown on Exhibit 5. The property is currently used by hikers and mountain bikers; the trails on the property are included in the trail network of the *Laguna Beach General Plan* Open Space/Conservation Element as “trails on private property” (Laguna Beach 2006). Relatively little trash (e.g., cans, bottles, golf balls) was observed during the surveys. Evidence of grazing is not present on this property.



D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\Ex_Anthrop_Invasive_20150917.mxd

Anthropogenic Features and Invasive Species

Exhibit 5

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

N W E S

600 300 0 600

Feet

BonTerra PSOMAS

(Rev: 09-17-2015 LEW) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\Ex5_Anthrop_Invasive_20150917.pdf

2.0 SURVEY METHODS

This section describes the methods used to conduct the literature review; perform general biological surveys, vegetation mapping, focused biological surveys, and a jurisdictional delineation; and assess the property's potential to support special status species. A cumulative list of all plant and wildlife species observed on the property is included as Appendices A-1 and A-2, respectively. Photographs of the property are included as Appendix B.

2.1 LITERATURE REVIEW

BonTerra Psomas conducted a literature search to identify special status plants, wildlife, and habitats reported to occur in the vicinity of the Aliso Canyon property. This search included a review of the USGS' Laguna Beach and San Juan Capistrano 7.5-minute quadrangles in the California Native Plant Society's (CNPS') Locational Inventory of Rare and Endangered Vascular Plants of California (CNPS 2015a) and the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2015a). The *City of Laguna Beach General Plan* was reviewed for species of local concern reported from Hobo and Aliso Canyons. In addition, a species list was obtained from the USFWS' Information, Planning, and Conservation System (IPaC) for the property.

2.2 VEGETATION MAPPING AND GENERAL SURVEYS

BonTerra Psomas Senior Biologist Allison Rudalevige and Biologist Jonathan Aguayo conducted a general survey to describe and map the vegetation types on the property on March 25, 2015; Ms. Rudalevige refined the vegetation mapping for the southern end of the site on April 9, 2015. Nomenclature for vegetation types follows *A Manual of California Vegetation* (Sawyer et al. 2009) for recognized Alliances or Associations.[2] Vegetation was mapped in the field on an aerial photograph at a scale of 1 inch equals 300 feet (1″=300′).

The general surveys included an evaluation of the property's potential to support special status plant and wildlife species, with special focus on M2 NCCP/HCP Covered Species. Covered Species include intermediate mariposa lily (*Calochortus weedii* var*. intermedius*), southern tarplant (*Centromadia parryi* ssp. *australis* [*Hemizonia p.* ssp. *a.*]), many-stemmed dudleya (*Dudleya multicaulis*), arroyo chub (*Gila orcutti*), Blainville's [coast] horned lizard (*Phrynosoma blainvillii*), orange-throated whiptail (*Aspidoscelis hyperythra* [*Cnemidophorus h.*]), Pacific [western] pond turtle (*Actinemys marmorata* [*Emys m.*]), southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), coastal California gnatcatcher (*Polioptila californica californica*), bobcat (*Lynx rufus*), and mountain lion (*Puma concolor* [*Felis c.*]). Suitable habitat and/or observed individuals were documented in field notes and with global positioning system (GPS) units, and a CNDDB form was filled out for each occurrence.

During field surveys, natural or physical resources and opportunities were identified (mapped and included in field notes) that "preserve, restore and enhance aquatic, riparian and terrestrial natural communities and ecosystems that support Covered Species" (OCTA 2010). Resources that provide valuable enhancement, restoration, or preservation opportunities were mapped and documented in field notes, such as significant stands of non-native species requiring eradication/control; presence of rock outcroppings that provide niche areas for unusual plants, bats, ringtails (*Bassariscus astutus*), or other species; nesting cavities; large mammal burrows;

[2] Alliance is "a classification unit of vegetation, containing one or more associations and defined by one or more diagnostic species, often of high cover, in the uppermost layer or the layer with the highest canopy cover". Association is "a vegetation classification unit defined by a diagnostic species, a characteristic range of species composition, physiognomy, and distinctive habitat conditions" (Sawyer et al. 2009).

avian rookeries/roosts; and dens. This may include significant stands of invasive plant species based on the California Invasive Plant Council (Cal-IPC) Inventory. Anthropogenic influences/structures on the property (e.g., paved and unpaved roads, trails, cell towers, water towers, abandoned vehicles, and/or "dumped" trash or debris) were also documented. GPS devices were utilized for recording all point locations.

Plant species were identified in the field or collected for subsequent identification using keys in Baldwin et al. (2012), Hickman (1993), and Munz (1974). Taxonomy follows the Jepson eFlora (Jepson Herbarium 2014); where the Jepson eFlora does not recognize a taxon, naming conforms to Baldwin et al. (2012), Hickman (1993), or current scientific data (e.g., scientific journals) for scientific and common names. Active searches for reptiles and amphibians included lifting, overturning, and carefully replacing rocks and debris. Birds were identified by visual and auditory recognition. Surveys for mammals were conducted during the day and included searching for and identifying diagnostic sign including scat, footprints, burrows, and trails. Taxonomy and nomenclature for wildlife generally follows Crother (2012) for amphibians and reptiles, the American Ornithologists' Union (AOU 2013) for birds, and the Smithsonian National Museum of Natural History (SNMNH 2011) for mammals. All species observed were recorded in field notes and are included in Appendices A-1 and A-2.

2.3 FOCUSED BIOLOGICAL SURVEYS

Focused biological surveys were conducted in 2015 for special status plant species and the coastal California gnatcatcher. Surveys were conducted in suitable habitat based on the Senior Biologists' best professional judgment.

2.3.1 Special Status Plant Species

Special status plant surveys were floristic in nature and were conducted following the *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009). Target species included the following Covered Species: intermediate mariposa lily (*Calochortus weedii* var. *intermedius*) and many-stemmed dudleya (*Dudleya multicaulis*).

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 4.4 inches of precipitation between March 1, 2014, and February 28, 2015 (data taken from Laguna Beach Station No. 044647) (WRCC 2015). The average annual precipitation for this area is approximately 12.1 inches. In years of low or unusual rainfall patterns, monitoring of reference populations is important in order to ensure that the surveys were comprehensive. Prior to conducting the field surveys, accessible reference populations of target species known in the Orange County area were monitored to ensure that the scheduled surveys were comprehensive and conducted during the appropriate blooming period for these species. Many-stemmed dudleya was confirmed blooming at the University of California, Irvine, Ecological Reserve on March 24, 2014, and intermediate mariposa lily was confirmed blooming in Bee Canyon on May 14, 2015. Rainfall throughout the region was below average for the year. Although reference populations and regional rainfall amounts were monitored to ensure the scientific adequacy of these focused surveys, there is always a minimal potential for false negative survey results, as species could possibly be present on a site but may not be detectable at the time of the surveys.

The survey area for special status plant species consisted of the entire property. Botanical data were collected concurrent with vegetation mapping on March 25, 2015; additional surveys were conducted on May 20, 2015, by Ms. Rudalevige and field assistant Matheson Lowe, and on June 7, 2015, by Ms. Rudalevige. Systematic walking surveys were conducted in all areas of suitable special status plant habitat (e.g., sage scrub, openings in chaparral, ridgelines, canyon

bottoms); binoculars were used to search for plants in areas considered inaccessible due to steep terrain or high shrub density. The habitat preferences of target species (see Table 8, below) were compared to the resources on site (e.g., community associations, soil, slope, shade) to determine which portions of the property represented suitable habitat. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for later identification. Plants were identified to the taxonomic level necessary to determine whether or not they are a special status species using taxonomic keys, descriptions, and illustrations in Baldwin et al. (2012), Hickman (1993), and Munz (1974). Taxonomy and nomenclature follow the CNPS (2015b) for special status species and the Jepson eFlora (Jepson Herbarium 2014) for other species. Any voucher specimens collected would be deposited at the herbarium at Rancho Santa Ana Botanic Gardens in Claremont, California.

2.3.2 Coastal California Gnatcatcher

Surveys for the coastal California gnatcatcher were conducted in accordance with the guidelines issued by the USFWS for areas participating in an NCCP/HCP (USFWS 1997). These guidelines stipulate that three surveys must be conducted in suitable habitats with at least one week between site visits; the surveys can be conducted year-round. All visits must take place during the morning hours, and no more than 100 acres of suitable habitat may be surveyed per visit.

CDFW Environmental Scientist Christine Beck (USFWS Permit No. TE-15544A-2) and OCTA Biologist Lesley Hill conducted all coastal California gnatcatcher surveys on the Aliso Canyon property. Surveys were conducted on May 13, May 20, and June 20, 2015, between the hours of 6:00 AM and 10:30 AM in appropriate weather conditions (i.e., temperature averaged 65°F with a slight wind and 100 percent cloud cover). Surveys were conducted by slowly walking through all appropriate habitats, including the scrub and mixed scrub vegetation; approximately 75 acres was surveyed during each field visit. Surveys in the southern portion of the property were discontinued after the first visit determined that the steep habitat and dense chaparral vegetation were not suitable for the gnatcatcher. Recordings of coastal California gnatcatcher vocalizations were used to attempt to elicit responses for any gnatcatchers that might be present when gnatcatchers were not observed in suitable habitat after waiting/searching for approximately 10 to 15 minutes. All bird species detected during the survey were recorded.

2.4 JURISDICTIONAL DELINEATION

Drainages and waterbodies, which may include wetlands and other “waters of the U.S.”, are protected under Section 404 of the Clean Water Act (CWA) and are under the jurisdiction of the U.S. Army Corps of Engineers (USACE). Non-wetland “waters of the U.S.” are delineated based on the limits of the Ordinary High Water Mark (OHWM), which can be determined by a number of factors including erosion, the deposition of vegetation or debris, and changes in vegetation. The OHWM limits (i.e., active floodplain) occurring on the property were further verified using methodologies contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*, *A Delineation Manual* (Lichvar and McColley 2008), and in *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) In the Arid West Region of the Western United States* (Curtis and Lichvar 2010).

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This regional supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland “waters of the U.S.”. A three-parameter approach is used to identify wetlands and requires evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. Wetlands generally

include swamps, marshes, bogs, and similar areas. In order to be considered a wetland, an area must exhibit at least minimal hydric characteristics within the three parameters. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability of the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Section 401 of the CWA provides the Regional Water Quality Control Board (RWQCB) with the authority to regulate, through a Water Quality Certification, any proposed, federally permitted activity that may affect water quality. It should be noted that the RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters conditions are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM and/or the three-parameter wetlands methods pursuant to the 1987 Wetlands Manual.

The CDFW has jurisdictional authority over wetland resources associated with rivers, streams, and lakes pursuant to *California Fish and Game Code* Sections 1600 through 1616. The CDFW's jurisdiction is defined as the top of the bank to the top of the bank of the stream, channel, or basin or to the outer limit of riparian vegetation located within or immediately adjacent to the river, stream, creek, pond, or lake or other impoundment.

Waters in the "coastal zone" are regulated by the California Coastal Commission (CCC). Wetlands under Section 30121 of the Coastal Act are defined as "lands within the coastal zone which may be covered periodically or permanently with shallow water and includes salt marshes, freshwater marshes, open and closed brackish water marshes, swamps, mudflats, and fens". The wetland boundary is based on a "one parameter" definition determined by at least one of the following: hydrology, hydric soils, and hydrophytic vegetation. The CCC approved the City of Laguna Beach's Local Coastal Program in 1993; however, the Hobo Canyon Area of Deferred Certification is currently uncertified.

The jurisdictional delineation was conducted by Ms. Rudalevige and Psomas Biologist Tanessa Hartwig on July 7, 2015, to describe and map the extent of resources under the jurisdiction of the USACE, the RWQCB, and the CDFW. Jurisdictional features were delineated on a 1 inch equlas 300 feet (1"=300') scale aerial photograph either as a drainage centerline with corresponding width measurements or, for riparian vegetation canopy clearly visible on aerial imagry, as a polygon. Inaccessible areas were mapped remotely.

3.0 EXISTING BIOLOGICAL RESOURCES

This section describes the biological resources that occur or potentially occur on the Aliso Canyon property. Vegetation types, wildlife populations and movement patterns, and special status biological resources are discussed below.

3.1 VEGETATION TYPES AND OTHER AREAS

Fourteen vegetation types and other areas occur on the Aliso Canyon property, as shown in Table 1 and Exhibit 6. Descriptions of these vegetation types are provided below. Note that classification follows Gray and Bramlet (1992), which is a regional classification system for Orange County, and these names are grouped according to the general vegetation types used in the NCCP/HCP (i.e., chaparral, scrub, grassland, barren, and developed/non-native). In the vegetation descriptions below, each vegetation type is also cross-walked to *A Manual of California Vegetation* (Sawyer et al. 2009), which is commonly used by the resource agencies.

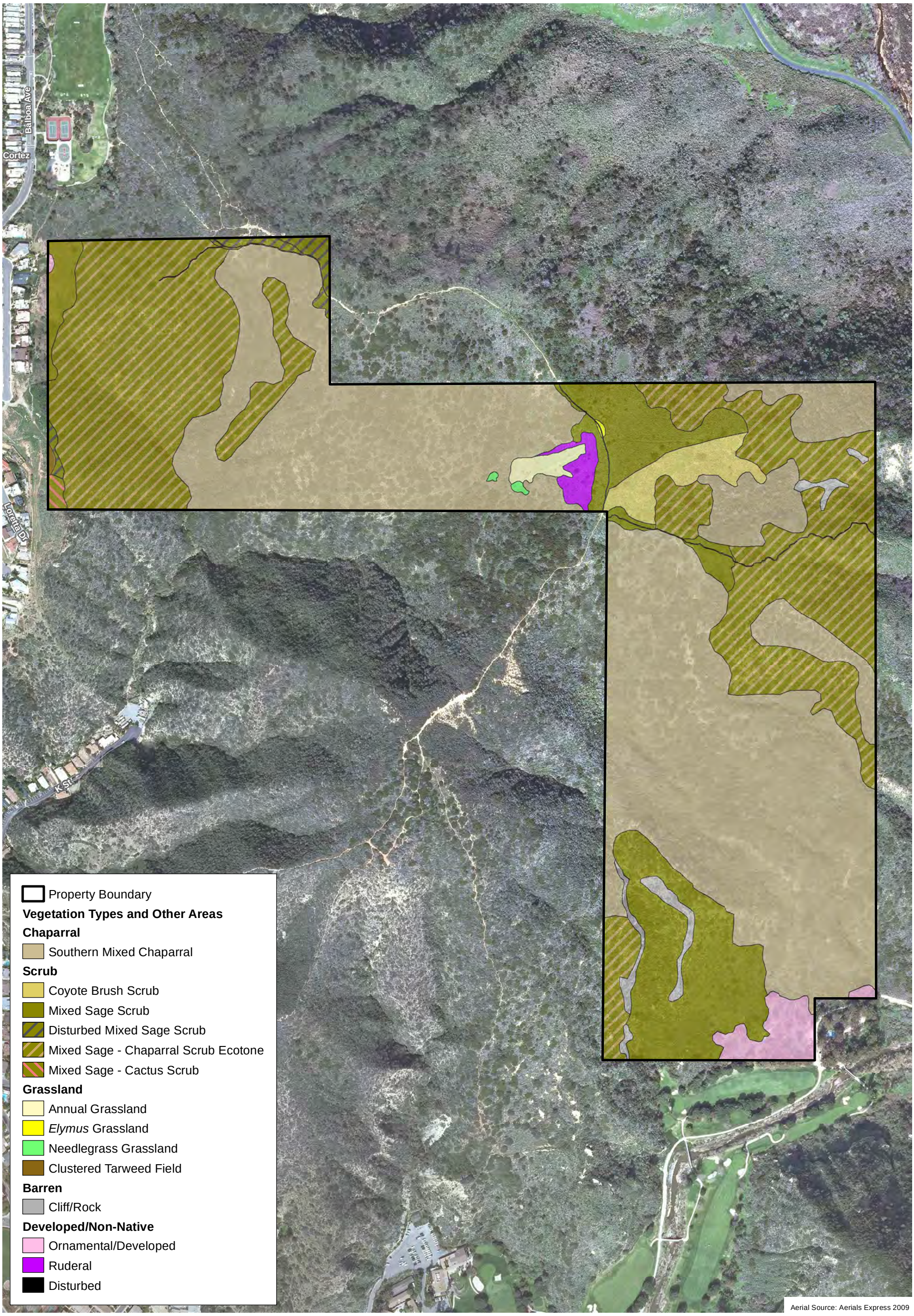
TABLE 1
VEGETATION TYPES AND OTHER AREAS ON
THE ALISO CANYON PROPERTY

General Vegetation Types	Vegetation Types and Other Areas	Amount on Property (Acres)
Chaparral	southern mixed chaparral	78.18
	Chaparral Subtotal	*78.18*
Scrub	coyote brush scrub	2.79
	mixed sage scrub	17.77
	disturbed mixed sage scrub	1.25
	mixed sage–chaparral scrub ecotone	44.59
	mixed sage–cactus scrub	0.29
	Scrub Subtotal	*66.69*
Grassland	annual grassland	0.79
	Elymus grassland	0.05
	needlegrass grassland	0.11
	clustered tarweed field	0.09
	Grassland Subtotal	*1.04*
Barren	cliff/rock	1.56
	Barren Subtotal	*1.56*
Developed/Non-Native	ornamental/developed	2.43
	ruderal	1.00
	disturbed	0.24
	Developed/Non-Native Subtotal	*3.67*
	Total Acreage	***151.14***

Chaparral

Southern Mixed Chaparral

A total of 78.18 acres of southern mixed chaparral occurs on slopes throughout the property and is the predominant vegetation. This vegetation type is dominated by large, evergreen shrubs such as lemonade berry (*Rhus integrifolia*), laurel sumac (*Malosma laurina*), and spiny redberry



D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\Ex_Veg_20150921.mxd

Vegetation Types and Other Areas

Exhibit 6

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

N W E S

425 212.5 0 425 Feet

Bonterra PSOMAS

(Rev: 09-22-2015 LEW) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\Ex6_Veg_20150921.pdf

(*Rhamnus crocea*); vegetative cover is generally very dense. Scattered sage scrub species, such as California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), and coastal prickly pear (*Opuntia littoralis*) are also present. Understory species, where present, include needlegrass (*Stipa* sp.), blue dicks (*Dichelostemma capitatum*), and splendid mariposa lily (*Calochortus splendens*). This vegetation type most closely corresponds to a mix of the *Rhus integrifolia* Shrubland Association and *Malosma laurina* Shrubland Association in Sawyer et al. (2009).

Scrub

Coyote Brush Scrub

A total of 2.79 acres of coyote brush scrub occurs on a southeastern-facing slope near the center of the property. This vegetation type is dominated by coyote brush (*Baccharis pilularis*) with California sagebrush and bush monkeyflower (*Mimulus aurantiacus*) also present. Giant wildrye (*Elymus condensatus*) and cardoon (*Cynara cardunculus*) are present at the top of the slope. This vegetation type most closely corresponds to the *Baccharis pilularis–Artemisia californica* Shrubland Association in Sawyer et al. (2009).

Mixed Sage Scrub

A total of 17.77 acres of mixed sage scrub occurs on slopes throughout the property. This vegetation type is dominated by species such as black sage, California buckwheat (*Eriogonum fasciculatum*), and California sagebrush. Some areas have scattered lemonadeberry and laurel sumac. In some places, the shrub cover is dense while other areas are more open. This vegetation type most closely corresponds to a mix of the *Artemisia californica* Shrubland Association and the *Eriogonum fasciculatum–Salvia mellifera* Shrubland Association in Sawyer et al. (2009).

Disturbed Mixed Sage Scrub

A total of 1.25 acres of disturbed mixed sage scrub occurs along the northern edge of the property. This area has a similar species composition of mixed sage scrub, but has encroaching non-native species such as freeway iceplant (*Carpobrotus edulis*) and Selloa pampas grass (*Cortaderia selloana*). This area is also disturbed by foot-traffic and off-road bicycle use. This vegetation type most closely corresponds to a mix of the *Artemisia californica* Shrubland Association, the *Eriogonum fasciculatum–Salvia mellifera* Shrubland Association, and the *Carpobrotus edulis* Semi-natural Herbaceous Stand in Sawyer et al. (2009).

Mixed Sage–Chaparral Scrub Ecotone

A total of 44.59 acres of mixed sage–chaparral scrub ecotone generally occurs on slopes between the southern mixed chaparral and mixed sage scrub. This vegetation type represents a transition between the two communities instead of an abrupt change in vegetation. It contains a mix of both chaparral and sage scrub species.

Mixed Sage–Cactus Scrub

A total of 0.29 acre of mixed sage–cactus scrub occurs along the ridgeline at the western end of the property. This vegetation type consists of a mix of sage scrub species, such as California sagebrush and California buckwheat, with large patches of coastal prickly pear. There is a discontinuous shrub canopy with bare ground between the shrubs. This vegetation type most closely corresponds to the *Opuntia littoralis*–Mixed Coastal Sage Scrub Association in Sawyer et al. (2009).

Grassland

Annual Grassland

A total of 0.79 acre of annual grassland occurs as a large patch on a western-facing slope in the center of the property. This vegetation type is dominated by wild oat (*Avena fatua*). Towards the bottom of the slope there is an increasing density of native species, such as western blue-eyed-grass (*Sisyrinchium bellum*), blue dicks, needlegrass (*Stipa* sp.), and Catalina mariposa lily (*Calochortus catalinae*). This vegetation type most closely corresponds to the *Avena fatua* Semi-Natural Herbaceous Stand in Sawyer et al. (2009).

Elymus Grassland

A total of 0.05 acre of Elymus grassland occurs on the ridgeline in the center of the property on either side of the trail. This vegetation type is dominated by giant wild rye. California sagebrush is present along the edge of this patch, and non-native grasses grow below the giant wild rye. This vegetation type most closely corresponds to the *Leymus condensatus* Herbaceous Association in Sawyer et al. (2009).

Needlegrass Grassland

A total of 0.11 acre of needlegrass grassland occurs at the bottom of a western-facing slope below the annual grassland. While the dominant species is soft chess (*Bromus hordeaceus*), this vegetation type is characterized by native needlegrass at approximately 15 percent cover. Other species scattered in this area include blue-eyed grass, Catalina mariposa lily, lemonade berry, and bush monkeyflower. This vegetation type most closely corresponds to one of the *Nassella* (spp.) Herbaceous Alliances in Sawyer et al. (2009).

Clustered Tarweed Field

A total of 0.09 acre of clustered tarweed field occurs along the ridgeline at the western end of the property. At the time of the surveys, this vegetation type was dominated by fascicled tarplant (*Deinandra fasciculata*); however, non-native grasses likely grow in this area at other times of the year. This vegetation type most closely corresponds to the *Deinandra fasciculata* Herbaceous Alliance in Sawyer et al. (2009).

Barren

Cliff/Rock

A total of 1.56 acres of cliff/rock occurs on the steep slopes at the southern end of the property. These areas consist of exposed, weathered rock face. Sawyer et al. (2009) does not provide a classification for this mapping unit.

Developed/Non-native

Ornamental/Developed

A total of 2.43 acres of ornamental/developed areas occurs along the northwestern and southern edges of the property. The northwestern area consists of landscaping from the surrounding residential development encroaching within the property boundary. The southern area consists of landscaping associated with the Aliso Creek Golf Course and includes a stand of gum trees (*Eucalyptus* sp.) and turf grass.

Ruderal

A total of 1.00 acre of ruderal vegetation occurs at the ridgeline and down a slope in the center of the property. This vegetation type is dominated by the non-native cardoon. Sawyer et al. (2009) does not provide a corresponding vegetation type for this area, but it may be considered functionally equivalent to *Centaurea* (*solstitialis*, *melitensis*) semi-natural herbaceous stands.

Disturbed

A total of 0.24 acre of disturbed areas occurs throughout the property and consist of dirt trails. These areas lack vegetation and are actively used by hikers and off-road cyclists. There is some erosion evident on the steeper trails. Sawyer et al. (2009) does not provide a classification for this mapping unit.

3.2 WILDLIFE POPULATIONS AND MOVEMENT PATTERNS

Vegetation on and adjacent to the property provides potential habitat for a number of wildlife species. Common wildlife species observed or expected to occur on the property and/or in adjacent off-site areas are discussed below.

3.2.1 Fish

Most creeks and waterways in Southern California are subject to periods of high water flow in winter and spring and little to no flow during the late summer and fall. Most drainages occurring on the property are expected to convey water only following storm events. While fish species are expected to occur in nearby Aliso Creek, no fish species were observed on the property, nor are they expected to occur due to lack of suitable habitat.

3.2.2 Amphibians

Amphibians require moisture for at least a portion of their life cycle and many require standing or flowing water for reproduction. Terrestrial species may or may not require standing water for reproduction; they survive in dry areas by aestivating (i.e., remaining beneath the soil in burrows or under logs and leaf litter, and emerging only when temperatures are low and humidity is high). Many of these species' habitats are associated with water, and they emerge to breed once the rainy season begins. Soil moisture conditions can remain high throughout the year in some habitat types depending on factors such as amount of vegetation cover, elevation, and slope/aspect.

Marginally suitable habitat for amphibian species occurs in the drainages on the property. No amphibian species were observed on the property. Common amphibian species that may occur on the property include garden slender salamander (*Batrachoseps major*), western toad (*Anaxyrus boreas*), and Pacific treefrog (*Pseudacris* [*Hyla*] *regilla*).

3.2.3 Reptiles

Reptiles are well-adapted to life in arid habitats. They have several physiological adaptations that allow them to conserve water. Reptiles can also become dormant during weather extremes, allowing them to survive prolonged droughts and paucity of food (Ruben and Hillenius 2005). Reptilian diversity and abundance typically varies with vegetation type and character. Many species prefer only one or two vegetation types; however, most species will forage in a variety of habitats. Most reptile species that occur in open areas will excavate a burrow or use rodent burrows for cover, protection from predators, and refuge during extreme weather conditions.

Common reptile species observed or expected to occur on the property include western fence lizard (*Sceloperus occidentalis*), side-blotched lizard (*Uta stansburiana*), and gopher snake (*Pituophis catenifer*).

3.2.4 Birds

A variety of bird species are expected to be residents on the property, using habitats throughout the year. Other species are present only during certain seasons. For example, the white-crowned sparrow (*Zonotrichia leucophrys*) is expected to occur on the property during the winter season, but would not occur in the summer season because it migrates north to its breeding range.

Resident bird species observed on the property include California quail (*Callipepla californica*), western scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), wrentit (*Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), spotted towhee (*Pipilo maculatus*), and California towhee (*Pipilo crissalis*). Urban-tolerant species that occur in disturbed areas and in natural vegetation types that were also observed on the property include mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), northern mockingbird (*Mimus polyglottos*), house finch (*Carpodacus mexicanus*), and lesser goldfinch (*Spinus* [*Carduelis*] *psaltria*).

Wintering birds are those species that generally breed outside the region but migrate to the area for the winter season. Wintering species that may occur on the property include white-crowned sparrow and fox sparrow (*Passerella iliaca*). Summer residents are species that migrate into the region to breed, but generally winter south of the region. Summer breeders that may occur on the property include black-chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), and hooded oriole (*Icterus cucullatus*). During spring and fall migration, the property also provides foraging habitat for a variety of migratory species.

Birds of prey (raptors) observed on the property include northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk (*Buteo jamaicensis*).

3.2.5 Mammals

Burrows provide cover for a number of small mammal species. Small ground-dwelling mammals observed or expected to occur on the property include California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and Bryant's woodrat (*Neotoma bryanti*).

Open grassland communities and the leafy understory of scrub and woodland communities provide excellent foraging habitat for herbivorous mammals. Common herbivores observed or expected to occur on the property include southern mule deer (*Odocoileus hemionus*) and desert cottontail (*Sylvilagus audubonii*).

Medium to larger mammalian predators (both carnivorous and omnivorous species) expected to occur on the property include common striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), and mountain lion.

Bat activity on the property may occur in the lower elevation canyons and ravines where the bats are most likely to find more abundant insect food. While there are no buildings or other man-made structures on the property, on-site cliffs would be suitable for roosting. The property also has some potential to support roosting bats in tree snags or under bark; however, the closed nature of the chaparral habitat provides limited open areas suitable for foraging. Species such as the Brazilian free-tailed bat (*Tadarida brasiliensis*) and big brown bat (*Eptesicus fuscus*) may occur on the property.

3.2.6 Wildlife Movement

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990). Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other necessary resources (Noss 1983; Fahrig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (e.g., foraging for food or water, defending territories or searching for mates, breeding areas, or cover). A number of terms such as "wildlife corridor", "travel route", "habitat linkage", and "wildlife crossing" have been used in various wildlife movement studies to refer to areas in which wildlife moves from one area to another. To clarify the meaning of these terms and to facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

- **Travel Route**—a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and to provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another. It contains adequate food, water, and/or cover while moving between habitat areas, and it provides a relatively direct link between target habitat areas.

- **Wildlife Corridor**—a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bound by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and to facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat linkages" or "landscape linkages") can provide both transitory and residential habitat for a variety of species.

- **Wildlife Crossing**—a small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These obstacles often represent "choke points" along a movement corridor, which may impede wildlife movement and increase the risk of predation.

It is important to note that, in a large open space area where there are few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors (as defined

above) may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and to provide a variety of travel routes (e.g., canyons, ridgelines, trails, riverbeds, and others), wildlife will use these "local" routes while searching for food, water, shelter, and mates and will not need to cross into other large open space areas. Based on their size, location, vegetative composition and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles (such as roads and highways), the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise or lighting) that would generally hinder wildlife movement.

In general, animals discussed within the context of movement corridors typically include larger, more mobile species (such as southern mule deer, black bear [*Ursus americanus*], mountain lion, fox [*Urocyon* sp.], and coyote) and even some of the mid-sized mammals (such as raccoon [*Procyon lotor*], striped skunk, American badger [*Taxidea taxus*], and Virginia opossum [*Didelphis virginiana*]). Most of these species have relatively large home ranges through which they move to find adequate food, water, and breeding and wintering habitat. It is assumed that corridors that serve larger, more fragile species also serve as corridors for many smaller, less mobile species, such as reptiles, amphibians, and rodents (generally discussed within the context of local movement). Regional movement for these species facilitates gene flow and requires at least some local "stepping stone" movement of individuals between populations.

The availability of open space corridors is generally considered less important for bird species. Most bird species are believed to fly in more or less direct paths to desired locations; however, some habitat-specific species may not move great distances from their preferred habitat types and are believed to be less inclined to travel across unsuitable areas.

Ideally, an open space corridor should encompass a heterogeneous mix of vegetation types to accommodate the ecological requirements of a wide variety of resident species in any particular region. Most species typically prefer adequate vegetation cover during movement, which can serve as both a food source and as protection from weather and predators. Drainages, riparian areas, and forested canyon bottoms typically serve as natural movement corridors because these features provide cover, food, and often water for a variety of species. Very few species will move across large expanses of open, uncovered habitat unless it is the only option available to them. For some species, landscape linkages must be able to support animals for sustained periods, not just for travel. Smaller or less mobile animals (such as rodents and reptiles) require long periods to traverse a corridor, so the corridor must contain adequate food and cover for survival.

Local Movement

The Aliso Canyon property contains multiple ridgelines and canyons (such as the upper end of Hobo Canyon) that provide a variety of travel routes for local wildlife movement. The trails on the property may also be used for movement. Movement is expected to occur on the property as well as between the property and contiguous off-site habitat.

Regional Movement

The relatively undeveloped nature of the landscape on and surrounding the Aliso Canyon property is highly conducive to regional wildlife movement. Wildlife moving across the property are not presently confined to a "corridor", as described above. The property is contiguous with

approximately 4,500 acres of undeveloped open space in Aliso and Wood Canyons Wilderness Park to the north and east. The southern boundary of the western half of the property is contiguous with approximately 171 acres of open space as part of the Driftwood Estates and Pacific Triangle dedications. Wildlife movement is relatively unhindered across these areas, with minimal barbed wire fencing and trails along the property boundary and no major roads or development.

To the south, wildlife movement between the property and the wilderness park on the northern-facing slopes of Aliso Canyon is hindered to some extent by the upper portion of the Aliso Canyon Golf Course; however, wildlife is still expected to cross this area, especially at night when the golf course is closed. While there are patches of open space in canyons west of the northern end of the property, these areas are separated by residential development. Wildlife traveling to these canyons would have two options: (1) cross Balboa Avenue in an approximate 150-foot corridor between residences at the northwestern end of the property or (2) move south down Hobo Canyon and across slopes adjacent to residential development to cross Nyes Place.

3.3 SPECIAL STATUS BIOLOGICAL RESOURCES

This section addresses special status biological resources that were observed, reported, or have the potential to occur on the property or in adjacent off-site areas. These resources include plant and wildlife species that have been afforded special status and/or recognition by federal and State resource agencies and private conservation organizations. In general, the principal reason an individual taxon (i.e., species, subspecies, or variety) is given such recognition is the documented or perceived decline or limitations of its population size, geographic range, and/or distribution resulting in most cases from habitat loss. Tables 3 and 8, respectively, provide a summary of special status plant and wildlife species known to occur in the vicinity of the Aliso Canyon property (i.e., the USGS' Laguna Beach and San Juan Capistrano 7.5-minute quadrangles) and include information on the status, habitat, potential for occurrence, results of focused survey efforts, and definitions for the various status designations. Generally, this list includes species reported by the CNDDB and CNPS, supplemented with species from the author's experience that either occur nearby or could occur based on the presence of suitable habitat. In addition to species, special status biological resources include vegetation types and habitats that are either unique, of relatively limited distribution in the region, or of particularly high wildlife value. These resources have been defined by federal, State, and local government conservation programs. Sources used to determine the status of biological resources are listed below.

- **Plants**—Taxonomic and Status Inventory of Rare and Endangered Vascular Plants of California (CNPS 2015b); the CNDDB (CDFW 2015a); an official species list provided by the USFWS; various USFWS *Federal Register* notices regarding the listing status of plant species; and the *List of Special Vascular Plants, Bryophytes, and Lichens* (CDFW 2015c).

- **Wildlife**—California Wildlife Habitat Relationships Database System (CDFW BDB 2014); the CNDDB (CDFW 2015a); an official species list provided by the USFWS; various USFWS *Federal Register* notices regarding listing status of wildlife species; and the *List of Special Animals* (CDFW 2015b).

- **Habitats**—the CNDDB (CDFW 2015a) and the *List of Vegetation Alliances and Associations, Vegetation Classification and Mapping Program* (CDFG 2010).

3.3.1 Definitions of Special Status Biological Resources

A **federally Endangered species** is one facing extinction throughout all or a significant portion of its geographic range. A **federally Threatened species** is one likely to become Endangered in the foreseeable future throughout all or a significant portion of its range. The presence of any federally Threatened or Endangered species in a project impact area generally imposes severe constraints on development, particularly if a project would result in "take" of the species or its habitat. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct. "Harm", in this sense, can include any disturbance of habitats used by the species during any portion of its life history.

Proposed species or **Candidate species** are those officially proposed by the USFWS for addition to the federal Threatened and Endangered species lists. Because proposed species may soon be listed as Threatened or Endangered, these species could become listed prior to or during implementation of a proposed project. The presence of a Proposed or Candidate species in a project impact area may impose constraints on development if they are listed prior to issuance of project permits, particularly if a project would result in "take" of the species or its habitat.

The State of California considers an **Endangered species** as one whose prospects of survival and reproduction are in immediate jeopardy; a **Threatened species** as one present in such small numbers throughout its range that it is likely to become an Endangered species in the near future in the absence of special protection or management; and a **Rare species** as one present in such small numbers throughout its range that it may become Endangered if its present environment worsens. "Rare species" applies only to California native plants. State-listed Threatened and Endangered species are protected against take unless an Incidental Take Permit is obtained from the resource agencies. The presence of any State-listed Threatened or Endangered species in a project impact area generally imposes severe constraints on development, particularly if a project would result in "take" of the species or its habitat.

California Species of Special Concern is an informal designation used by the CDFW for some declining wildlife species that are not State Candidates. This designation does not provide legal protection, but signifies that these species are recognized as special status by the CDFW. Recently, the CDFW downgraded some of these species from Species of Special Concern to the **Watch List.**

Species that are **California Fully Protected** and **Protected** include those protected by special legislation for various reasons, such as the mountain lion and white-tailed kite (*Elanus leucurus*). Fully Protected species may not be taken or possessed at any time. California Protected species include those species that may not be taken or possessed at any time except under special permit from the CDFW issued pursuant to the *California Code of Regulations* (Title 14, §650, §670.7) or Section 2081 of the *California Fish and Game Code.*

Species of **Local Concern** are those that have no official status with the resource agencies, but are being watched because there is either a unique population in the region or the species is declining in the region. Species listed in the *City of Laguna Beach General Plan* are included here.

Special Animal is a general term that refers to species that the CNDDB is interested in tracking, regardless of legal or protective status. This term includes species designated as any of the above terms, but also includes species that may be considered biologically rare; restricted in distribution; declining throughout their range; have a critical, vulnerable stage in their life cycle that warrants monitoring; are on the periphery of their range and are threatened with extirpation

in California; are associated with special status habitats; or are considered by other State or federal agencies or private organizations to be sensitive or declining.

The California Rare Plant Rank (CRPR), formerly known as CNPS List, is a ranking system by the Rare Plant Status Review group[3] and managed by the CNPS and the CDFW. A ranking is given based on information regarding the distribution, rarity, and endangerment of California's vascular plants. Plants with a CRPR of **1A** are presumed extinct in California because they have not been seen in the wild for many years. Plants with a CRPR of **1B** are Rare, Threatened, or Endangered throughout their range. Plants with a CRPR of **2A** are presumed extirpated from California, but are more common elsewhere. Plants with a CRPR of **2B** are considered Rare, Threatened, or Endangered in California, but are more common elsewhere. Plants with a CRPR of **3** require more information before they can be assigned to another rank or rejected; this is a "review" list. Plants with a CRPR of **4** are of limited distribution or infrequent throughout a broader area in California; this is a "watch" list. The CRPR Threat Rank is an extension added onto the CRPR to designate the level of endangerment by a 1 to 3 ranking (CNPS 2014). An extension of **.1** is assigned to plants that are considered to be "seriously threatened" in California (i.e., over 80 percent of the occurrences are threatened or have a high degree and immediacy of threat). Extension **.2** indicates the plant is "fairly threatened" in California (i.e., between 20 and 80 percent of the occurrences are threatened or have a moderate degree and immediacy of threat). Extension **.3** is assigned to plants that are considered "not very threatened" in California (i.e., less than 20 percent of occurrences are threatened or have a low degree and immediacy of threat or no current threats known). The absence of a threat code extension indicates plants lacking any threat information.

In addition to providing an inventory of special status plant and wildlife species, the CNDDB also provides an inventory of vegetation types that are considered special status by the State and federal resource agencies, academic institutions, and various conservation groups (such as the CNPS). Determination of the level of imperilment (i.e., exposure to injury, loss, or destruction) is based on the NatureServe Heritage Program Status Ranks that rank both species and vegetation types on a global (G) and statewide (S) basis according to their rarity; trend in population size or area; and recognized threats (e.g., proposed developments, habitat degradation, and non-native species invasion) (Faber-Langendoen et al. 2009). The ranks are scaled from 1 to 5. NatureServe considers **G1** or **S1** communities to be critically imperiled and at a very high risk of extinction or elimination due to extreme rarity, very steep declines, or other factors; **G2** or **S2** communities to be imperiled and at high risk of extinction or elimination due to very restricted range, very few populations or occurrences, steep declines, or other factors; **G3** or **S3** communities to be vulnerable and at moderate risk of extinction or elimination due to a restricted range, relatively few populations or occurrences, recent and widespread declines, or other factors; **G4** or **S4** communities to be apparently secure and uncommon but not rare with some cause for long-term concern due to declines or other factors; and **G5** or **S5** communities to be secure. A question mark (?) denotes an inexact numeric rank, but existing information points to this rank (Faber-Langendoen et al. 2009). For vegetation alliances[4] that have State ranks of S1–S3, all associations within the alliance are considered to be highly imperiled.

[3] This group consists of over 300 botanical experts from the government, academia, non-governmental organizations, and the private sector.

[4] A vegetation alliance is "a classification unit of vegetation, containing one or more associations and defined by one or more diagnostic species, often of high cover, in the uppermost layer or the layer with the highest canopy cover" (Sawyer et al. 2009).

3.3.2 Vegetation Types

Special status vegetation types observed on the property are described further below.

Chaparral

The predominant vegetation type on the Aliso Canyon property is southern mixed chaparral (78.18 acres). This vegetation type most closely corresponds to a mix of the *Rhus integrifolia* Shrubland Association and *Malosma laurina* Shrubland Association in Sawyer et al. (2009), which are ranked as G3 S3 and G4 S4, respectively.

Chaparral is a "drought tolerant plant community dominated by sclerophyllous, woody shrubs shaped by a Mediterranean-type climate and naturally recurring wildfires" (Halsey 2007). It is the most extensive vegetation community in California and is not presently considered to have special status by the resource agencies, though its status in the future may be uncertain given continuing drought conditions, increased fire frequencies, and limited understanding of the system. The City of Laguna Beach considers sumac-toyon chaparral to have moderate biological value (Marsh 1992).

Scrub

Coyote brush scrub (2.79 acres) most closely corresponds to the *Baccharis pilularis–Artemisia californica* Shrubland Association in Sawyer et al. (2009), which is ranked as G5 S5. Mixed sage scrub (17.77 acres) most closely corresponds to a mix of the *Artemisia californica* Shrubland Association and the *Eriogonum fasciculatum–Salvia mellifera* Shrubland Association in Sawyer et al. (2009), which are both ranked as G5 S5; disturbed mixed sage scrub (1.25 acres) is also present on the property. Mixed sage–chaparral scrub ecotone (44.59 acres) may be considered G3 S3 or G4 S4 (based on ranking of Associations of lemonade berry, black sage, and California sagebrush versus laurel sumac, California sagebrush, and California buckwheat). Mixed sage–cactus scrub (0.29 acre) most closely corresponds to *Opuntia littoralis*–mixed coastal sage scrub, which is ranked as G4 S3.

While the Global/State rankings of coyote brush scrub, mixed sage scrub, and disturbed mixed sage scrub indicate that they are secure or apparently secure, they are of local concern (Laguna Beach 2006) as part of the larger coastal sage scrub community and because they have potential to support Threatened or Endangered species. Coastal sage scrub had, as a whole, declined approximately 70 to 90 percent in its historic range in California by the mid-1990s (Noss and Peters 1995). Sage scrub has largely been lost to land use changes in Southern California basins and foothills. The ecological function of Southern California's remaining sage scrub is threatened by habitat fragmentation and degradation, which is largely the result of invasive non-native species, livestock grazing, off-highway vehicles, altered fire regime, and air pollution (O'Leary 1995; Allen et al. 2000).

Grassland

Annual grassland (0.79 acre) is considered to be a semi-natural herbaceous stand and therefore is not given a ranking. Elymus grassland (0.05 acre) most closely corresponds to the *Leymus condensatus* Herbaceous Association in Sawyer et al. (2009), which is ranked as G3 S3. Needlegrass grassland (0.11 acre) most closely corresponds to one of the *Nassella* (spp.) Herbaceous Associations in Sawyer et al. (2009), which are ranked as either G4 S3? (for *N. cernua* and *N. pulchra*) or G3? S3? (for *N. lepida*). The clustered tarweed field (0.09 acre) most closely corresponds to the *Deinandra fasciculata* Herbaceous Alliance in Sawyer et al. (2009), which is ranked as G3? S3?.

Native grasslands, which once may have covered nearly $^1/_5$ of the State, have declined by approximately 99 percent in their historic range in California (Barry 1972; Noss and Peters 1995). "Floweriferous native grasslands" are considered to have very high biological value by the City of Laguna Beach while needlegrass grassland is considered to have high biological value (Marsh 1992). Annual grassland is considered to have moderate biological value.

Other Areas

The cliff/rock (1.56 acres), ornamental/developed (2.43 acres), ruderal (1.00 acre), and disturbed (0.24 acre) areas provide limited habitat for plant or wildlife species and would not be considered special status by the resource agencies. However, the City of Laguna Beach considers rock outcrops to have very high biological value in their capacity to support special status plant species (Marsh 1992). Eucalyptus woodlands and other "urban forests" are considered to have moderate biological value.

Jurisdictional Areas

Multiple drainages are present on the Aliso Canyon property (Exhibit 7). These all exhibit evidence of bed, bank, and OHWM and would be considered under the jurisdiction of the RWQCB, the CDFW, and the CCC. Some of the on-site drainage features would be considered tributaries[5] of Hobo Canyon and Aliso Creek, which convey flow into the Pacific Ocean southwest of the property. Therefore, these drainages would be considered under the jurisdiction of the USACE. Five on-site drainage features do not exhibit a connection to Hobo Canyon or Aliso Creek and so would not be considered tributaries (i.e., they dissipate at the canyon bottom and do not cross under the paved road east of the property). These isolated drainage features would not be considered under the jurisdiction of the USACE. No wetlands "waters of the U.S." were observed on the property.

Based on the field observations and data collected, a total of approximately 0.597 acre of non-wetland "waters of the U.S." under the jurisdiction of the USACE, 1.281 acres of "waters of the State" under the jurisdiction of the RWQCB (of which 0.684 acre are isolated waters), 1.281 acres of waters under CDFW jurisdiction, and 1.281 acres of waters under CCC jurisdiction occur on the property (Table 2; Exhibit 7).

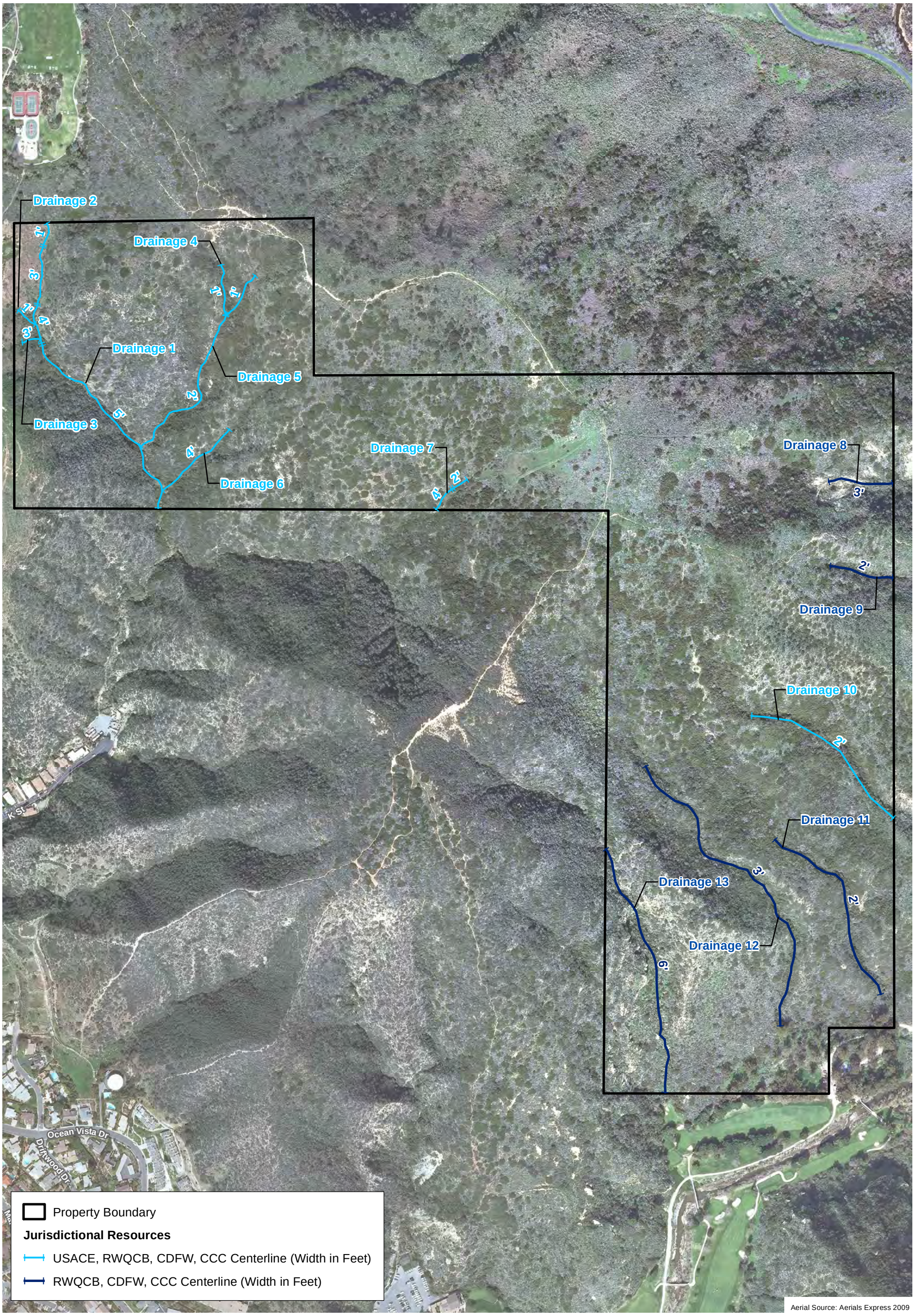
Should jurisdictional resources be impacted by management activities on the property, permits/agreements from the regulatory agencies would be required. This would consist of a USACE Section 404 Permit, an RWQCB Section 401 Water Quality Certification, a CDFW Section 1602 Streambed Alteration Agreement, and a CCC Coastal Development Permit.

A California Rapid Assessment Method (CRAM) analysis may be required as part of the permitting procedure. CRAM is a tool for assessing the overall condition[6] of a wetland; it was developed by a consortium of federal, State, and local scientists and managers. The results of a condition assessment can be used to infer the ability to provide various functions or services to which a wetland is most suited. This analysis can be used for a variety of applications, such as evaluating a site to inform regulatory decisions (e.g., Section 401 and 404 permitting) or restoration or mitigation site evaluation.

---

5 "Tributaries" are defined as waters that are characterized by the presence of physical indicators of flow—bed and banks and OHWM—and that contribute flow directly or indirectly to a traditional navigable water, interstate water, or territorial sea.

6 "Condition" is defined as the state of a wetland Assessment Area's (AA's) physical and biological structure, the hydrology, and its buffer and landscape context relative to the best achievable states for the same type of wetland (CWMW 2013).



Jurisdictional Resources

Exhibit 7

Measure M2 Acquisition Properties Evaluation – Aliso Canyon Property

N W E S

400 200 0 400 Feet

BonTerra PSOMAS

(Rev: 09-22-2015 LEW) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\Ex7_JD_Resources_20150917.pdf

D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\Ex_JD_Resources_20150917.mxd

TABLE 2
JURISDICTIONAL RESOURCES ON THE ALISO CANYON PROPERTY

Drainage	Amount of Jurisdictional Resources (Acres)				
	USACE	Isolated	RWQCB[a]	CDFW	CCC
Drainage 1	0.302	–	0.302	0.302	0.302
Drainage 2	0.005	–	0.005	0.005	0.005
Drainage 3	0.013	–	0.013	0.013	0.013
Drainage 4	0.011	–	0.011	0.011	0.011
Drainage 5	0.083	–	0.083	0.083	0.083
Drainage 6	0.077	–	0.077	0.077	0.077
Drainage 7	0.030	–	0.030	0.030	0.030
Drainage 8	–	0.041	0.041	0.041	0.041
Drainage 9	–	0.027	0.027	0.027	0.027
Drainage 10	0.076	–	0.076	0.076	0.076
Drainage 11	–	0.085	0.085	0.085	0.085
Drainage 12	–	0.208	0.208	0.208	0.208
Drainage 13	–	0.323	0.323	0.323	0.323
Total	**0.597**	**0.684**	**1.281**	**1.281**	**1.281**

USACE: U.S. Army Corps of Engineers; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; CCC: California Coastal Commission; –: not present in this drainage.

[a] RWQCB jurisdictional boundaries are defined as those determined for the USACE under "waters of the U.S."; however, the RWQCB also takes jurisdiction over isolated waters.

CRAM scores range from 25 to 100. The maximum score possible represents how a wetland is doing relative to the best achievable conditions for that wetland type in the state. It is assumed that the same scores for different wetlands of the same type represent the same overall condition and functional capacity. Therefore, these scores may be used to track the progress of restoration efforts over time; to compare impacted sites to their in-kind mitigation sites; or to compare an individual wetland to the status and trends in ambient condition of its wetland type. Enhancement of the property, such as through targeted removal of weed species, may result in higher CRAM scores.

3.3.3 Special Status Plants

Based on the results of the literature review, 44 special status plant species have been reported in the vicinity of the Aliso Canyon property. These species, survey results, and their potential for occurrence (which is based on the presence of suitable habitat) are summarized in Table 3. Note that these species are listed alphabetically according to their scientific name. One federally and State-listed Threatened species, five non-listed special status plant species with a CRPR, and two species of local concern were observed on the property; two additional species of local concern were tentatively observed on the property. These species are discussed after the table. Note that detailed information and mapping of special status plant species populations were only recorded for listed species and those with a CRPR; species of local concern are discussed generally below.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Adenostoma fasciculatum var. *obtusifolium* San Diego chamise	–	–	–	ND	Between May and June	Dry slopes, ridges, chaparral.	Southern South Coast, southwest Peninsular Ranges, and Baja California, Mexico; between sea level and 2,625 feet above msl.	Suitable habitat, but not observed during surveys.
Adiantum jordanii California maidenhair	–	–	–	LI	–	Shaded hillsides, moist woodland.	California, Oregon, and Baja California, Mexico; between sea level and 3,940 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Anemopsis californica yerba mansa	–	–	–	LI	Between March and September	Saline or alkaline soil in wet or moist areas, seeps, and springs.	High Cascade Range, southern Sierra Nevada, possibly Tehachapi Mountain Area, southwestern Sacramento Valley, San Joaquin Valley, Central Western California, South Coast, Channel Islands, Western Transverse Ranges, possibly San Gabriel Mountains and San Bernardino Mountains, Peninsular Ranges, east of Sierra Nevada, Mojave Desert, possibly Sonoran Desert to Oregon, Kansas, Texas, and northwestern Mexico; between sea level and 6,560 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Aphanisma blitoides aphanisma	–	–	1B.2	–	Between June and September	Saline sand, coastal scrub, and bluffs.	Central Coast, South Coast, Channel Islands, and Baja California, Mexico; between sea level and 655 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Atriplex coulteri Coulter's saltbush	–	–	1B.2	–	Between March and October.	Alkaline soils in open sites, coastal bluffs, and dry hillsides; often on clay barrens in native perennial grasslands, coastal sage scrub, and coastal bluff scrub.	South Coast, Channel Islands, and Baja California, Mexico; between sea level and 1,640 feet above msl.	Suitable habitat, but not observed during surveys.
Atriplex pacifica South Coast saltscale	–	–	1B.2	–	Between March and October.	Coastal bluff scrub and dunes.	South Coast, Channel Islands, and Baja California, Mexico; between sea level and 985 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Atriplex parishii Parish's brittlescale	–	–	1B.1	–	Between June and October.	Alkaline or clay soils in chenopod scrub, playas, and vernal pools.	South Coast, Peninsular Ranges, and Baja California, Mexico; between sea level and 1,540 feet above msl.	No suitable habitat, considered extirpated from Orange County (Roberts 2008), and not observed during surveys; not expected to occur.
Atriplex serenana var. *davidsonii* Davidson's saltscale	–	–	1B.2	–	Between April and October	Alkaline soils in coastal bluffs, coastal scrub, and borders of cultivated fields.	South Coast; between sea level and 655 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Brodiaea filifolia thread-leaved brodiaea	FT	SE	1B.1	–	Between March and June.	Clay soils, especially Alo clays, in grasslands, openings in coastal sage scrub, and vernal pools.	South Coast (Los Angeles and San Diego Counties.), San Bernardino Mountains (San Bernardino County.), western Peninsular Ranges (Orange, Riverside, and San Diego Counties.); between 80 and 2,820 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Calochortus catalinae **Catalina mariposa lily**	**–**	**–**	**4.2**	–	**Between March and May.**	**Heavy soil on ridges and slopes in native grassland and openings in coastal sage scrub and chaparral; can be locally common following fire.**	**Southern South Coast, southern Outer South Coast Ranges, western South Coast, Channel Islands, western edge of Western Transverse Ranges, San Gabriel Mountains, and northern Peninsular Ranges; between sea level and 2,300 feet above msl.**	**Suitable habitat; observed during surveys.**
Calochortus weedii **var. *intermedius*[a] intermediate mariposa lily**	**–**	**–**	**1B.2**	–	**Between June and July.**	**Rocky soils on dry, open ridges and slopes in coastal sage scrub and chaparral; can be locally common following fire.**	**South Coast and northern Peninsular Ranges; between sea level and 2,230 feet above msl.**	**Suitable habitat; observed during surveys.**
Ceanothus spinosus var. *nov.* [b] non-spined greenbark ceanothus	–	–	–	LI	Between January and May.	Slopes, canyons, and chaparral.	Southern Outer South Coast Ranges, Western Transverse Ranges, Peninsular Ranges, and northern Baja California, Mexico; between sea level and 3,940 feet above msl.	Suitable habitat, but not observed during surveys.
Centromadia parryi ssp. *australis*[a] southern tarplant	–	–	1B.1	–	Between June and October.	Salt marshes, grassland, vernal pools, and coastal scrub.	South Coast to northwestern Baja California, Mexico; between sea level and 655 feet above msl.	Suitable habitat, but not observed during surveys.
Cercocarpus minutiflorus San Diego mountain mahogany	–	–	–	ND	Between March and May.	Chaparral.	Peninsular Ranges (Riverside, San Diego Counties) and northern Baja California, Mexico; between sea level and 4,595 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Chaenactis glabriuscula var. *orcuttiana* Orcutt's pincushion	–	–	1B.1	–	Between April and July.	Sandy coastal bluffs, dunes, and beaches.	South Coast to northern Baja California, Mexico; between sea level and 330 feet above msl.	No suitable habitat, considered extirpated from Orange County (Roberts 2008), and not observed during surveys; not expected to occur.
***Chorizanthe staticoides* var. *chrysacantha*[c] Orange County Turkish rugging**	**–**	**–**	**–**	**OCE**	**Between April and July.**	**Sand, gravel, or rocks.**	**Central and southern South Coast, Outer South Coast Ranges, Southwestern California (except eastern Peninsular Ranges); between 985 and 5,580 feet above msl.**	**Suitable habitat; full species observed during surveys.**
***Cneoridium dumosum* bushrue**	**–**	**–**	**–**	**NRE**	**Between February and May.**	**Mesas and coastal bluffs.**	**Southern South Coast, southern Channel Islands (San Clemente Island) and Baja California, Mexico; between sea level and 3,280 feet above msl.**	**Suitable habitat; observed during surveys.**
Comarostaphylis diversifolia ssp. *diversifolia* summer holly	–	–	1B.2	–	Between May and June.	On somewhat mesic slopes and occasionally along sandstone ridges in chaparral.	South Coast and Peninsular Ranges to northern Baja California, Mexico; between 330 and1,805 feet above msl.	Suitable habitat, but not observed during surveys.
***Deinandra paniculata* paniculate tarplant**	**–**	**–**	**4.2**	**–**	**Between May and November.**	**Often in sandy soils of grasslands, open chaparral and woodlands, and disturbed areas.**	**Southern Central Coast/Outer South Coast Ranges, southern Outer South Coast Ranges, South Coast, Western Transverse Ranges (eastern Santa Ynez Mountains), Peninsular Ranges, and northern Baja California, Mexico; between sea level and 4,330 feet above msl.**	**Suitable habitat; observed during surveys.**

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Dichondra occidentalis **western dichondra**	**–**	**–**	**4.2**	**–**	**Between March and June.**	**Among rocks and shrubs in coastal scrub, chaparral, and oak woodland.**	**Southern Central Coast, South Coast, Channel Islands, Peninsular Ranges, and Baja California, Mexico; between sea level and 1,705 feet above msl.**	**Suitable habitat; observed during surveys.**
Dudleya edulis ladies fingers dudleya	–	–	–	LI	Between May and July.	On soil, rocky slopes, and ledges.	South Coast, Peninsular Ranges, and northern Baja California, Mexico; between sea level and 4,265 feet above msl.	Suitable habitat, but not observed during surveys.
Dudleya lanceolata **lance-leaved dudleya**	**–**	**–**	**–**	**RUGF (octoploid segregate)**	**Between April and July.**	**On soil or slopes with broken rocks.**	**Central Coast (southern Santa Cruz County), San Francisco Bay Area, South Coast Ranges, Transverse Ranges, Peninsular Ranges, Desert Mountains, and northern Baja California, Mexico; between 100 and 4,100 feet above msl.**	**Suitable habitat; undetermined genetic form observed during surveys.**
Dudleya multicaulis[a] **many-stemmed dudleya**	**–**	**–**	**1B.2**	**–**	**Between May and June.**	**In heavy, often clayey or cobbly soils or on sandstone outcrops in coastal plains, coastal sage scrub, or native grassland.**	**South Coast; between sea level and 1,970 feet above msl.**	**Suitable habitat; observed during surveys.**
Dudleya stolonifera Laguna Beach dudleya	FT	ST	1B.1	–	Between May and July	On rocky, northern-facing cliffs and outcrops. May hybridize with *Dudleya edulis*.	Central South Coast (San Joaquin Hills, Orange County.); between sea level and 820 feet above msl.	Suitable habitat, but not observed during surveys. Observed in immediate vicinity during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Euphorbia misera cliff spurge	–	–	2B.1	–	Between January and August.	Rocky slopes and coastal bluffs in coastal bluff scrub and Mojavean desert scrub.	South Coast, southern Channel Islands, western Sonoran Desert; and Baja California, Mexico; sea level to 1,640 feet above msl.	Suitable habitat, but not observed during surveys.
Ferocactus viridescens San Diego barrel cactus	–	–	2B.1	–	Between May and June.	Sandy to rocky areas.	South Coast (San Diego County) and Baja California, Mexico; between 35 and 490 feet above msl.	Suitable habitat, but not observed during surveys.
Harpagonella palmeri Palmer's grappling hook	–	–	4.2	–	Between March and April	Dry, semi-barren sites in chaparral, coastal scrub, and grassland.	South Coast, Peninsular Ranges, southwestern Sonoran Desert, southwestern Arizona, and northwestern Mexico; between sea level and 3,280 feet above msl.	Suitable habitat, but not observed during surveys.
Hordeum intercedens vernal barley	–	–	3.2	–	Between March and June.	Vernal pools; mesic grasslands; dry, saline streambeds; and alkaline flats.	San Joaquin Valley, Outer South Coast Ranges, South Coast, Channel Islands, Peninsular Ranges, and northwestern Baja California, Mexico; between sea level and 1,640 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Horkelia cuneata var. *puberula* mesa horkelia	–	–	1B.1	–	Between March and July.	Dry, sandy, coastal chaparral and openings of oak woodlands.	Outer South Coast Ranges, South Coast (especially foothill edge of Los Angeles Basin), and Peninsular Ranges; between 230 feet and 2,855 feet above msl.	Suitable habitat, but not observed during surveys.
Isocoma menziesii var. *decumbens* decumbent goldenbush	–	–	1B.2	–	Between July and November.	Sandy soil in chaparral, coastal scrub, the landward side of dunes, hillsides, and arroyos.	Southern South Coast, southern Channel Islands, southern Peninsular Ranges, and Baja California, Mexico; between sea level and 655 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Juncus textilis basket rush	–	–	–	LI	Between July and November.	Slong stream courses in riparian woodland and rarely on mesic slopes.	Southern Outer South Coast Ranges, southwestern California (except Channel Islands); between sea level and 5,905 feet above msl.	Marginally suitable habitat, but not observed during surveys.
Lasthenia glabrata ssp. *coulteri* Coulter's goldfields	–	–	1B.1	–	Between April and May.	Saline places, vernal pools, coastal salt marshes.	Inner North Coast Ranges, southern Sierra Nevada Foothills, Tehachapi Mountain area, Great Central Valley, Central Western California, South Coast, northern Channel Islands (Santa Rosa Island), Peninsular Ranges, and western Mojave Desert; between sea level and 3,280 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Nama stenocarpum mud nama	–	–	2B.2	–	Between March and October.	Intermittently wet areas such as drying vernal pools and ponds.	San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, southeastern Sonoran Desert to Texas, and northern Mexico; between sea level and 2,655 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Navarretia prostrata prostrate vernal pool navarretia	–	–	1B.1	–	Between April and July.	Alkaline floodplains and vernal pools.	Western San Joaquin Valley (Merced County), Central Coast (western Alameda County), San Francisco Bay Area (Alameda County), South Coast Ranges, central South Coast (Los Angeles County), and Peninsular Ranges (Santa Rosa Plateau); between sea level and 2,300 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Nolina cismontana chaparral nolina	–	–	1B.2	–	Between May and July.	Dry chaparral and coastal sage scrub.	South Coast, Western Transverse Ranges, and Peninsular Ranges; between 655 and 4,265 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Pentachaeta aurea ssp. *allenii* Allen's pentachaeta	–	–	1B.1	–	Between March and May.	Dry slopes and flats in open, grassy, coastal sage scrub.	Southern South Coast and Peninsular Ranges (Orange County); between sea level and 1,640 feet above msl.	Suitable habitat, but not observed during surveys.
Phacelia ramosissima var. *austrolitoralis*[b] south coast branching phacelia	–	–	3.2	–	Between March and August	Sandy soils near the coast in sand dunes, salt marshes, and coastal bluffs.	Central Coast, South Coast, and northern Channel Islands; between sea level and 985 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Pseudognaphalium leucocephalum white rabbit-tobacco	–	–	2B.2	–	Between July and October.	Sandy and gravelly benches, dry stream bottoms, and canyon bottoms in alluvial scrub and mulefat scrub.	South Coast, San Bernardino Mountains, Peninsular Ranges, Arizona, New Mexico, and Mexico; between sea level and 1,640 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Quercus dumosa Nuttall's scrub oak	–	–	1B.1	–	Between March and May.	Sandy and sandstone-derived soils near the coast in chaparral and coastal sage scrub.	South Coast, Peninsular Ranges, and Baja California, Mexico; between sea level and 655 feet above msl.	Suitable habitat, but not observed during surveys.
Quercus engelmanii Engelmann oak	–	–	4.2	–	Between April and May.	Slopes, foothills, and woodland.	South Coast, southern Channel Islands, San Gabriel Mountains, Peninsular Ranges, and Baja California, Mexico; between sea level and 4,265 feet above msl.	Suitable habitat, but not observed during surveys.

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				
Rhamnus crocea **spiny redberry**	–	–	–	**RR**	**Between January and April.**	**Coastal sage scrub, chaparral, and woodland.**	**Klamath Ranges, Outer North Coast Ranges, High Sierra Nevada, Central Western California, Southwestern California, and Baja California, Mexico; between sea level and 3,775 feet above msl.**	**Suitable habitat; observed during surveys.**
Suaeda esteroa estuary seablite	–	–	1B.2	–	Between May and October.	Mid-level coastal salt marshes.	South Coast and northern Mexico; between sea level and 15 feet above msl.	No suitable habitat and not observed during surveys; not expected to occur.
Symphoricarpos mollis creeping snowberry	–	–	–	LI	Between April and May.	Ridges, slopes, and open places in woodland.	Northwestern California, Cascade Range, Sierra Nevada, Central Western California, Southwestern California, Modoc Plateau, to British Columbia, Idaho, and New Mexico; between 30 and 9,845 feet above msl.	Suitable habitat, but not observed during surveys.
Verbesina dissita **big-leaved crownbeard**	**FT**	**ST**	**1B.1**	–	**Between May and August.**	**Dry slopes and canyons in southern maritime chaparral and Diegan coastal sage scrub.**	**Southern South Coast (Orange County), naturalized in San Bernardino Mountains, and Baja California, Mexico; between sea level and 655 feet above msl.**	**Suitable habitat; observed during surveys.**

TABLE 3
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status				Blooming Period	Habitat	Range	Potential to Occur on the Property; Results of Survey
	USFWS	CDFW	CRPR	Local Concern				

USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife; CRPR: California Rare Plant Rank; msl: mean sea level; –: No status designation.

Species observed on site are denoted in **boldface type.**

Federal (USFWS)		State (CDFW)		Local	
FE	Endangered	SE	Endangered	LI	Local Interest
FT	Threatened	ST	Threatened	OCE	Orange County Endemic
FC	Candidate			RR	Regionally Rare
				RUC	Regionally Unique Cline
				RUGF	Regionally Unique Genetic Form
				ND	Northern Disjunct
				NRE	Northern Range Edge Species

CRPR

1B	Plants Rare, Threatened, or Endangered Throughout Their Range
2B	Plants Rare, Threatened, or Endangered in California But More Common Elsewhere
3	Plants that require more information before they can be assigned to another rank or rejected
4	Plants of Limited Distribution – A Watch List

CRPR Threat Rank Extensions

None	Plants lacking any threat information
.1	Seriously Endangered in California (over 80% of occurrences threatened; high degree and immediacy of threat)
.2	Fairly Endangered in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)
.3	Not very Threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)

[a] A Covered Species

[b] The variety is not recognized in Jepson Herbarium (2014), Hickman (1993) or Munz (1947); information on blooming, habitat, and range is for the full species.

[c] The variety is not recognized in Jepson Herbarium (2014); Hickman (1993) states that the "ssp. *chrysacantha*" is a form apparently environmentally induced. Information on blooming, habitat, and range is for the full species.

Catalina Mariposa Lily

Catalina mariposa lily has a CRPR of 4.2. It typically blooms between March and May. This perennial bulbiferous herb occurs in heavy soil on ridges and slopes in native grasslands and openings in coastal sage scrub and chaparral (Roberts 2008; Baldwin et al. 2012). This species is known from the southern South Coast, southern Outer South Coast Ranges, western South Coast, Channel Islands, western edge of the Western Transverse Ranges, San Gabriel Mountains, and northern Peninsular Ranges at elevations between sea level and approximately 2,300 feet above msl.

A total of 393 Catalina mariposa lily individuals were observed in 4 locations at the center of the property (Table 4; Exhibit 8). Most of these plants (Population 1) were observed in the annual grassland on the property; associated species include wild oat, western blue-eyed-grass, blue dicks, needlegrass, and cardoon. A voucher specimen (ADR11) was collected from this population and deposited at the herbarium at Rancho Santa Ana Botanic Garden. Populations 2 and 3 were observed in openings in southern mixed chaparral; associated species include black sage and dot seed plantain (*Plantago erecta*). Population 4 was observed in openings of mixed sage scrub along the trail; associated species include needlegrass, California sagebrush, and bush monkeyflower.

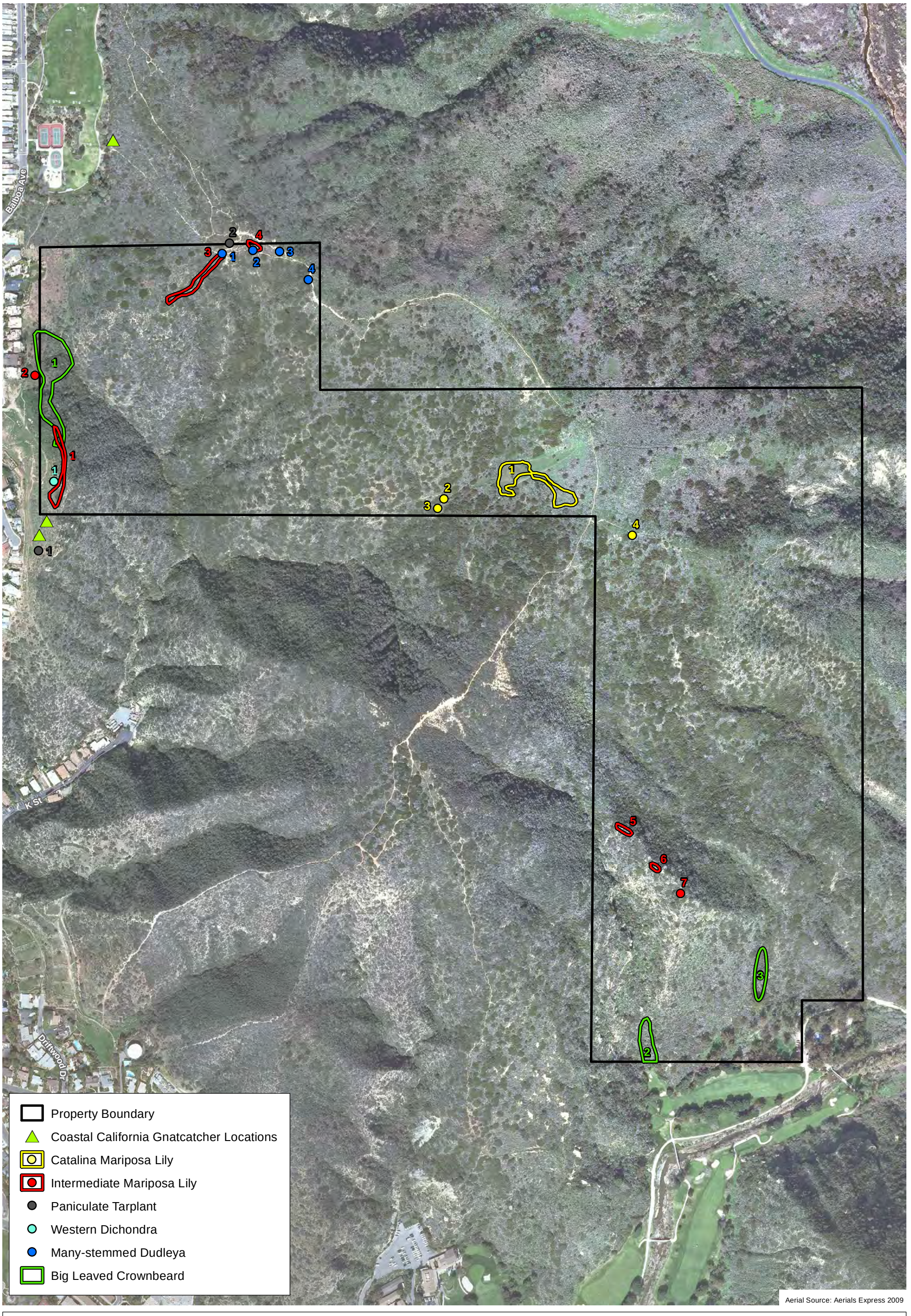
TABLE 4
CATALINA MARIPOSA LILY POPULATIONS OBSERVED ON THE ALISO CANYON PROPERTY

Population	Number of Individuals	Phenology		
		Vegetative	Flowering	Fruiting
1	360	0%	96%	4%
2	1	0%	100%	0%
3	1	0%	100%	0%
4	31	0%	52%	48%
Total/Average	**393**	**0%**	**87%**	**13%**

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It typically blooms between June and July (Baldwin et al. 2012). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,230 feet above msl (Roberts 2008; Baldwin et al. 2012). This species is known from the South Coast and northern Peninsular Ranges (Baldwin et al. 2012).

A total of 144 intermediate mariposa lily individuals were observed in 7 locations on the property (Table 5; Exhibit 8). These plants were observed primarily on ridgelines and southern-facing slopes in mixed sage scrub and mixed sage–chaparral scrub ecotone. The species generally associated with these populations includes California sagebrush, California buckwheat, black sage, lemonade berry, coastal prickly pear, red brome (*Bromus madritensis* ssp. *rubens*), and needlegrass. A voucher specimen was not collected.



D:\Projects\OCTA\J008\MXD\AlisoCyn\BioTech\Ex_SSSpecies_20150917.mxd

Special Status Species

Exhibit 8

Measure M2 Acquisition Properties Evaluation - Aliso Canyon Property

N W E S

425 212.5 0 425 Feet

BonTerra PSOMAS

(Rev: 10-02-2015 LEW) R:\Projects\OCT_OCTA\J008.01\Graphics\Aliso_Cyn\BioTech\Ex8_SSSpecies_20150917.pdf

TABLE 5
INTERMEDIATE MARIPOSA LILY POPULATIONS OBSERVED ON THE ALISO CANYON PROPERTY

Population	Number of Individuals	Phenology		
		Vegetative	Flowering	Fruiting
1	64	12%	52%	36%
2	2	0%	100%	0%
3	27	37%	59%	4%
4	3	0%	100%	0%
5	8	0%	75%	25%
6	12	0%	100%	0%
7	28	57%	39%	4%
Total/Average	**144**	**15%**	**75%**	**10%**

Paniculate Tarplant

Paniculate tarplant (*Deinandra paniculata*) has a CRPR of 4.2. It typically blooms between May and November (Baldwin et al. 2012). This annual herb occurs in sandy soils of grassland, open chaparral, and woodland and disturbed areas at elevations between sea level and approximately 4,330 feet above msl (Baldwin et al. 2012). This species is known from the southern Central Coast/Outer South Coast Ranges, southern Outer South Coast Ranges, South Coast, eastern Santa Ynez Mountains of the Western Transverse Ranges, Peninsular Ranges, and northern Baja California, Mexico (Baldwin et al. 2012).

A total of four paniculate tarplant individuals were observed; one location was immediately south of the property and the other was on a ridgeline on the property (Table 6; Exhibit 8). Population 1 was observed in mixed sage–cactus scrub and associated with California buckwheat, coastal prickly pear, California sagebrush, needlegrass, fascicled tarplant (*Deinandra fasciculata*), and red brome. Population 2 was observed in disturbed mixed sage scrub and associated with California sagebrush, freeway iceplant, osmadenia (*Osmadenia tenella*), soft chess, and French cottonrose. A voucher specimen was not collected due to the small population size.

TABLE 6
PANICULATE TARPLANT POPULATIONS OBSERVED ON THE ALISO CANYON PROPERTY

Population	Number of Individuals	Phenology		
		Vegetative	Flowering	Fruiting
1	1	0%	100%	0%
2	3	66%	34%	0%
Total/Average	**4**	**33%**	**67%**	**0%**

Western Dichondra

Western dichondra has a CRPR of 4.2. It typically blooms between March and June. This perennial, stoloniferous herb occurs among rocks and shrubs in coastal scrub, chaparral, and oak woodland (Baldwin et al. 2012). It is known from the southern Central Coast, South Coast, Channel Islands, Peninsular Ranges, and Baja California, Mexico, at elevations between sea level and approximately 1,705 feet above msl (Baldwin et al. 2012).

One western dichondra individual was observed along the western boundary of the property at the edge of mixed sage–chaparral scrub ecotone. This individual was growing under deerweed and was not in bloom. A voucher specimen was not collected due to the small population size.

Many-Stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It typically blooms between May and June (Baldwin et al. 2012). This fleshy, perennial herb occurs in heavy, often clayey or cobbly soils or on sandstone outcrops in coastal plains, coastal sage scrub, or native grassland (Baldwin et al. 2012; Roberts 2008). This species is known from the South Coast at elevations between sea level and approximately 1,970 feet above msl (Baldwin et al. 2012).

A total of 60 many-stemmed dudleya individuals were observed at 4 locations on the property (Table 7, Exhibit 8). These plants occur in disturbed mixed sage scrub immediately adjacent to the trail. The species generally associated with these populations include California buckwheat, California sagebrush, black sage, lemonade berry, coastal prickly pear, needlegrass, red brome, freeway iceplant, and intermediate mariposa lily. A voucher specimen was not collected due to the small population size.

TABLE 7
MANY-STEMMED DUDLEYA POPULATIONS OBSERVED ON THE ALISO CANYON PROPERTY

Population	Number of Individuals	Phenology		
		Vegetative	Flowering	Fruiting
1	1	0%	100%	0%
2	13	8%	92%	0%
3	20	0%	100%	0%
4	26	62%	38%	0%
Total/Average	**60**	**18%**	**82%**	**0%**

Big-Leaved Crownbeard

Big-leaved crownbead is a federally and State-listed Threatened species and has a CRPR of 1B.1. It typically blooms between May and August (Baldwin et al. 2012). This perennial shrub occurs on dry slopes and in canyons in southern maritime chaparral and Diegan coastal sage scrub at elevations between sea level and approximately 656 feet above msl (Baldwin et al. 2012; Roberts 2008). This species is known from the southern South Coast in Orange County and Baja California, Mexico; it is naturalized in the San Bernardino Mountains (Baldwin et al. 2012).

Big-leaved crownbeard was observed at three locations on the property (Exhibit 8). This species may be clonal and spread out over a large area (Marsh 1992); therefore, an accurate population count could not be made. However, almost 1,000 individual shrub stems were observed, and the populations are each estimated to contain 100s of individuals. These plants occur on steep slopes in mixed sage scrub, mixed sage–chaparral scrub ecotone, and southern mixed chaparral. The species generally associated with these populations include black sage, California buckwheat, toyon, and lemonade berry. A voucher specimen was not collected due to the listed status of the species.

Species of Local Concern

Two species of local concern were observed on the property: bushrue (*Cneoridium dumosum*) and spiny redberry. Turkish rugging (*Chorizanthe staticoides*) was observed on the property and is assumed to be Orange County Turkish rugging (*Chorizanthe staticoides* var. *chrysacantha*) based on range. Lance-leaved dudleya (*Dudleya lanceolata*) was observed on the property, but it is undetermined whether it is the octoploid segregate (i.e., having twice the number of typical chromosomes).

3.3.4 Special Status Wildlife

Based on the results of the literature review, 42 special status wildlife species have been reported in the vicinity of the Aliso Canyon property. These species and their potential for occurrence (which is based on the presence of suitable habitat) are summarized in Table 8. Note that these species are listed taxonomically. Three special status wildlife species were observed on the property; two species of local concern were also observed on the property. These species are discussed after the table. Note that detailed information and mapping of special status wildlife species populations were only recorded for those considered special status by the USFWS and/or the CDFW; species of local concern are discussed generally below.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Invertebrates						
Danaus plexippus pop. 1 monarch (California overwintering population)	–	SA	–	Primarily occurs in coastal, lowland, and foothill areas with milkweed (*Ascelpias* spp.), though also in deserts and mountains; overwinters in large numbers on trees.	South Argentina and the Bahamas and Antilles; established in Bermuda, Hawaii, the Solomon's, New Caledonia, New Zealand, Australia, New Guinea, Ceylon, India, the Azores, and the Canary Islands.	Limited suitable wintering habitat; limited potential to occur.
Branchinecta sandiegonensis San Diego fairy shrimp	FE	–	–	Vernal pools and ephemeral ponds in San Diego Mesa hardpan and claypan basins, typically in chamise chaparral but also coastal sage scrub and annual grassland.	Coastal Orange County and San Diego County; a disjunct population reported from Santa Barbara.	No suitable habitat; not expected to occur.
Streptocephalus woottoni Riverside fairy shrimp	FE	–	–	Deep vernal pools and ephemeral ponds.	Coastal Ventura County south to Baja California, Mexico.	No suitable habitat; not expected to occur.
Fish						
Oncorhynchus mykiss irideus southern steelhead (southern California DPS)	FE	SSC	–	Cool water streams; spawns in areas of gravelly substrate in riffles or pool tails.	From the Santa Maria River, San Luis Obispo County to U.S./Mexico border.	No suitable habitat; not expected to occur.
Oncorhynchus mykiss irideus steelhead (Central Valley DPS)	FT	–	–	Cool water streams; spawns in areas of gravelly substrate in riffles or pool tails.	The Sacramento and San Joaquin Rivers and their tributaries, excluding the San Francisco and San Pablo Bays and their tributaries. Also included are artificial propagation programs in the Coleman National Fish Hatchery and the Feather River Hatchery.	No suitable habitat; not expected to occur.
Gila orcuttii[a] arroyo chub	–	SSC	–	Coastal freshwater streams and rivers with steady current and emergent vegetation.	Currently found at three native locations: Santa Margarita and De Luz Creeks in San Diego County, Trabuco and San Juan Creeks in Orange County, and Malibu Creek in Los Angeles County; introduced elsewhere.	No suitable habitat; not expected to occur.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Eucyclogobius newberryi tidewater goby	FE	SSC	–	Brackish, fairly still but not stagnant water primarily in shallow coastal lagoons, estuaries, marshes, and lower stream reaches.	From Tillas Slough (mouth of the Smith River, Del Norte County) to Agua Hedionda Lagoon (northern San Diego County).	No suitable habitat; not expected to occur.
Amphibians						
Spea hammondii western spadefoot	–	SSC	–	Quiet streams, vernal pools, and temporary ponds.	Great Valley and bordering foothills and Coast Ranges from Monterey Bay south to Baja California, Mexico.	No suitable habitat; not expected to occur.
Anaxyrus californicus arroyo toad	FE	SSC	–	Semi-arid regions near washes or intermittent streams; requires suitable breeding pools.	Southern California and northwestern Baja California, Mexico.	No suitable habitat; not expected to occur.
Reptiles						
Emys marmorata[a] western pond turtle	–	SSC	–	In ponds, lakes, marshes, rivers, streams, and irrigation ditches with a rocky or muddy bottom and aquatic vegetation.	Pacific slope drainages from Washington south to northern Baja California, Mexico.	No suitable habitat; not expected to occur.
Phrynosoma blainvillii[a] coast horned lizard	–	SSC	–	Scrubland, grassland, coniferous forests, and broadleaf woodland with friable soil for burrowing.	Northern California south to northern Baja California, Mexico.	Suitable habitat; may occur.
Aspidoscelis hyperytha[a] orange-throated whiptail	–	SSC	–	Washes and open areas of sage scrub and chaparral in friable, gravelly soil.	Western Peninsular Ranges from Orange and San Bernardino Counties south to Baja California, Mexico.	Suitable habitat; may occur.
Aspidoscelis tigris stejnegeri San Diegan tiger whiptail	–	SA	–	Hot and dry open areas with sparse foliage (e.g., chaparral, woodland).	Coastal Southern California, mostly west of the Peninsular Ranges, south of the Transverse Ranges, and north into Ventura County.	Suitable habitat; may occur.
Anniella pulchra pulchra silvery legless lizard	–	SSC	LI	In loose sandy soil of chaparral, pine-oak woodland, beach, and riparian areas.	Coast, Transverse, and Peninsular Ranges from Contra Costa County south to Baja California, Mexico.	Suitable habitat; may occur.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Thamnophis hammondii two-striped garter snake	–	SSC	–	Perennial or intermittent freshwater streams with rocky beds bordered by willows or other dense vegetation.	From Monterey County south to El Rosario in Baja California, Mexico.	No suitable habitat; not expected to occur.
Crotalus ruber red-diamond rattlesnake	–	SSC	–	Open scrub, chaparral, woodland, and grassland.	Orange County and San Bernardino County south to Baja California, Mexico.	Suitable habitat; may occur.
Birds						
Accipiter cooperii **Cooper's hawk (nesting)**	**–**	**WL**	–	**Prefers to nest in oak woodlands and riparian woodlands; forages primarily in forest habitats.**	**Breeds from southern Canada into northwestern and north-central Mexico; wintering range extends south.**	**Suitable foraging and nesting habitat; observed foraging and may occur for nesting.**
Accipiter striatus sharp-shinned hawk (nesting)	–	WL	–	Nests and forages in forest habitats.	Breeds in Alaska and Canada, portions of the U.S., in the West Indies, and south through Mexico, Central America, and South America. Migrant and winter visitor in Orange County.	Suitable foraging habitat; may occur for foraging. Outside the breeding range of the species; not expected to occur for nesting.
Buteo jamaicensis **red-tailed hawk**	–	–	**LI**	**Open country with high perches, including woodlands, prairie groves, mountains, plains, and roadsides. Nests in trees, on cliff ledges, among arms of giant cactus, or on artificial structures such as towers and buildings.**	**Widespread throughout North America; northern populations migrate south.**	**Suitable foraging and nesting habitat; observed foraging and may occur for nesting.**
Aquila chrysaetos golden eagle (nesting and wintering)	–	FP, WL	–	Breeds in open and semi-open habitats, such as tundra, shrublands, grasslands, woodland-brushlands, coniferous forests, farmland, and riparian habitats. Broad expanses of open country required for foraging; nesting primarily in mountainous areas with large trees or cliffs.	Resident throughout Southern California, except in the Colorado Desert and Colorado River, where it is a casual winter visitor.	Suitable foraging habitat; may occur for foraging. No suitable nesting habitat; not expected to occur for nesting.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Circus cyaneus **northern harrier (nesting)**	**–**	**SSC**	–	**Occurs in open habitats, nesting on the ground in dense vegetation.**	**Breeds throughout North American from northern Alaska and Canada south to northern Baja California, Mexico. Some populations migrate to Central America.**	**Suitable foraging and nesting habitat; observed foraging and may occur for nesting.**
Elanus leucurus white-tailed kite (nesting)	–	FP	–	Low elevation grassland, agricultural areas, wetlands, oak woodlands, savannahs, and riparian habitat adjacent to open areas.	Resident in coastal Southern California and a visitor and local breeder on the western edge of the deserts.	Suitable foraging and nesting habitat; may occur for foraging and nesting.
Charadrius alexandrines nivosus western snowy plover (nesting)	FT	SSC	–	Breeds primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches and creek and river mouths, and salt pans in at lagoons and estuaries. Winters in breeding habitat and man-made salt ponds and estuarine sand and mud flats.	Breeds from Damon Point, Washington south to Bahia Magdalena, Baja California, Mexico. Winters primarily in coastal areas from southern Washington to Central America.	No suitable foraging or nesting habitat; not expected to occur for foraging or nesting.
Sterna antillarum browni California least tern (nesting colony)	FE	SE, FP	–	Nests on sandy beaches or mud and sand flats near a lagoon or estuary, where they forage. Winters along marine coasts in littoral zone, bays, and estuaries; little is known of their wintering habitat.	Breeds along the Pacific coast primarily from Santa Barbara to San Diego County; however, reported from the San Francisco Bay to southern Baja California, Mexico; winters from Mexico south.	No suitable foraging or nesting habitat; not expected to occur for foraging or nesting.
Geococcyx californianus greater roadrunner	–	–	LI	Deserts and open country with scattered brush, including chaparral. Nests in dense brush, low trees, or cactus.	U.S. southwest.	Suitable habitat; may occur.
Empidonax traillii extimus[a] southwestern willow flycatcher (nesting)	FE	SE	–	Semi-arid regions near washes or intermittent streams; requires suitable breeding pools.	Southern California and northwestern Baja California, Mexico.	No suitable foraging or nesting habitat; not expected to occur for foraging or nesting.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Lanius ludovicianus loggerhead shrike (nesting)	–	SSC	–	Grasslands and other dry, open habitats.	Throughout North America; a year-round resident in Southern California.	Limited suitable foraging and nesting habitat; limited potential to occur for foraging and nesting.
Vireo bellii pusillus[a] least Bell's vireo (nesting)	FE	SE	–	Riparian habitat dominated by willows with dense understory vegetation.	Breeds throughout the Central Valley and other low-elevation river systems in California and Baja California, Mexico.	No suitable foraging or nesting habitat; not expected to occur for foraging or nesting.
Campylorhynchus brunneicapillus sandiegensis[a] coastal cactus wren (San Diego and Orange Counties)	–	SSC	–	Coastal sage scrub and alluvial sage scrub with prickly pear cactus and/or cholla.	Southern Orange County and San Diego County to northwestern Baja California, Mexico.	Limited suitable habitat; limited potential to occur.
***Polioptila californica californica*[a] coastal California gnatcatcher**	**FT**	**SSC**	–	**Coastal sage scrub vegetation.**	**Los Angeles, Orange, Riverside, and San Diego Counties south to Baja California, Mexico.**	**Suitable habitat; observed during focused surveys.**
Aimophila ruficeps canescens Southern California rufous-crowned sparrow	–	WL	–	Steep, dry, rocky, southern- or western-facing slopes in scrub vegetation interspersed with grasses and forbs or rock outcrops.	Year-round in Southern California.	Suitable habitat; may occur.
Ammodramus savannarum grasshopper sparrow (nesting)	–	SSC	–	Dense, dry, or well-drained grassland.	Across North America from southern Canada south to Ecuador. Summer resident along the coastal slope of Southern California.	No suitable habitat; not expected to occur.
Mammals						
Antrozous pallidus pallid bat	–	SSC	–	Low elevation grasslands, shrublands, woodlands, and forests. Roosts in caves, crevices, mines, bridges, and occasionally in hollow trees.	Throughout California except the high Sierra Nevada from Shasta County to Kern County and in the northwestern portion of the state.	Suitable foraging and roosting habitat; may occur for foraging and roosting.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Myotis yumanensis Yuma bat	–	SA	–	Open forests and woodlands, closely associated with water bodies. Roosts in buildings, mines, caves, crevices, swallow nests, and under bridges.	Southwestern British Columbia through the western U.S., and into central Mexico.	Suitable foraging habitat adjacent to property; limited potential to occur for foraging. Suitable roosting habitat; may occur for roosting.
Eumops perotis californicus western bonneted bat	–	SSC	–	Open, semi-arid to arid habitats including conifer and deciduous woodland, coastal scrub, grasslands, palm oases, chaparral, desert scrub, and urban. Roosts in crevices in cliffs, high buildings, trees, and tunnels.	Southeastern San Joaquin Valley and Coastal Ranges from Monterey County south through Southern California, and from the coast eastward to the Colorado Desert.	Suitable foraging and roosting habitat; may occur for foraging and roosting.
Nyctinomops femorosaccus pocketed free-tailed bat	–	SSC	–	Pinyon-juniper woodland, desert scrub, desert succulent scrub, desert riparian, desert. Roosts in crevices in cliffs, caverns, or buildings.	Southwestern U.S. to south-central Mexico.	No suitable habitat; not expected to occur for foraging or roosting.
Nyctinomops macrotis big free-tailed bat	–	SSC	–	Rugged, rocky habitats in arid landscapes. Found in a variety of plant associations, including desert shrub, woodlands, and evergreen forests. Roosts in crevices in high cliffs and rocky outcrops.	Most of South America northward to include Mexico, Arizona, New Mexico, southern and western Texas, southern California and southeastern Nevada, southern Utah, and north to central Colorado; near sea level to about 8,500 feet above msl.	Suitable foraging and roosting habitat; may occur for foraging and roosting.
Perognathus longimembris pacificus Pacific pocket mouse	FE	SSC	–	Occurs on fine-grained, sandy substrates in open coastal sage scrub, coastal strand, coastal dune, and river alluvium.	Historically occurred on the coast from Marina del Rey and El Segundo in Los Angeles County to the vicinity of the U.S./Mexican border. Currently known from the Dana Point Headlands in Orange County and two locations at Camp Pendleton in San Diego County.	No suitable habitat; not expected to occur.

TABLE 8
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROPERTY VICINITY

Species	Status			Habitat	Range	Potential to Occur on the Property/Results of Focused Surveys
	USFWS	CDFW	Local Concern			
Mustela frenata long-tailed weasel	–	–	LI	Found in most habitats, especially near water.	From southern Canada, throughout most of the U.S. (excluding southwestern deserts), to northern South America.	Suitable habitat; may occur.
Puma concolor[a] mountain lion	–	–	LI	Broad variety of habitats in range except shrubless deserts and agricultural areas.	Latitudinal range of 110 degrees in North and South America.	Suitable habitat; may occur.
Lynx rufus[a] bobcat	–	–	LI	Broad variety of habitats.	Throughout contiguous U.S. and Mexico south to Rio Mescale, and Canada.	Suitable habitat; may occur.
***Odocoileus hemionus* southern mule deer**	**–**	**–**	**LI**	**Prefers mixed habitat with both open areas for feeding and forest or brushy areas for protection; common in western mountain forests, deserts, and brushlands.**	**From western Canada and Alaskan panhandle, to the western U.S. to Minnesota, and to Baja California and Sonora to northern Tamaulipas, Mexico.**	**Suitable habitat; observed during surveys.**

USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife; DPS: Distinct Population Segment; –: No status designation.

Species observed on site are denoted in **boldface type.**

LEGEND

Federal (USFWS)		**State (CDFW)**		**Local**	
FE	Endangered	SE	Endangered	LI	Local Interest
FT	Threatened	SSC	Species of Special Concern		
		WL	Watch List		
		FP	Fully Protected		
		SA	Special Animal		

[a] Proposed Covered Species in the NCCP/HCP.

Cooper's Hawk

Cooper's hawk is a Watch List species; nesting individuals are protected. Preferred nesting habitats are oak woodlands and riparian woodlands (Hamilton and Willick 1996). This species preys on medium-sized birds and small mammals, foraging primarily in forest habitats (Curtis and Rosenfield 2006). Cooper's hawks breed from southern Canada, throughout the conterminous U.S., and into northwestern and northern-central Mexico (Curtis and Rosenfield 2006). The wintering range is similar to the breeding range except the northernmost populations are migratory or partially migratory, and the winter range extends throughout Mexico and possibly as far south as Panama (Curtis and Rosenfield 2006). Both resident and migratory populations exist in Orange County. Breeding populations have increased in recent years as they have expanded into urban areas (Shuford and Gardali 2008). This species is relatively tolerant of man-altered landscapes; however, threats to this species include the loss of appropriate woodlands for breeding and foraging, collisions with man-made objects, and possibly pesticides (Curtis and Rosenfield 2006).

This species was incidentally observed flying over the property during focused surveys for coastal California gnatcatcher; suitable nesting habitat is also present.

Northern Harrier

Northern harrier is a California Species of Special Concern; nesting individuals are protected. It is a regular winter migrant in marshes and fields throughout Southern California, but is very scarce as a local breeder (Garrett and Dunn 1981). Some breeding populations may be resident, though the species appears to be nomadic, both between years and within the breeding season (Shuford and Gardali 2008). This raptor occurs year-round over open habitats, nesting on the ground within dense vegetation (Shuford and Gardali 2008). While once a relatively common species during fall, winter, and spring in undeveloped areas of the County, the northern harrier population is now greatly reduced and localized in distribution. This species is threatened by loss of habitat, pesticides (Ehrlich et al. 1988), and loss of suitable breeding habitat (MacWhirter and Bildstein 1996).

This species was incidentally observed flying over the property during focused surveys for coastal California gnatcatcher; suitable nesting habitat is also present.

Coastal California Gnatcatcher

Coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. In California, this subspecies is an obligate resident of coastal sage scrub vegetation types. It occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). Brood parasitism by brown-headed cowbirds (*Molothrus ater*) and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

One male coastal California gnatcatcher was observed on the western edge of the property during focused surveys (Exhibit 8). A pair of gnatcatchers, and later the pair and fledglings, were observed to the north of the property.

Species of Local Concern

Two species of local concern were observed on the property: red-tailed hawk and southern mule deer. Red-tailed hawk was observed flying over the property and may nest on the property. Multiple deer were observed throughout the property.

3.3.5 Critical Habitat

The Federal Endangered Species Act defines critical habitat as follows:

> (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this [Endangered Species] Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of this [Endangered Species] Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

The Aliso Canyon property is not located in proposed or final critical habitat for any federally listed species.

3.4 COVERED SPECIES SUMMARY

The baseline surveys described in this document were focused towards establishing baseline knowledge of the set of species covered by the OCTA M2 NCCP/HCP. The OCTA M2 NCCP/HCP includes requirements to understand and document the status of Covered Species and their habitats within the Preserves. Table 9 provides the following: (1) a summary of the OCTA M2 NCCP/HCP Covered Species; (2) whether they were observed during the baseline surveys; (3) other information documenting the potential for the Covered Species to occur on site; and (4) a description of the threats and opportunities for management of the Preserve to benefit Covered Species.

Potential threats to Covered Species and their habitats on the property include habitat destruction by hikers and mountain bikers; illegal hunting; the spread of non-native plants and wildlife (e.g., freeway iceplant, Selloa pampas grass, and non-native ants); and wildland fires. An RMP may incorporate restricting unauthorized access on portions of the property; relocating public trails to avoid impacts on special status plant species; restoring native habitat by removing invasive plants; and maintaining movement opportunities through the property. A grant from the Wildlife Conservation Board (WCB), which provides funding for watershed-wide habitat enhancement, may be available to assist with restoration activities.

The disturbed mixed sage scrub, annual grassland, and ruderal vegetation on the property represent the primary candidate areas for habitat restoration to native grassland, scrub, or woodland communities depending on the slope, aspect, and soils present. Control of species such as ripgut brome (*Bromus diandrus*), wild oat, and tocalote (*Centaurea melitensis*) presents a challenge given their prevalence throughout the wildlands of Orange County. However, the African fountain grass (*Pennisetum cetaceum*), fennel (*Foeniculum vulgare*), freeway iceplant, giant reed (*Arundo donax*), Selloa pampas grass, and cardoon observed on the property (see Exhibit 5) should be targeted for removal. Removal of gum trees in the southeastern corner of the property would require coordination with the Aliso Canyon Golf Course.

TABLE 9
SUMMARY OF COVERED SPECIES

Species	Observations During Baseline Surveys	Potential to Occur on the Property	Threats, Opportunities, and Management
Plants			
Calochortus weedii* var. *intermedius **intermediate mariposa lily**	**Observed on site.**	**Suitable habitat; additional individuals/populations may be present.**	**Potential threats include hikers and mountain bikers.** **Opportunities occur to establish the species in areas with suitable conditions (e.g., soils) that are currently degraded.** **An RMP may restrict unauthorized access on portions of the site, relocate public trails to avoid adjacent populations, and allow for transplantation and/or seeding of this variety in suitable areas on site.**
Centromadia parryi ssp. *australis* southern tarplant	Not observed on site.	No suitable habitat; not expected to occur.	No opportunities available because suitable habitat does not occur on the property.
Dudleya multicaulis **many-stemmed dudleya**	**Observed on site.**	**Suitable habitat; additional individuals/populations may be present.**	**Potential threats include hikers and mountain bikers. Note that observed populations of this species were in close vicinity to actively used trails.** **Opportunities occur to establish the species in areas with suitable conditions (e.g., soils) that are currently degraded.** **An RMP may restrict unauthorized access on portions of the site, relocate public trails to avoid adjacent populations, and allow for transplantation and/or seeding of this variety in suitable areas on site.**
Fish			
Gila orcuttii arroyo chub	Not observed on site.	No suitable habitat; not expected to occur.	No opportunities available because suitable habitat does not occur on the property. Best Management Practices should be utilized to ensure that water quality in nearby habitat (i.e., Aliso Creek) is protected.

TABLE 9
SUMMARY OF COVERED SPECIES

Species	Observations During Baseline Surveys	Potential to Occur on the Property	Threats, Opportunities, and Management
Reptiles			
Emys marmorata western pond turtle	Not observed on site.	No suitable habitat; not expected to occur.	No opportunities available because suitable habitat does not occur on the property. Best Management Practices should be utilized to ensure that water quality in nearby habitat (i.e., Aliso Creek) is protected.
Phrynosoma blainvillii coast horned lizard	Not observed on site.	Suitable habitat present.	**Potential threats include mortality and habitat destruction due to hikers and mountain bikers, intense fire events, and the spread of non-native ant species.** **Habitat restoration opportunities for coastal sage scrub and other suitable habitat occurs on site.** **An RMP may incorporate restoration opportunities for coasal sage scrub and other native habitats utilized by this species and ensure any plant/soil material brought on site is free of non-native ant species.**
Aspidoscelis hyperytha orange-throated whiptail	Not observed on site.	Suitable habitat present.	**Potential threats include mortality and habitat destruction due to hikers and mountain bikers and intense fire events.** **Habitat restoration opportunities for coastal sage scrub and other suitable habitat occurs on site.** **An RMP may incorporate restoration opportunities for coastal sage scrub and other native habitats utilized by this species.**
Birds			
Empidonax traillii extimus southwestern willow flycatcher (nesting)	Not observed on site.	No suitable habitat; not expected to occur.	No opportunities available because suitable habitat does not occur on the property.
Vireo bellii pusillus least Bell's vireo (nesting)	Not observed on site.	No suitable habitat; not expected to occur.	No opportunities available because suitable habitat does not occur on the property.

TABLE 9
SUMMARY OF COVERED SPECIES

Species	Observations During Baseline Surveys	Potential to Occur on the Property	Threats, Opportunities, and Management
Campylorhynchus brunneicapillus sandiegensis coastal cactus wren (San Diego and Orange Counties)	Not observed on site.	Limited amounts of marginally suitable habitat present.	Potential threats include mortality and habitat destruction due to hikers and mountain bikers and intense fire events. Protection of coastal sage scrub habitat that contains cactus is crucial for the preservation of this subspecies. Habitat restoration opportunities for coastal sage scrub with cactus species occur on site.
Polioptila californica californica **coastal California gnatcatcher**	**Observed on site.**	**Suitable habitat; additional individuals/populations may be present.**	**Potential threats include mortality and habitat destruction due to hikers and mountain bikers and intense fire events.** **Protection of coastal sage scrub habitat is crucial for the preservation of this subspecies.** **There are limited opportunities to provide habitat for this subspecies on site because coastal sage scrub is a component of the chaparral vegetation. However, areas of disturbed mixed sage scrub may be enhanced and sage scrub may be established in suitable semi-natural herbaceous stands on site.**
Mammals			
Puma concolor mountain lion	Not observed on site.	Suitable habitat present.	Potential threats include illegal hunting and intense fire events. Opportunities are available for on-site native habitat restoration and enhancement, which would benefit this species. Management should include maintenance of movement opportunities through the site.
Lynx rufus bobcat	Not observed on site.	Suitable habitat present.	Potential threats include illegal hunting and intense fire events. Opportunities are available for on-site native habitat restoration and enhancement, which would benefit this species. Management should include maintenance of movement opportunities through the site.
Species observed on site are denoted in **boldface type.**			

4.0 REFERENCES

Allen, E.B, S.A. Eliason, V.J. Marquez, G.P. Schultz, N.K. Storms, C.D. Stylinski, T.A. Zink, and M.F. Allen. 2000. What are the Limits to Restoration of Coastal Sage Scrub in Southern California (pp. 253–262). *2nd Interface Between Ecology and Land Development in California* (J.E. Keeley, M. Baer-Keeley, and C.J. Fotheringham, Eds.). Sacramento, CA: U.S. Geological Survey.

American Ornithologists' Union (AOU). 2013 (September). *Check-list of North American Birds* (7th ed., as revised through 54th Supplement). Washington, D.C.: AOU. http://www.aou.org/checklist/north/index.php.

Atwood, J.L. 1992. Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look. *Birding* 25: 228–233. Colorado Springs, CO: American Birding Association.

———. 1990. *Status Review of the California Gnatcatcher (*Polioptila californica*)*. Manomet, MA: Manomet Bird Observatory.

Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.

Barry, W.J. 1972. *California Prairie Ecosystems*. *Vol. 1: The Central Valley Prairie.* Sacramento, CA: State of California Resources Agency, Department of Parks and Recreation.

Bennett, A.F. 1990. Habitat Corridors and the Conservation of Small Mammals in the Fragmented Forest Environment. *Landscape Ecology* 4(2–3):109–122. New York, NY: International Association for Landscape Ecology.

California Department of Fish and Game (CDFG). 2010 (September). *List of Vegetation Alliances and Associations, Vegetation Classification and Mapping Program.* Sacramento, CA: CDFG.

———. 2009 (November 24). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. Sacramento, CA: CDFG.

California Department of Fish and Wildlife (CDFW). 2015a. California Natural Diversity Database. Records of Occurrence for the USGS Laguna Beach and San Juan Capistrano 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

———. 2015b (July). *Special Animals.* Sacramento, CA: CDFW, Natural Heritage Division.

———. 2015c (July). *Special Vascular Plants, Bryophytes, and Lichens List.* Sacramento, CA: CDFW, Natural Heritage Division.

California Department of Fish and Wildlife, Biogeographic Data Branch (CDFW BDB). 2014. Wildlife Habitats — California Wildlife Habitat Relationships System. Sacramento, CA: CDFW BDB. http://www.dfg.ca.gov/bdb/html/wildlife_habitats.html.

California Native Plant Society (CNPS). 2015a. Locational Inventory of Rare and Endangered Vascular Plants of California (online edition, v8-02). Records of Occurrence for the USGS Laguna Beach and San Juan Capistrano 7.5-minute quadrangles. Sacramento, CA: CNPS. http://www.rareplants.cnps.org/advanced.html.

California Native Plant Society (CNPS). 2015b. Taxonomic and Status Inventory of Rare and Endangered Vascular Plants of California (online edition, v8-02). Sacramento, CA: CNPS. http://www.rareplants.cnps.org/.

———. 2014. *The CNPS Ranking System*. Sacramento, CA: CNPS. http://www.cnps.org/cnps/rareplants/ranking.php.

California Wetlands Monitoring Workgroup (CWMW). 2013 (April). *California Rapid Assessment Method (CRAM) for Wetlands User's Manual* (Version 6.1). http://www.cramwetlands.org/ sites/default/files/2013-04-22_CRAM_manual_6.1%20all.pdf.

Crother, B.I. 2012. *Scientific and Standard English Names of Amphibians and Reptiles of North American North of Mexico, with Comments Regarding Confidence in our Understanding* (Seventh ed.). Shoreview, MN: Society for the Study of Amphibians and Reptiles. http://ssarherps.org/wp-content/uploads/2014/07/HC_39_7thEd.pdf.

Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Curtis, O.E. and R.N. Rosenfield. 2006. Cooper's Hawk (Accipiter cooperii). *The Birds of North America, No. 75* (A. Poole, Ed.). Ithaca, NY: Cornell Lab of Ornithology.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. New York, NY: Simon and Schuster.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, and B. Young. 2009. *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks.* Arlington, VA: NatureServe. http://www.natureserve.org/publications/ConsStatusAssess_RankMethodology.pdf.

Fahrig, L. and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. *Ecology* 66(6): 1762–1768. Tempe, AZ: Ecological Society of America.

Garrett, K. and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Audubon Press.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

Halsey, R.W. 2007. Chaparral: Pure California. *Fremontia* 35(4): 2–7. Sacramento, CA: CNPS.

———. 2005. *Fire, Chaparral, and Survival in Southern California*. San Diego, CA: Sunbelt Publications, Inc.

Hamilton, R.A. and D.R. Willick. 1996. *The Birds of Orange County, California: Status and Distribution*. Irvine, CA: Sea and Sage Audubon Society.

Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors (pp. 11–34). *Preserving Communities and Corridors* (G. Mackintosh, Ed.). Washington, D.C.: Defenders of Wildlife.

Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.

Howard, J.L. 1992. Malomsa laurina. In: Fire Effects Information System, [Online]. Golden, CO: U.S., Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/.

Jepson Herbarium. 2014 (December 19, Revision 2). Jepson eFlora. Berkeley, CA: Jepson Herbarium. http://ucjeps.berkeley.edu/IJM.html.

Keeley, J.E. and P.H. Zedler. 2009. Large, High-intensity Fire Events in Southern California Shrublands: Debunking the Fine-grain Age Patch Model. *Ecological Applications* 19(1): 69-94. Tempe, AZ: Ecological Society of America.

Laguna Beach, City of. 2006. *Laguna Beach General Plan Open Space/Conservation Element*. Laguna Beach, CA: the City. http://www.lagunabeachcity.net/civicax/filebank/blobdload.aspx?BlobID=2688.

Laguna Beach Historical Society (LBHS). 2015 (August 7, last accessed). Chronology of Laguna Beach. Laguna Beach, CA: LBHS. http://www.lagunabeachhistory.org/chronology/.

Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton, NJ: Princeton University Press.

Marsh, K.G. 1992 (January 20). *South Laguna Biological Resources Inventory* (prepared for the City of Laguna Beach). Silverado, CA: Marsh.

MacWhirter, R.B., and K.L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). *The Birds of North America, No. 210* (A. Poole and F. Gill, Eds.). Philadelphia, PA and Washington, D.C.: The Academy of Natural Sciences and the AOU (respectively).

McCreary, D.D. 2004. *Fire in California's Oak Woodlands*. University of California Integrated Hardwood Range Management Program. Davis, CA: University of California, Agricultural Issues Center, Integrated Hardwood Range Management Program. http://ucanr.org/faqs/filegroups/faqs14-sep-09-1109/16808.pdf.

Minnich, R.A. and R.J. Dezzani. 1998. Historic Decline of Coastal Sage Scrub in the Riverside – Perris Plain, California. *Western Birds.* 29(4): 366–391. San Diego, CA: Western Field Ornithologists.

Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

Noss, R.F. 1983. A Regional Landscape Approach to Maintain Diversity. *BioScience.* 33(11): 700–706. Washington, D.C.: American Institute of Biological Sciences.

Noss, R.F. and R.L. Peters. 1995. *Endangered Ecosystems: a Status Report on America's Vanishing Habitat and Wildlife.* Washington, D.C.: Defenders of Wildlife.

O'Leary, J. 1995. Coastal Sage Scrub: Threats and Current Status. *Fremontia.* 23(4): 27–31. Sacramento, CA: California Native Plant Society.

Orange County Fire Authority (OCFA). 2008 (November 15). *After Action Report: Freeway Complex Fire*. Irvine, CA: OCFA.

———. 2007 (October). *After Action Report: Santiago Fire*. Irvine, CA: OCFA.

Orange County Transportation Authority (OCTA). 2010 (December 3). Notice of Preparation to Prepare an Environmental Impact Report. Orange, CA: OCTA.

Ritter, M.E. 2006. The Physical Environment: Mediterranean or Dry Summer Subtropical Climate. Stevens Point, WI: University of Wisconsin. http://www.uwsp.edu/geo/faculty/ritter/geog101/textbook/climate_systems/mediterranean.html.

Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

Ruben, J.A. and W.J. Hillenius. 2005 (May). Cold Blooded. *Natural History*. New York, NY: American Museum of Natural History.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation* (2nd ed.). Sacramento, CA: CNPS.

Schoenherr, A.A. 1992. *A Natural History of California.* Berkeley, CA: University of California Press.

Shuford, W.D. and T. Gardali (Eds.). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. *Studies of Western Birds 1*. Camarillo, CA and Sacramento, CA: Western Field Ornithologists and CDFG (respectively).

Simberloff, D. and J. Cox. 1987. Consequences and Costs of Conservation Corridors*. Conservation Biology* 1(1): 63–71. Boston, MA: Blackwell Scientific Publications.

Smithsonian National Museum of Natural History (SNMNH). 2011. Mammal Species of the World (3rd ed.) (a database based on Wilson, D.E. and D.M. Reeder's 2005 publication entitled *Mammal Species of the World, A Taxonomic and Geographic Reference, 3rd ed*). Washington, D.C.: SNMNH. http://www.vertebrates.si.edu/msw/mswcfapp/msw/index.cfm.

Soule, M.E. 1987. *Viable Populations for Conservation*. New York, NY: Cambridge University Press.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0).* (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Fish and Wildlife Service (USFWS). 2006 (March 24). Wetland Mapper [Information for the Aliso Canyon Property]. Washington D.C.: USFWS, National Wetlands Inventory. http://www.fws.gov/wetlands/Data/Mapper.html.

———. 1997 (February 28). *Coastal California Gnatcatcher (*Polioptila californica californica*). Presence/Absence Survey Guidelines.* Washington, D.C.: USFWS.

Unitt, P. 1984. *The Birds of San Diego County* (Memoir 13). San Diego, CA: San Diego Society of Natural History.

Western Regional Climate Center (WRCC). 2015. Monthly Climate Summary for Laguna Beach Station No. 044647. Reno, NV: WRCC.

APPENDIX A

PLANT AND WILDLIFE COMPENDIA

A-1
PLANT SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
LYCOPHYTES	
SELAGINELLACEAE - SPIKE-MOSS FAMILY	
Selaginella bigelovii	bushy spike-moss
FERNS	
PTERIDACEAE - BRAKE FAMILY	
Pentagramma triangularis	goldback fern
GYMNOSPERMS	
PINACEAE - PINE FAMILY	
Pinus sp.	pine
EUDICOTS	
ADOXACEAE - MUSKROOT FAMILY	
Sambucus nigra ssp. *caerulea*	blue elderberry
AIZOACEAE - FIG-MARIGOLD FAMILY	
*Carpobrotus edulis**	freeway iceplant
*Mesembryanthemum crystallinum**	crystalline iceplant
AMARANTHACEAE - AMARANTH FAMILY	
Amaranthus sp.	amaranth
ANACARDIACEAE - SUMAC FAMILY	
Malosma laurina	laurel sumac
Rhus integrifolia	lemonade berry
Toxicodendron diversilobum	western poison oak
APIACEAE - CARROT FAMILY	
*Conium maculatum**	poison hemlock
*Foeniculum vulgare**	fennel
Sanicula crassicaulis	Pacific sanicle
ASTERACEAE - SUNFLOWER FAMILY	
Ambrosia psilostachya	western ragweed
Artemisia californica	California sagebrush
Artemisia dracunculus	tarragon sagebrush
Baccharis pilularis ssp. *consanguinea*	coyote brush
Brickellia californica	California brickellbush
*Centaurea melitensis**	tocalote
Corethrogyne filaginifolia	common sand aster
*Cynara cardunculus**	cardoon
Deinandra fasciculata	fascicled tarplant
Deinandra paniculata	paniculate tarplant
Encelia californica	California brittlebush
Grindelia camporum	field gumplant
Hazardia squarrosa	saw toothed goldenbush
Isocoma menziesii var. *menziesii*	coastal goldenbush
*Lactuca serriola**	prickly lettuce
Logfia filaginoides	California cottonrose
*Logfia gallica**	french cottonrose
Osmadenia tenella	osmadenia

A-1
PLANT SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
Pseudognaphalium californicum	California everlasting
Sonchus asper ssp. *asper**	prickly sow thistle
Stylocline gnaphaloides	everlasting neststraw
Uropappus lindleyi	silver puffs
Verbesina dissita	big-leaved crownbeard
BORAGINACEAE - BORAGE FAMILY	
Cryptantha sp.	cryptantha
*Echium candicans**	pride of madeira
Eucrypta chrysanthemifolia	spotted hideseed
Phacelia cicutaria	caterpillar phacelia
Phacelia parryi	Parry's phacelia
BRASSICACEAE - MUSTARD FAMILY	
*Raphanus sativus**	radish
CACTACEAE - CACTUS FAMILY	
Cylindropuntia prolifera	coast cholla
Opuntia littoralis	coastal prickly pear
CARYOPHYLLACEAE - PINK FAMILY	
Silene laciniata	cardinal catchfly
CHENOPODIACEAE - GOOSEFOOT FAMILY	
Chenopodium californicum	California goosefoot
*Salsola tragus**	prickly Russian thistle
CLEOMACEAE - SPIDERFLOWER FAMILY	
Peritoma arborea	bladderpod
CONVOLVULACEAE - MORNING-GLORY FAMILY	
Calystegia macrostegia	coast morning-glory
Dichondra occidentalis	western dichondra
CRASSULACEAE - STONECROP FAMILY	
Crassula connata	pygmyweed
Dudleya lanceolata	lance-leaved dudleya
Dudleya multicaulis	many-stemmed dudleya
Dudleya pulverulenta	chalk dudleya
CUCURBITACEAE - GOURD FAMILY	
Marah macrocarpa	large fruit wild cucumber
FABACEAE - LEGUME FAMILY	
Acmispon glaber	deerweed
Lupinus sp.	lupine
*Melilotus indicus**	indian sweetclover
GERANIACEAE - GERANIUM FAMILY	
*Erodium cicutarium**	redstem filaree
GROSSULARIACEAE - GOOSEBERRY FAMILY	
Ribes speciosum	fuchsia-flowered gooseberry
LAMIACEAE - MINT FAMILY	
Salvia mellifera	black sage
Stachys ajugoides	bugle hedgenettle

A-1
PLANT SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
MALVACEAE - MALLOW FAMILY	
*Malva parviflora**	cheeseweed
MYRSINACEAE - MYRSINE FAMILY	
*Lysimachia arvensis**	scarlet pimpernel
MYRTACEAE - MYRTLE FAMILY	
Eucalyptus sp.*	gum
NYCTAGINACEAE - FOUR O'CLOCK FAMILY	
Mirabilis laevis var. *crassifolia*	coastal wishbone plant
ONAGRACEAE - EVENING PRIMROSE FAMILY	
Camissoniopsis cheiranthifolia	beach evening-primrose
OROBANCHACEAE - BROOM-RAPE FAMILY	
Castilleja cf. *affinis* ssp. *affinis*	coast indian paintbrush
PHRYMACEAE - LOPSEED FAMILY	
Mimulus aurantiacus	bush monkeyflower
PLANTAGINACEAE - PLANTAIN FAMILY	
Antirrhinum nuttallianum	Nuttall's snapdragon
Plantago erecta	dot seed plantain
POLEMONIACEAE - PHLOX FAMILY	
Eriastrum sapphirinum	sapphire woollystar
POLYGONACEAE - BUCKWHEAT FAMILY	
Chorizanthe staticoides	Turkish rugging
Eriogonum fasciculatum	California buckwheat
PRIMULACEAE - PRIMROSE FAMILY	
Primula clevelandii ssp. *clevelandii*	padre's shooting star
RANUNCULACEAE - BUTTERCUP FAMILY	
Ranunculus californicus	California buttercup
RHAMNACEAE - BUCKTHORN FAMILY	
Ceanothus megacarpus	bigpod ceanothus
Rhamnus crocea	spiny redberry
ROSACEAE - ROSE FAMILY	
Heteromeles arbutifolia	toyon
RUBIACEAE - COFFEE FAMILY	
Galium angustifolium ssp. *angustifolium*	narrow leaved bedstraw
Galium aparine	common bedstraw
RUTACEAE - CITRUS FAMILY	
Cneoridium dumosum	bushrue
SOLANACEAE - NIGHTSHADE FAMILY	
Solanum douglasii	Douglas' nightshade
MONOCOTS	
AGAVACEAE - AGAVE FAMILY	
Chlorogalum pomeridianum	wavyleaf soap plant
IRIDACEAE - IRIS FAMILY	
Sisyrinchium bellum	western blue-eyed-grass

A-1
PLANT SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
JUNCACEAE - RUSH FAMILY	
Juncus cf. *effusus*	soft rush
Juncus sp.	rush
LILIACEAE - LILY FAMILY	
Calochortus catalinae	Catalina mariposa lily
Calochortus splendens	splendid mariposa lily
Calochortus weedii var. *intermedius*	intermediate mariposa lily
POACEAE - GRASS FAMILY	
*Arundo donax**	giant reed
*Avena barbata**	slender wild oat
*Avena fatua**	wild oat
Bothriochloa barbinodis	cane bluestem
*Bromus diandrus**	ripgut brome
*Bromus hordeaceus**	soft chess
Bromus madritensis ssp. *rubens**	red brome
*Cortaderia selloana**	Selloa pampas grass
*Cynodon dactylon**	Bermuda grass
Distichlis spicata	salt grass
Elymus condensatus	giant wildrye
*Festuca myuros**	rattail fescue
*Hordeum murinum**	wall barley
*Lamarckia aurea**	goldentop grass
*Pennisetum setaceum**	African fountain grass
*Schismus barbatus**	Mediterranean schismus
Stipa cernua	nodding needle grass
Stipa sp.	needle grass
THEMIDACEAE - BRODIAEA FAMILY	
Bloomeria crocea	common goldenstar
Dichelostemma capitatum	blue dicks

* Non-native species

cf. = appears similar to, species can not be confirmed 100% due to phenological condition

A-2
WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
LIZARDS	
PHRYNOSOMATIDAE - SPINY LIZARD FAMILY	
Sceloporus occidentalis	western fence lizard
BIRDS	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY	
Callipepla californica	California quail
ACCIPITRIDAE - HAWK FAMILY	
Circus cyaneus	northern harrier
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	red-tailed hawk
COLUMBIDAE - PIGEON AND DOVE FAMILY	
Zenaida macroura	mourning dove
TROCHILIDAE - HUMMINGBIRD FAMILY	
Calypte anna	Anna's hummingbird
Selasphorus sasin	Allen's hummingbird
TYRANNIDAE - TYRANT FLYCATCHER FAMILY	
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus vociferans	Cassin's kingbird
CORVIDAE - JAY AND CROW FAMILY	
Aphelocoma californica	western scrub-jay
HIRUNDINIDAE - SWALLOW FAMILY	
Petrochelidon pyrrhonota	cliff swallow
AEGITHALIDAE - BUSHTIT FAMILY	
Psaltriparus minimus	bushtit
TROGLODYTIDAE - WREN FAMILY	
Thryomanes bewickii	Bewick's wren
POLIOPTILIDAE - GNATCATCHER FAMILY	
Polioptila californica californica	coastal California gnatcatcher
SYLVIIDAE - SILVIID WARBLERS FAMILY	
Chamaea fasciata	wrentit
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY	
Toxostoma redivivum	California thrasher
Mimus polyglottos	northern mockingbird
PARULIDAE - WOOD-WARBLER FAMILY	
Oreothypis celata	orange-crowned warbler
Geothlypis trichas	common yellowthroat
Setophaga townsendi	Townsend's warbler
EMBERIZIDAE - SPARROW FAMILY	
Pipilo maculatus	spotted towhee
Melozone crissalis	California towhee
FRINGILLIDAE - FINCH FAMILY	
Haemorhous mexicanus	house finch
Carduelis psaltria	lesser goldfinch

A-2
WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species	
Scientific Name	**Common Name**
MAMMALS	
SCIURIDAE - SQUIRREL FAMILY	
Otospermophilus beecheyi	California ground squirrel
CERVIDAE - CERVID FAMILY	
Odocoileus hemionus	southern mule deer

APPENDIX B

SITE PHOTOGRAPHS

Overlooking the upper reaches of Hobo Canyon from the northwest portion of the property, facing east.

Southern mixed chaparral (background) and annual grassland (foreground) in the center of the property.

D:\Projects\OCTA\J008\Graphics\AlisoCyn\BioTech\Ex_SP1_20150917.ai

Site Photographs

Appendix B-1

Measure M2 Acquisition Properties Evaluation – Aliso Canyon Property

BonTerra PSOMAS

Mixed sage scrub and cliff/rock in the southern portion of the property.

Mixed sage – chaparral scrub ecotone in the western portion of the property.

D:\Projects\OCTA\J008\Graphics\AlisoCyn\BioTech\Ex_SP2_20150917.ai

Mixed sage – cactus scrub on the property.

Disturbed mixed sage scrub at the north end of the property.

D:\Projects\OCTA\J008\Graphics\AlisoCyn\BioTech\Ex_SP3_20150917.ai

Annual grassland in the center of the property.

Ruderal vegetation (i.e. cardoon) in the center of the property.

D:\Projects\OCTA\J008\Graphics\AlisoCyn\BioTech\Ex_SP4_20150917.ai

Appendix C
Nesting Bird Policy for Preserve Management

Preserve Managers will implement a Nesting Birds Policy to conform to existing regulations and procedures for protection of nesting birds. Migratory native bird species are protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (50 CFR 10.13). Sections 3503, 3503.5, and 3513 of the California Fish and Game Code make it unlawful to: take, possess, or needlessly destroy the nest or eggs of any bird (3503); take, possess or destroy any birds in the orders of Falconiformes or Strigiformes (birds-of-prey) and the nest and eggs of any such bird (3503.5); and take or possess any migratory nongame bird, or any part thereof, as designated in the MBTA. Under State law, take means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill (Fish and Game Code Section 86), and includes take of eggs and/or young resulting from disturbances that cause abandonment of active nests.

Proposed activities with the potential to impact nesting birds (including, but not limited to, vegetation removal and use of heavy construction equipment) should occur outside of the avian breeding season, which generally runs from March 1 to September 15 (as early as January 1 for some birds) to avoid disturbance to breeding birds or destruction of the nest or eggs. Depending on the avian species present, a qualified biologist may determine that a change in the breeding season dates is warranted.

If the Preserve Manager determines that avoidance of the avian breeding season is not feasible, at least two weeks prior to the initiation of project activities, a qualified biologist with experience in conducting breeding bird surveys will conduct weekly bird surveys to detect presence/absence of native bird species occurring in suitable nesting habitat that is to be directly or indirectly disturbed and (as access to adjacent areas allows) any other such habitat within an appropriate buffer distance of the disturbance area. Generally the buffer distance should be 300 feet (500 feet for raptors). If a narrow buffer distance is warranted, the Preserve Manager will have a qualified biologist identify the appropriate buffer distances for raptors and non-raptors and notify Wildlife Agencies. The surveys should continue on a weekly basis with the last survey being conducted no more than three days prior to the initiation of project activities. If a native or nesting bird species is found, the Preserve Manager will do one of the following to avoid and minimize impacts on native birds and the nest or eggs of any birds.

a. Implement default 300-foot minimum avoidance buffers for all birds and 500-foot minimum avoidance buffers for all raptor species. The breeding habitat/nest site will be fenced and/or flagged in all directions, and this area will not be disturbed until the nest becomes inactive, the young have fledged, the young are no longer being fed by the parents, the young have left the area, and the young will no longer be impacted by the project.

b. If a narrower buffer distance is determined appropriate by the qualified biologist, the Preserve Manager will develop a project-specific Nesting Bird Management Plan. The site-specific nest protection plan will be developed collaboratively with Wildlife Agencies and submitted to the Wildlife Agencies, although the Wildlife Agencies will not be responsible for approving the narrower buffer distance and the Nesting Bird Management Plan. The Plan should include detailed methodologies and definitions to enable a qualified avian biologist to monitor and implement nest-specific buffers based on topography, vegetation, species, and individual bird

behavior. This Nesting Bird Management Plan will be supported by a Nest Log that tracks each nest and its outcome. The Nest Log will be submitted to the Wildlife Agencies at the end of each week.

c. The Preserve Manager may propose an alternative plan for avoidance and nesting birds for Wildlife Agencies' review and approval.

Flagging, stakes, and/or construction fencing should be used to demarcate the inside boundary of the buffer between the project activities and the nest. The personnel working for the Preserve Manager, including any contractors working on site, should be instructed on the sensitivity of the area. The Preserve Manager will document the results of the recommended protective measures described above to demonstrate compliance with applicable State and Federal laws pertaining to the protection of native birds.

The Biological Monitor will be present on site during all grubbing and clearing of vegetation to ensure that these activities remain within the project footprint (i.e., outside the demarcated buffer) and that the flagging/stakes/fencing is being maintained, and to minimize the likelihood that active nests are abandoned or fail due to project activities. The Biological Monitor will send weekly monitoring reports to the Preserve Manager during the grubbing and clearing of vegetation and will notify the Preserve Manager immediately if project activities take, possess, or needlessly destroy the nest or eggs of any bird as well as birds-of-prey and their nest or eggs. Within 48 hours of damage to an active nest or eggs or observed death or injury of birds protected under State law or the MBTA (which includes, but not is limited to, the birds on the Covered Species list), the Preserve Manager will notify the NCCP/HCP Administrator and Wildlife Agencies.

Appendix D

Five-Year Invasive Plan Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP

This page intentionally left blank.

Five-Year Invasive Plant Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP

Report for the Natural Communities Coalition, 2016

mapio.net

Prepared by:

California Invasive Plant Council
- Doug Johnson, Executive Director
- Dana Morawitz, Conservation Program Manager

In partnership with:

Milan Mitrovich, Natural Communities Coalition
and the Core Management Team:
- Jutta Burger, Irvine Ranch Conservancy
- Lana Nguyen, Crystal Cove State Park
- Jennifer Naegele, Orange County Parks

Note: In addition to this report, see detailed information in GIS geodatabases provided.

CONTENTS

EXECUTIVE SUMMARY

This 5-year Invasive Plant Management Plan (Plan) lays out a contemporary approach for effectively controlling invasive plants in the coastal portion of the County of Orange Central & Coastal Subregion NCCP/HCP (Coastal Reserve). The Plan includes three major components—an overall conceptual framework for invasive plant management, a targeted management plan, and an early detection and rapid response (EDRR) plan—as well as an associated GIS dataset. Together these provide detailed guidance and recommendations for land managers on the weed management priorities in specified management units.

We developed a prioritized approach in coordination with NCC and the Core Management Team (CMT), comprising Jutta Burger of Irvine Ranch Conservancy, Jennifer Naegele of Orange County Parks, and Lana Nguyen of California State Parks. This involved prioritization of invasive plant species and prioritization of geographic areas.

For plant prioritization, we evaluated invasive plants from six different lists. Sources included the 2003 Habitat and Restoration Enhancement Plan, the 2013 Back Country Council agreement, and the Orange County Chapter of the California Native Plant Society (OC-CNPS) early detection list. We ranked these plants using impact scores, then categorized them based on their potential for eradication.

For spatial prioritization, we used the 2015 aerial survey by Wildlands Conservation Science and other mapping datasets to defined four “Core Areas” that have relatively less cover by nonnative plants than surrounding lands. These areas comprise 25% of the Coastal Reserve but include only 3% of the invasive plant acreage. We also defined “Investment Areas” where extensive restoration and invasive plant management activities have already been conducted. All of these areas are considered high priorities for consistent weed management.

We divided the Coastal Reserve into 28 Management Units, based on sub-watersheds and existing fire management units. For each Management Unit we prioritize species and populations for eradication. The GIS layers provided with this report contain 2,419 invasive plant populations totaling 258 net acres over 3,836 gross acres. Of these, approximately 60% (1,442 populations totaling 144 net acres over 2,473 gross acres) are ranked as priorities for eradication or containment.

We estimated labor required from full-time staff, seasonal staff, and contractors to control priority populations across the Coastal Reserve as approximately 25,000 person-hours a year, with 70% of this spent implementing on-the-ground control activities and 30% spent on oversight activities. Focusing only on the highest-impact species would require approximately 15,000 person-hours a year. As weed populations are eradicated this need could decrease over time, but recreation, fire, and other human-related activities are likely to continue introducing and spreading invasive species. We recommend that NCC and the CMT work together to set an annual work plan based on the priorities and timeline described in this document.

Early detection and rapid response is the best way to identify and prevent the spread of new invasive plants. Regular active searches of the most vulnerable areas are an important way to find new

populations of these species before they become more widespread. We provide maps of key trails, roads, and facilities to survey, and estimate that these surveys would require 26 person-days annually. We recommend that Reserve managers regularly coordinate with one another (and with others, especially OC-CNPS) to track new invasive plants regionally to ensure that information about new species detections, treatment strategies, and management recommendations is shared within the broader region. We recommend that the CMT maintain a current list of top EDRR target species, starting from the list and criteria in this plan, and conduct annual trainings to help field staff identify target species and prevent the inadvertent spread of invasives.

Tracking EDRR observations, management goals and work performed is critical. We recommend that all landowners use the statewide online database Calflora as the tool of choice mapping and tracking. Land manger reports should be shared in common format, such as through Calflora's Weed Manager application, to facilitate overall tracking. We also recommend aerial surveys every five years to provide comprehensive mapping datasets and serve as the basis for periodic reserve-wide assessments. Dashboard-style reports should be prepared that summarize the progress made on achieving the goals established in this plan and in individual resource management plans.

Regional collaboration with other land management entities is critical for controlling invasive plants before they spread to the reserve. Across the state, Weed Management Areas (WMAs) are the structure for such regional collaboration. CMT partners should engage actively in the existing Santa Ana River/Orange County WMA or develop a new WMA geography that better serves their needs.

To summarize, here are our overarching recommendations for NCC and the CMT:

1. Each year, prepare and implement a management plan based on the criteria in this report.
2. Each year, prepare and implement a EDRR survey plan based on the criteria in this report.
3. Use Calflora as a shared database for mapping and tracking invasive plant populations.
4. Conduct annual trainings to support EDRR and prevention.
5. Prepare a simple annual report documenting progress made toward stated goals.
6. Conduct a reserve-wide helicopter survey every 5 years to check progress.
7. Collaborate with regional partners through active participation in a Weed Management Area.

Details for each of these are described in the report.

1. MANAGEMENT FRAMEWORK

This Plan updates the strategic approach to invasive plant management in the NCCP/HCP Coastal Reserve. The goal is to provide guidance for making the best investments in preventing native habitat degradation caused by the spread and colonization of invasive plants. The strategy includes ongoing management work (detailed in the Annual Management Plan) and a strengthened focus on proactive early detection/rapid response (detailed in the EDRR Plan). Cal-IPC and OC-CNPS advocate for early eradication of emerging weeds before they become widespread, and both organizations are providing new assessments of potentially invasive plant species to help determine which species present the greatest risk.

This section describes the overarching conceptual framework for managing invasive plants in the Coastal (and Central) Reserve. Land managers who treat invasive plants in the reserves need a consistent, structured approach for prioritizing which invasive species and populations should be targeted for eradication and control. Our approach provides a foundation for transparent decision-making and assessment and helps ensure coordination and effectiveness of efforts across the reserve.

1.1 Management Approach

Background – The focus of invasive plant management in the reserve has evolved over the years. The initial focus, begun by The Nature Conservancy on Irvine Ranch properties before the reserve was formed in 1996, was to control the extensive infestation of artichoke thistle (*Cynara cardunculus*). High cover of artichoke thistle was present throughout the upland native vegetation communities in the reserve, especially in degraded annual grasslands. High cover of artichoke thistle reduces the habitat value of these communities for the wildlife species they support including NCCP target species such as the cactus wren (*Campylorhynchus brunneicapillus*) and California gnatcatcher (*Polioptila californica californica*).

Significant progress has been made in reducing the cover of artichoke thistle. Comparing acreages presented in the 2003 Habitat Restoration and Enhancement Plan with acreages reported in 2014 by Harmsworth & Associates (adjusting for the fact that they only work on a portion of Coastal Reserve lands), there has been a 90% reduction in the amount of artichoke thistle.

The 2003 plan recommends prioritizing the removal of invasive plants from areas with mostly intact native vegetation where natural recruitment can accomplish passive restoration. The plan stresses the importance of an early warning system so that new infestations can be responded to quickly, but does not outline a systematic mechanism for accomplishing this task.

In 2013, the region's land management entities convened in various configurations – as the Back Country Council and the Land Management Committee – to discuss the need for a structured, coordinated strategy for invasive plant management. Through the Back Country Council, landowner agencies and other collaborators signed an agreement establishing their commitment to working together on the eradication of invasive plants. This effort categorized the various plant species as "emergent," "targeted," or "entrenched."

The major landowners in the Coastal Reserve are California State Parks, Orange County Parks, the City of Irvine, and the City of Newport Beach. They are responsible for mapping and treating invasive plants on their respective lands. The Natural Communities Coalition (NCC), the coordinating management entity for the reserve, has provided additional resources to support this work and has led the Coastal Reserve's Invasive Control Program in the past. These landowners and their land management contractors, such as the Irvine Ranch Conservancy, use mapping and treatment contractors, including Harmsworth & Associates, Nakae, Pacific Restoration Group, and DiRocco Environmental. The institutional knowledge and expertise of these contractors is a significant asset.

Volunteers play a role as well. For example, the Irvine Ranch Conservancy has developed an effective volunteer stewardship program for weed management as part of their work on the City of Irvine's Open Space, Newport Beach and OC Parks lands under their management. OC-CNPS has recently worked to identify new invasive plants of particular concern, listing 19 on their website and urging members to be on the lookout for new infestations.

Landowner staff and contractors perform some field mapping every year, but typically only for populations being treated and not as part of an overarching mapping program. Mapping is critical for documenting work, charting progress, and providing guidance for future work. In 2014, an aerial weed survey of the Coastal Reserve was conducted by Wildland Conservation Science. They prepared a report that included species location and abundance (in acres) data and management prioritization for 50 species. This effort provides an important spatial foundation for developing strategic priorities. A similar survey of the Central Reserve was conducted in 2011, and an update is being flown in 2016.

Early detection and rapid response – Land managers have always known that addressing an invasive plant infestation before it has a chance to spread is the best strategy because it avoids more costly management strategies later. The term for this approach is "early detection and rapid response", or EDRR for short. Though simple in concept, it can be challenging to implement effectively. Spotting a new infestation of a weed already known in a particular area is relatively easy, but detecting a new infestation of a species not yet known in an area can be difficult. Busy land managers with limited resources may sometimes focus on an obvious problem, such as large infestations of a well-known and widespread weed species, without having the time to find smaller infestations of lesser well-known weed species that might be important to address. Cal-IPC promotes the integration of EDRR concepts into all land managers' invasive plant management efforts.

Along with surveillance to spot new infestations, this approach includes eradication of small populations that are already known. These "early eradication" opportunities can be determined in an area by conducting a "risk assessment" to prioritize which species and populations pose the greatest threat to conservation goals. Online tools like CalWeedMapper and WHIPPET have been developed in recent years to support such assessments. When it is possible to pursue eradication at the regional level, future impacts and control costs can be avoided. (Using WHIPPET was initially explored as an approach for prioritizing populations in the Coastal Reserve. The scale of project, with a large number of invasive plant populations in a relatively small area, does not make ideal use of WHIPPET's spatial algorithms.)

Eradication – Complete removal of an invasive plant from an area, including its propagules (such as seeds in the soil seed bank) is a significant task. It requires sustained commitment so that no new

propagules are generated and existing propagules are exhausted. However, when feasible, because it is for a finite duration it can be the most cost-effective approach to accruing long-term conservation benefits. We stress eradication as a first priority where possible. Every year that treatment is deferred provides more potential for spread and another year's production of seed added to the soil seed bank. To determine that a species has been eradicated from an area requires monitoring the area for a period of time after all plants have been removed to conclude that there are no viable seeds remaining in the soil. The length of time will vary with the ability of the seeds to survive (some survive for only a few years, others for decades). Events like wildfires or plentiful rainy seasons can flush a seed bank, which is advantageous if a land manager is prepared to capitalize on the opportunity. For each of the reserve's priority species, we assigned a duration (in years) expected for an eradication effort—5 years, 10 years or 20 years (these are included in the tables in Appendix C).

Full eradication can be difficult to attain, and even to assess, for small species and species with a long seed life. The closest managers may come to eradicating some populations is through "containment at very low numbers," or "control to less-than-detectable levels." These remain worthy goals, though caution must be taken with any events (such as a wildfire) that may facilitate expansion of such populations.

By contrast, containment of a particular invasive plant species in an area—in which populations are reduced and spread is not allowed—may take fewer resources in a given year but will require an annual expenditure, possibly in perpetuity.

Prioritization – An invasive plant management strategy is typically based on a combination of species and spatial prioritizations. Management is focused on particular weed species and particular locations. There are multiple approaches for prioritizing where to best invest invasive plant management resources. We recommend integrating a mix of the following approaches, which are presented in rough order of declining priority.

Regional eradication – when possible, eliminating all populations of a given species in a region is very cost-effective, assuming the potential for reintroduction is also addressed. This requires:

- Species assessment - determining which species are most harmful
- Feasibility assessment - weighing costs and challenges to determine which species are most feasible to eradicate over the entire region

Eradication is difficult to attain. When spread of a target species outpaces treatment, or it proves impossible to halt all replenishment of the soil seed bank, an eradication target evolves into a containment target.

EDRR surveillance and treatment – actively scouting for new detections, vetting observations to determine which species and locations are actionable, and implementing timely control measures aimed at eradication. This does not result in a high number of "acres treated" but does potentially result in a high number of "acres protected" from potential future spread. (The EDRR element is discussed in detail in Section 3.) This requires:

- Detection - identifying high-risk locations for introduction of weed propagules (such as trailheads, fuel modification areas, and areas with heavy equipment use), and designing a regular search protocol for these locations. (Establishing best practices for maintenance activities, vehicles and equipment helps prevent new introductions in these areas—see section 2.6). Citizen science volunteers can also provide reports of new finds.
- Response - determining in advance how each local management entity will respond to reports of new infestations, or an event like a wildfire that creates immediate management needs.

Protect "Core Areas" – determining areas that are relatively less impacted by invasive plants and that have significant native habitat deserving protection, and removing weeds in and around that area. This requires ongoing, consistent maintenance.

- Spatial assessment - determining locations with high-quality habitat and few weeds
- Feasibility assessment - gauging efforts needed to remove weeds from the location and in a buffer around the location

Protect "Investment Areas" – areas where substantial prior work (invasive plant management and restoration) has been done deserve continued attention until site goals are met, so work in these areas is prioritized to maintain the investment.

Containment – when a weed species is too widespread to eradicate fully from a region, it can be effective to eradicate outlier populations and leading-edge populations that are most likely to spread into un-infested areas. This requires:

- Spatial assessment - identifying outlier populations in areas that are not occupied by that weed species
- Species assessment - determining which populations pose the greatest threat
- Feasibility assessment - weighing costs and challenges to determine which populations are most feasible to eradicate

Aesthetic maintenance – invasive plants in iconic areas that receive high visitation may be important to treat for the visitor experience (as well as for their potential to spread). This may be an aesthetic issue or a comfort issue depending on the type of plant. Treatment in these areas also provides an excellent educational opportunity, and due to ease of access, may be good areas for volunteer work parties.

Moving forward, Reserve managers should implement annual management work plans based on this 5-year Management Plan. The 5-year Management Plan should be reviewed and revised, where appropriate, to incorporate adaptive management approaches and any new information on weed management techniques (i.e., herbicides). EDRR priorities should be evaluated as new species are identified, with special funding requested for response, when appropriate.

Procedural tasks that will facilitate success are: develop an informed, structured process within which experts can develop strategies for use across the reserve; review and approval of the strategies by a

strong group of stakeholders; and regular reporting to document progress and support assessment of program effectiveness. The formation of the CMT is providing essential expertise for all of these components.

Treatment Methods – Integrated pest management (IPM) defines the basic principles of a treatment approach. According to the University of California's IPM program (web access June 30, 2016):

> Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

Invasive plant management is a form of IPM that typically involves multiple techniques, with physical and chemical being most common; these two techniques are often used together for optimal effectiveness. Note that the definition of IPM does not exclude the use of pesticides; it specifies appropriate caution, with safe use based on legal and scientific guidelines. Herbicides used in invasive plant management are low-risk, and the amounts used are typically minor relative to amounts used on residential and commercial landscaping. For more information on how herbicides are used safely in invasive plant management refer to Cal-IPC's Best Management Practices manual on "Protecting Wildlife When Using Herbicides for Invasive Plant Management" available online at www.cal-ipc.org/ip/management/BMPs. The manual includes toxicology risk charts for the herbicides used in wildland weed control.

1.2 Budgeting

Successful invasive plant management requires consistent long-term follow-through. A detailed work plan for invasive plant management will dictate budget needs. Each effort has a particular cost curve. For instance, eradication efforts can stretch over many years but is expected to be of finite duration, and may cost less in later years. Other costs are steady and ongoing, such as the cost of active surveillance for EDRR, while some costs are unpredictable. For example, when rapid response is necessary, a new expense may arise virtually overnight. Below is a summary of cost trends by treatment categories that is based on the strategic management approaches outlined above.

Regional eradication	Annual cost over finite time frame to eradicate all populations. May diminish over time.
EDRR	Steady annual cost to perform active scouting in high-risk areas. New costs for responding to critical detections.
Protect Core Areas	Annual cost over finite time frame to eradicate key populations. Ongoing annual cost to scout for new populations.

Protect Investment Areas	Annual cost over finite time frame to eradicate key populations. Ongoing annual cost to scout for new populations.
Containment	Steady annual cost to eradicate outlier and leading-edge populations, treat other populations, and scout for new populations.
Aesthetic maintenance	Steady annual cost for treatment in priority areas.

Costs are associated with (1) treatment to eradicate priority populations, (2) treatment to contain other selected populations as specified in this report, and (3) surveillance costs to scout for new populations. In addition to field costs for treatment and surveillance, there is an office cost for the significant coordination needed to plan field work and to track effectiveness.

In this 5-year Plan, eradication and containment targets are recommended, as well as search areas for early detection. For each of these targets we estimate the labor required and the duration of the effort. These estimates include both direct field hours as well as planning and oversight hours. These estimated costs can be revised in future updates of this Plan using the data from actual expenses incurred over the previous 5 years. Managers may find that particular eradication efforts take shorter or longer than originally estimated. New approaches may be developed to make control more feasible for well-established (or "entrenched") weed infestations that are now intractable, such as exotic annual grasses or mustard.

There are choices to be made about how to stage investment. Addressing invasive plant infestations now requires immediate capacity, but it has the benefit of not letting populations spread further before control is initiated. Basically, front-loading investment in order to address current infestations could result in decreased needs in future years as populations are eradicated. However, it should be recognized that increasing recreational use, increasing fuels management, rising fire risk and other factors associated with greater population pressure caution against assuming that invasive plant management needs will decrease in the future. Introductions and spread may keep pace with treatment efforts.

There may be a rationale for fluctuating budgets as years with favorable rainfall may enable land managers to make significant progress in depleting the soil seed bank for invasive plants, since a higher percentage of seeds will germinate. Thus increased funding in these years could be advantageous.

Partners have seen how steady investment can make tremendous progress over time on a widespread weed like artichoke thistle. The rate of progress depends on the biology of the different weed species and the extent of their soil seed bank, but Reserve partners are committed to stewardship in perpetuity and can finish projects they start. Steady funding, smart coordination, consistent reporting, and periodic assessment will allow Reserve partners to meet their invasive plant management goals.

1.3 Oversight Structure

It is critical that the CMT, which comprises knowledgeable land management representatives from each major landowner in the reserve, meet on a regular basis. This team will be central to designing and

implementing the invasive plant management program throughout the reserve. Their role includes: developing collaborative annual work plans based on this 5-Year Management Plan; presenting these plans to the larger Reserve community and NCC decision-makers and adjusting based on input; and reporting back on progress made. In addition, they will serve an important role in evaluating new invasive plant detections and recommending appropriate management response.

Composition – Representatives currently forming the CMT are:

- Crystal Cove State Park – Lana Nguyen, Resource Ecologist
- Orange County Parks – Jennifer Naegele, Restoration Ecologist
- City of Irvine Open Space – Jutta Burger, Managing Director of Science and Stewardship, Irvine Ranch Conservancy.

This group could grow in the future, including representatives from other entities, but it should always maintain representation from land managers responsible for the three main properties above. The Natural Communities Coalition should also remain intimately involved with the CMT.

Annual work plans – Each landowner needs an annual work plan for invasive plant management, and these work plans need to mesh into a coherent overall annual work plan for the reserve. This 5-Year Management Plan does not spell out the nuts and bolts of each landowner's annual work plan. Rather, it provides the raw materials and logical framework for selecting targets for annual work plans. Substantial site-specific knowledge is required for this selection, and landowner managers are the only ones with this knowledge.

Annual work plan design will be an iterative process between each individual landowner and the full CMT. A work plan will build on the previous year's work, but may deviate if adaptive management suggests a shift in priorities.

A work plan should be developed for each Management Unit (as defined in Section 2). Drafting a work plan requires integrating several sources of information, including: (1) the prioritized ranking of species for that Management Unit, (2) the spatial distribution of populations of each species in the Management Unit based on the GIS layer, and (3) budget and resources available. Goals should be set for each species—eradication, containment, or no treatment. (The goal may not the same for all populations of a given species; flexibility is required to account for factors such as lack of accessibility, planned future restoration, etc.)

The selected goals will dictate treatment approach, treatment cost, and progress reporting. Once the managers from each landowner have drafted work plans for each Management Unit under their jurisdiction, the CMT should work to coordinate priorities across Management Units.

Timing – Each winter, results from the mapping and treatment season should be compiled and evaluated by the CMT. Treatment for most species begins in March, though some species may be treated earlier (e.g., treatment for Saharan mustard begins in January). Using this analysis, the CMT should draft a proposed work plan for the upcoming treatment season. This plan should be coordinated with NCC before finalizing. Because external treatment contractors may need to be engaged, a time frame might look like:

November – mapping and treatment entities complete and submit reports, CMT meets to analyze reports and draft coming year's work plan

December – seek feedback from NCC and finalize work plan

January-March – set up contracts with mapping and treatment contractors

March – mapping and treatment begins

Additional CMT meetings during the year may be useful to address challenges that arise in treatment. Communicating on a quarterly or semi-annual basis with the NCC and region's land managers would also be useful to maintain familiarity with the work going on and the rationale behind it. The CMT will also need to meet when a potential new EDRR sighting is reported in order to discuss response options. If a response is proposed, this will need to be communicated to the reserve's land managers so that they are aware of the action and can contribute to surveillance, as appropriate.

Coordination – Coordinated planning and tracking is critical to successful implementation of this plan. This coordination will rely on strong engagement from CMT partners and NCC. Adopting common data protocol using the online Calflora database will make collaborative planning and tracking easier. NCC and the CMT may find it useful to designate an individual to serve as a coordination lead to help drive the process.

Metrics – Tracking progress toward management goals (both treatment and EDRR) is essential for helping decision makers and stakeholders assess the impact of investments and adjust approaches as necessary. Eradication, in particular, requires clear delineation of extent using thorough mapping data. To enable straightforward assessment of mapping and treatment efforts undertaken by multiple entities, work should be documented in consistent ways. Land managers should track gross acres and percent cover of each weed species that is treated such that reduction in net acres (gross acres x percent cover) can be estimated each year and this can be compared against the projected eradication curve for that species to gauge progress. (For small infestations, number and size of plants may be a more useful metric.) For EDRR, simple completion of prescribed search areas serves as a useful metric.

Each landowner has particular in-house requirements for tracking. State Parks has specific policies spelled out in the department's operations manual. The goal should be to fulfill each agency's in-house requirements while also finding a common shared format for tracking progress together. Details of reporting are discussed in section 2.5. Progress should be clearly illustrated in a concise dashboard format designed for decision-makers, using graphic representations to show progress relative to projected goals. Because invasive plant management may not result in linear progress, care must be taken to convey long-term trends and to explain annual variations.

Assessment of progress over time can be tracked using the annual assessment done by each agency, and from periodic benchmarks, such as that provided by helicopter surveys every 5 years. Such surveys can provide a comprehensive sweep of the reserve and provide an opportunity to compare overall population count and size to the previous fly-over. We recommend completing these surveys every 5 years.

1.4 Regional collaboration

Protecting the Coastal Reserve from invasive plants requires collaboration not only on the reserve, but also with regional partners managing lands beyond reserve borders. Other landowners, like the US Forest Service, have a strong stake in preventing the spread of wildland weeds. Communication with colleagues managing adjacent lands is essential for keeping current on new weeds that have the potential to colonize the reserve. For immediately adjoining landowners, control of particular weed populations may even require joint efforts.

Within southern Orange County, fostering regular communication and coordination would be productive. South County partners like Audubon Starr Ranch can be important allies. Orange County is part of the Santa Ana River/Orange County Weed Management Area (WMA) led by the Riverside-Corona Resource Conservation District. We recommend that partners working on the reserve engage as active participants in the WMA, or start their own Orange County WMA, with regular meetings (quarterly seems to work well for many WMAs).

Volunteer groups, especially OC-CNPS, are important for detecting new weeds across jurisdictions. Several reputable botanists are actively publicizing new weeds on the chapter's website and encouraging chapter members to look for them. This information is often new for landowner agencies as well. Cultivating a partnership with OC-CNPS will provide a range of benefits and is recommended. However, scouting by expert botanists is a critical need, and we recommend hiring such experts under formal agreement as necessary to ensure that this key function is covered.

Much of what OC-CNPS finds locally (such as bitou bush or Moroccan knapweed) may not yet be on reserve lands. Absent a strong County Agricultural Department (the agency that typically takes the lead on eradicating new weeds in other counties), it is recommended that NCC take a lead in addressing these new weeds.

Collaboration farther afield is also productive. Communicating with the Weed Management Areas in Los Angeles, Riverside, and San Diego counties on a regular basis will help maintain awareness of invasive plant species in the greater region. For example, San Diego has created a detailed assessment of invasive plant species for the coastal region of the county.

Collaborative work at the regional level will benefit from adopting a shared mapping platform. Across the state, we recommend that land managers post their data to the online Calflora database, and we recommend that for Orange County partners as well. This enables others to see the distribution of a particular plant at the landscape scale. New features on Calflora allow a land manager to store treatment data in the cloud (with privacy controls), which may be a better solution for many users than a custom in-house system within their organization. However, basic data from an internal system can easily be shared with Calflora, and it's important to find ways to integrate data across existing systems, such as WIMS used by State Parks.

1.5 Plan integration

As NCC works with partners to develop management plans identified in the NCCP/HCP, it is important that the plans integrate effectively with each other. Regular meetings among experts and stakeholders in all areas are important for identifying coordination needs.

The “Invasive Plant Management” focus area touches on all the others, but the strongest connection is with the “Restoration” focus area. Removing invasive plants, planting native plants, and other habitat restoration activities form a spectrum of approaches that should not be isolated. Some efforts involve removing a few individual invasive plants from an otherwise intact habitat, while other efforts may involve significant modification of existing vegetation (and even terrain) in an effort to re-establish habitat. In addition, invasive plant management has critical overlap with the “Fire Management” focus area. Weeds provide fuels for fire, they can be spread by fire, and they often spread in fuel modification zones.

Periodic meetings between those working on invasive plant management and those working on restoration can ensure that planning and implementation are well coordinated. There is a history of work to build on. As described in a 2014 report by Suding and Dickens from UC Berkeley, not all sites where weeds have been removed have progressed to high native cover (though native species richness has increased). Much of this relates to historic agricultural disturbance, with the proliferation of exotic annual grasses being one key factor that has been shown to limit native cover on Reserve sites. Working together to find approaches that reduce annual grasses would be of great benefit.

The “Invasive Plant Management” focus area also intersects with the “Recreation Management” and “Fire Management” areas. Recreation and wildfire both serve as vectors for invasive plant spread. For recreation, prevention best practices like boot cleaning stations at trailheads can reduce the risk of spread. Active surveillance for early detection will prioritize areas most impacted by recreation. Such efforts should be coordinated with those working on the “Recreation Management” focus area.

Wildfire provides a disturbance that can facilitate the spread of invasive plants. Veldt grass is of particular concern, since it is known to spread vigorously after fire. As with recreation, prevention best practices in fire suppression and firefighting efforts can reduce the risk of spread. After a fire, active surveillance in the burn area is critical, and treatment activities will need to be preplanned. These efforts should be coordinated with those working on the “Fire Management” focus area.

2. MANAGEMENT PLAN

The Management Framework in the previous section provides the guiding principles for long-term management. Using the framework as a blueprint, this 5-Year Management Plan specifies goals and activities for invasive plant management in the Coastal Reserve for 2017-2021. Priorities are set based on species factors and spatial factors, as described in the following sections.

Management actions vary by location. We defined 28 Management Units, shown on the map below (and in detail in Appendix E), to partition recommendations for management action. These Management Units are based on sub-watersheds and existing fire management units, and are designed to correspond with jurisdictional boundaries, major roads, and major topographic features. Management Units do not always align perfectly with property boundaries, and in some cases extend beyond the reserve, but were chosen because they are ecologically relevant. Land managers already work cooperatively across jurisdictional boundaries, so these 28 Management Units are not expected to create any extra burden to the respective land managers, and there is some synergy in establishing a common structure with fire management, another important resource management issue.

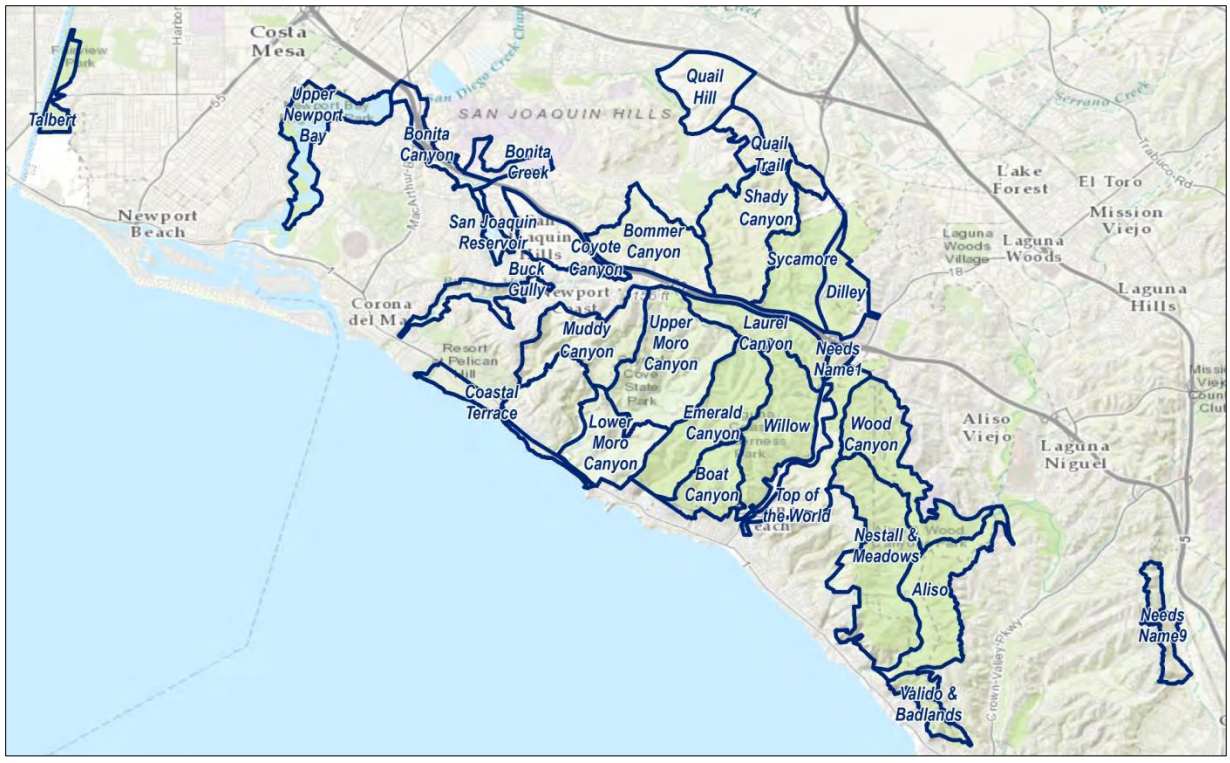


Fig. 1 Management Units

Each Management Unit is associated with a primary landowner:

City of Irvine: Bommer Canyon, Quail Hill, Quail Trail, San Joaquin Reservoir, Shady Canyon (approx. 3,637 acres)

California Dept. of Fish & Wildlife: Upper Newport Bay (approx. 809 acres)

California State Parks: Coastal Terrace, Lower Moro Canyon, Upper Moro Canyon (approx. 2,746 acres)

Newport Beach: Buck Gully (approx. 332 acres)

Orange County Parks: Aliso, Boat Canyon, Bonita Canyon, Bonita Creek, Dilley, Emerald Canyon, Laurel Canyon, Muddy Canyon, Needs Name 1, Needs Name 9, Nestall & Meadows, Sycamore, Talbert, Top of the World, Valido & Badlands, Willow, Wood Canyon (approx. 12,490 acres)

Orange County Waste: Coyote Canyon (approx. 576 acres)

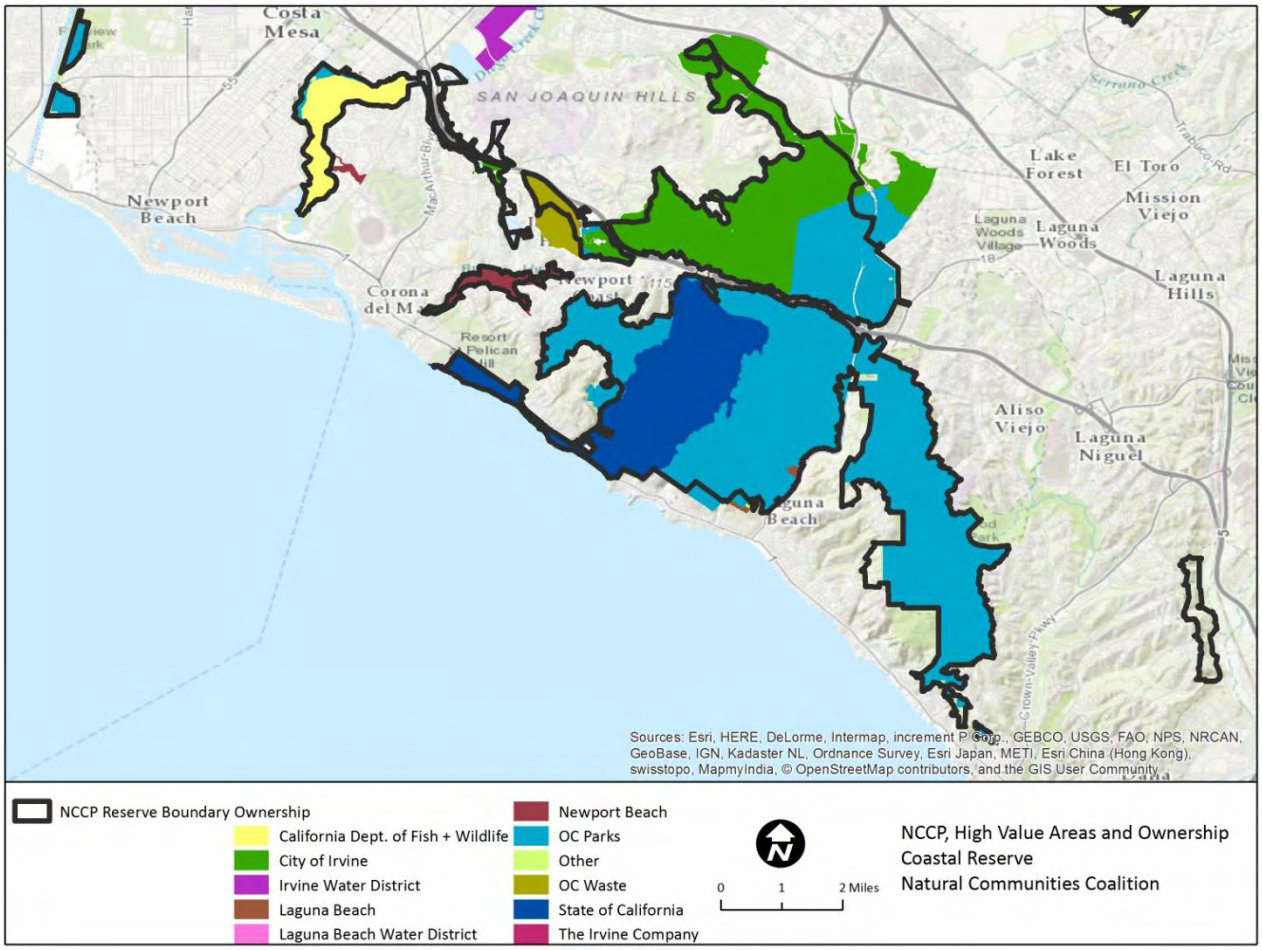


Fig. 2 Land ownership

2.1 Species prioritization

Numerous invasive plant species have been identified in relation to the Coastal Reserve by different entities over the years, including:

- Habitat Restoration and Enhancement Plan (2003) – 45 species, with level of impact to different habitat types;
- Back Country Council agreement (2013) – 15 species, some classified as "emergent" and others as "targeted";
- Harmsworth & Associates annual reports (2013-2015) – 8 species, some mapped as primary treatment targets and others as opportunistic targets;
- The Irvine Ranch Conservancy's Landscape-Wide Invasive Control Program (2016) – 13 species of concern;
- Wildland Conservation Science (2015) – 50 species from aerial weed survey;
- California State Parks' EDRR list for Orange Coast parks (2016) – 16 weed species of special concern for surveillance work to support early detection;
- Orange County Chapter of the California Native Plant Society (2016) – 19 weed species as priorities for early detection.

Together these sources list nearly one hundred species, from widespread weeds to potential new threats and are summarized in the Appendix. A small subset of these species is currently being managed in the Coastal Reserve. For example, in the Laguna Coast and Aliso and Wood Canyons Wilderness Parks, Harmsworth Associates focuses on three primary target species and includes five secondary species as opportunity arises. The Irvine Ranch Conservancy currently treats 12 species on City of Irvine Open Space.

With the CMT we undertook a review of all compiled species. We removed 36 species that were viewed as a low priority. We classified the remaining species into three categories based on level of threat and feasibility of eradication at the local and Reserve-wide scale (see table below). Species are categorized as either: (1) eradicate all populations of the species found on reserve lands in the Coastal Reserve, (2) eradicate all populations of the species in those parts of the reserve where it is feasible, but for other areas simply contain populations of the species, and (3) only treat populations of the species opportunistically, when they are found next to other priority populations and there is extra time and resources available.

Category 1 - Eradicate across the Coastal Subregion:

*Centaurea solstitialis**	yellow starthistle
Chrysanthemoides monilifera	bitou bush
Delairea odorata	Cape-ivy
*Dittrichia graveolens**	Stinkwort
*Euphorbia terracina**	carnation spurge
*Euphorbia virgata***	leafy spurge
Hypericum canariense	Canary Island St. Johnswort
Lepidium appelianum	hairy whitetop
Limonium ramosissimum	Algerian sea lavender

Plantago arenaria	Indian plantain
Rubus armeniacus	Himalayan blackberry
Senecio linearifolius	Linear-leaved Australian fireweed
Volutaria tubuliflora	Moroccan knapweed

Category 2 - Contain, eradicate where feasible:

Ailanthus altissima	tree-of-heaven
*Araujia sericifera**	Bladderflower
Arundo donax	giant reed
Asphodelus fistulosus	Onionweed
Brassica tournefortii	Sahara mustard
Cirsium vulgare	bull thistle
Conium maculatum	poison hemlock
Cortaderia selloana	pampas grass
Cynara cardunculus	artichoke thistle
Ehrharta calycina	perennial veldt grass
Emex spinosa	spiny emex
Foeniculum vulgare	Fennel
Glebionis coronaria	garland chrysanthemum
*Kochia scoparia**	summer cypress
Lepidium draba	Whitetop
Lepidium latifolium	perennial pepperweed
*Leucanthemum vulgare***	ox-eye daisy
Pennisetum setaceum	fountain grass
Phalaris sp.	Hardinggrass
Ricinus communis	castor bean
Robinia pseudoacacia	black locust
Salpichroa origanifolia	lily-of-the-valley vine
Schinus terebinthifolius	Brazilian pepper tree
Spartium junceum	Spanish broom
Stipa trichotoma	Mexican feather grass
Tamarix sp.	Tamarisk
Tropaeolum majus	garden nasturtium

Category 3 – Control Opportunistically:

Arctotheca calendula	fertile capeweed
Carduus pycnocephalus	Italian thistle
Carpobrotus edulis	Iceplant
Echium candicans	pride of Madeira
Encelia farinosa	Brittlebush
Eucalyptus sp.	Eucalyptus
Gazania sp.	Gazania
Limonium perezii/preauxii	Statice
Ludwigia hexapetala	creeping water primrose
Myoporum laetum	lollypop tree
Nicotiana glauca	tree tobacco
Olea europaea	Olive

Phoenix canariensis	Canary Island date palm
Salsola tragus	Russian thistle
Silybum marianum	milk thistle
Washingtonia robusta	Mexican fan palm

* not known to occur in the Coastal Subregion
** not known to occur in the greater Orange County region

2.2 Spatial prioritization

We developed a spatial overlay for prioritizing invasive plant management within the following Core Areas and Investment Areas, as defined earlier. The map below shows approximate boundaries of these areas, with Core Areas outlined in green and Investment Areas outlined in blue. The project GIS includes mapping of all priority areas.

Core Areas with relatively low levels of invasive plants were determined based on the available mapping data (Harmsworth ground mapping, Wildland Conservation Science helicopter mapping, and OC-CNPS data for new species collected in Calflora). These less-weedy areas generally correspond to interior areas of the reserve that are far from the Wildland Urban Interface, an area associated with the introduction of invasive species. The map below shows approximate boundaries of the four Core Areas – Shady Canyon, Laguna Coast Wilderness, San Joaquin Hills and Aliso. We recommend that protection of the Core Areas be a top priority in annual weed management work plans.

Investment Areas—areas that have been the focus of substantial restoration work (e.g. invasive plant management, cactus restoration)—were identified by the CMT.

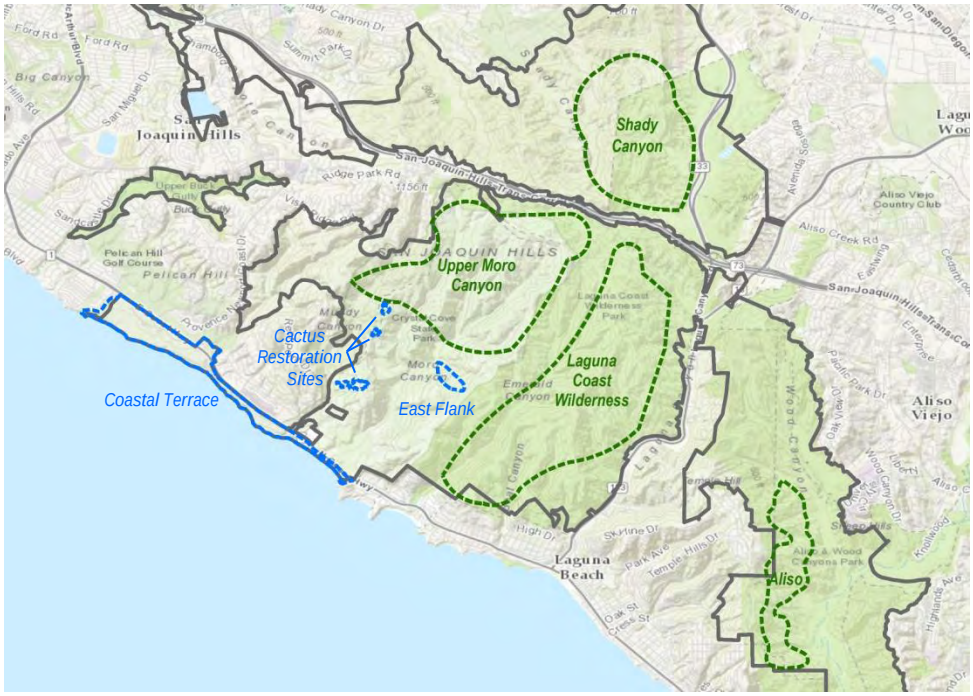


Fig. 3 Core Areas and Investment Areas

2.3 Management actions

The management actions recommended in this Plan are based on protecting Core Areas and Investment Areas and addressing high-priority invasive plants. For each Management Unit we recommend particular management actions, set goals based on those actions, and estimate the labor needed to implement the actions.

Management actions are determined using the species prioritization as described in section 2.1 and the spatial prioritization described in section 2.2. We used invasive plant mapping datasets from (1) 2014 Harmsworth ground mapping efforts, (2) 2015 Wildland Conservation Science helicopter mapping, and (3) OC-CNPS new weed mapping in Calflora to assess which invasive plant species are found in each Management Unit. We also used these datasets to determine species' extent and cover in acres and whether it is present within a Core or Investment Area within that Management Unit.

Management actions recommended within each Management Unit are prioritized based on the steps described below. Note that the goal when treating an invasive plant population should almost always be eradication of that population, though there may be exceptions where manager treats a population with the goal of simply limiting its expansion and spread.

1. Eradicate reserve-wide targets by treating all populations of plant species that have been identified as a target for eradication across the entire reserve. Continue treating those populations until they are eradicated.
2. Keep Core Areas free of invasives by treating all invasive plant populations found in Core Areas, regardless of their treatment category. Continue treating those populations until they are eradicated.
3. Protect Core and Investment Areas by treating populations of invasive plant species found in the Management Unit and categorized as "contain, eradicate where feasible." For a given Management Unit, eradicate all populations of species with 1 net acre or less in the unit. For more widespread species, eradicate those populations that are determined to be the highest priority based on: level of threat posed by the particular species; proximity of the population to Core and Investment Areas; and feasibility of eradication for the population.
4. Maintain popular volunteer efforts in locations where volunteer commitment is high, such as along popular trails. These are not specified in this Plan, but it is recognized that managers will continue to make this a component of their approach.

The tables in Appendix C present prioritized actions for each Management Unit, based on the logic above. For each action we provide a rough estimate of labor needed, based simply on net acreage and a generic labor per acre for control work and associated programmatic costs.

Estimating labor needs - For treatment activities (both eradication and containment), we start with a per-population expense of 4 hours to allow for site access and to provide a minimum expense for small populations.

Next we add a generic annual labor cost of 80 person-hours per net acre (i.e., equivalent to a 20-acre population at 5% cover). Based on past experience, this breaks down into 7 person-days for control

activities (including preparation and access) and 3 person-days for programmatic activities (planning, oversight, tracking and reporting). This labor may represent multiple treatments during a year. For weed populations that are spread over a large area with density (net acres divided by gross acres) at less than 10%, we increase the labor required per net acre by 50%.

These generic amounts are not meant to be highly accurate for all species and sites, but are designed to provide a reasonable estimate to help gauge resource needs. We are using a simple baseline cost for treatment regardless of whether the goal is eradication or containment, but the meticulous requirements of eradication will often mean increased labor is required.

The annual costs can be extended for the number of years estimated for eradication (we provide these estimates in Appendix C). Though in some cases the annual cost for eradication activities for a given species may decrease over time, we maintain the estimated labor expenditure as constant throughout the life of the effort, since for many species the level of effort does not decrease much. For instance, eradication efforts for Saharan mustard in the reserve, though now in the phase of only removing newly germinated plants, still requires extensive time because of the close attention needed to find small cryptic plants.

Most invasive plant populations in the Coastal Reserve are species in Category 2 ("contain, eradicate where feasible"). Of 1,997 populations, 1,436 (72%) are Category 2, with the remaining 28% being Category 3 ("Control opportunistically") and less than 1% (only 6 populations) being Category 1 ("Eradicate across the Coastal Subregion;" see table below). Most populations are found outside of Core Areas and Investment Areas as well, with only 3% of the net acreage falling in these areas. Though few in quantity, these are high-priority targets, and are integrated as high priority actions recommended by Management Unit in Appendix C.

Category 1 Species:			**Pops**	**Gross**	**Net**
Mgmt Unit	**Owner**	**Species**	(#)	(acres)	(acres)
Aliso	OC Parks	*Hypericum canariense*	1	0.1	0.02
Lower Moro Canyon	Crystal Cove SP	*Delairea odorata*	1		0.00
San Joaquin Reservoir	OC Waste	*Senecio linearifolius v. linearifolius*	2	2.3	0.35
Upper Newport Bay	Cal Dept. F&W	*Volutaria tubuliflora*	1		0.29
Willow	OC Parks	*Hypericum canariense*	1	8.0	0.08

The bulk of the information, then, in Appendix C relates to the Category 2 species found outside of Core and Investment Areas. The information in Appendix C for each Management Unit needs to be interpreted using the GIS layers provided that show locations for the invasive plant populations in that area. Decisions regarding which species or populations to treat as eradication targets or containment targets within the Management Unit will be made by the responsible land managers based on factors including: resources available; proximity to Core Areas, Investment Areas or other conservation resources; ease of access; and feasibility of control.

For the Category 2 species, the table below summarizes the number of invasive plant populations and total gross acreage infested in each Management Unit, as well as the estimated labor needs, based on the recommendations in Appendix C. The total number of person-days per year is equivalent to approximately 12 people full time. Management Units are listed in descending order of priority based on the amounts of Core Area and Investment Area in the unit. In the future, additional prioritization can be undertaken based on the percentage of valued habitat types, such as high-quality perennial grasslands, in each Management Unit (mapping of such habitat is not currently complete).

Category 2 Species:		**Core/Investment**	**Pops**	**Gross**	**Labor**
Management Unit	**Owner**	(acres)	(#)	(acres)	(p-d/yr)
Upper Moro Canyon	Crystal Cove SP	1080	69	85	85
Willow	OC Parks	673	55	20	37
Emerald Canyon	OC Parks	630	65	26	67
Sycamore	OC Parks	549	49	56	64
Shady Canyon	City of Irvine	381	58	66	61
Nestall & Meadows	OC Parks	351	23	18	35
Boat Canyon	OC Parks	320	12	6	8
Coastal Terrace	Crystal Cove SP	309	4	4	4
Laurel Canyon	OC Parks	182	48	49	54
Muddy Canyon	OC Parks	108	105	190	331
Lower Moro Canyon	Crystal Cove SP	12	51	19	46
Aliso	OC Parks		136	278	370
Bommer Canyon	City of Irvine		58	147	146
Bonita Canyon	OC Parks		2	0.2	1
Bonita Creek	OC Parks		5	2	3
Buck Gully	Newport Beach		18	20	30
Coyote Canyon	OC Waste		86	14	75
Dilley	OC Parks		87	610	150
Needs Name1	OC Parks		69	41	52
Quail Hill	City of Irvine		120	119	203
Quail Trail	City of Irvine		29	76	62
San Joaquin Reservoir	City of Irvine		88	241	248
Top of the World	OC Parks		64	207	233
Upper Newport Bay	CDFW		16	12	22
Valido & Badlands	OC Parks		26	50	75
Wood Canyon	OC Parks		93	107	182
		4,595	1,436	2,463	2,643

2.5 Reporting

Record-keeping is a critical aspect of invasive plant management. Detailed records help gauge and improve the effectiveness of treatment through adaptive management. Such detailed records can be kept internally for the organization implementing the treatment. In addition, summary data should be kept in a shared location as well. We recommend using the online Calflora mapping database, which has several ways to track treatment.

For those wanting to simply note very basic information for free, Cal-IPC has worked with Calflora to set up simple functions for adding treatment notes to an invasive plant population. Instructions for doing this are available on the Cal-IPC website at www.cal-ipc.org/ip/mapping. Data in Calflora on populations being managed connects to Cal-IPC's online CalWeedMapper application which tracks progress at the landscape scale. More powerful tools are available for a fee through Calflora's Weed Manager applications, which are designed replace the need for an in-house database and GIS. We recommend that NCC and the CMT invest in using Weed Manager in order take advantage of its customizable tracking tools. This will allow each landowner to keep data in a format that fulfills their internal agency requirements as well as the common tracking needs of this plan. Making data from all organizations available on a single platform will greatly simplify landscape-level planning and tracking.

For tracking overall progress at the landscape level, reporting from each jurisdictional entity should have common fields of data. Work for each Management Unit should be reported on annually. Core Area within the Management Unit can be reported on separately from other areas in the Management Unit. The report should include the species treated, and for each species:

- Total acreage present (gross and net, current and original baseline)
- Confidence level that the total represents a complete inventory for that area
- Goal for this species in this Management Unit (eradication or containment)
- Portion treated this year
- Cost of treatment
- General observations to account for particular progress or lack thereof

Spatial data for new populations mapped should be uploaded to Calflora as a single shared geodatabase. Attributes for existing populations should be updated. The CMT—or the invasive plant management coordinator, if one has been designated—should oversee this process and synthesize data from all landowners and Management Units into an overall report.

2.6 Prevention

Prevention is the first line of defense, and it is critical that all land managers in the reserve work to prevent new weed introductions to the best of their ability. Prevention tasks include: preventing the introduction of new invasive plants onto the reserve, preventing the re-introduction of invasive plant species already on the reserve, and preventing the inadvertent spread of invasive plants around the reserve.

As mentioned previously, it is important to monitor areas on the perimeter of the reserve for new invasive plant introductions. New introductions can come from neighboring landscaping, and perimeter areas of the reserve often include fuel modification zones that are vulnerable to invasive plants. Using GIS data, we have provided land ownership information for parcels adjacent to the reserve to support communication with neighbors about prevention activities. In particular, choosing appropriate non-invasive plants for landscaping is important and educating homeowners on the appropriate disposal of yard waste.

Many invasive plants have evolved to have seeds that can attach themselves to animals, people, and vehicles, helping them colonize new areas. Other seeds can be moved in soil, for instance on hiking boots or tires. And ground disturbance, such as fuel breaks, can provide suitable places for weeds to grow. Cal-IPC has prepared two manuals on Best Management Practices (BMPs) for preventing the spread of invasive plants. One manual is for land managers and includes information regarding fire suppression and fire-fighting activities. The other manual is for entities that manage transportation and utility corridors.

These manuals provide a foundation for institutionalized best practices so that inadvertent spread of invasive plants is reduced. (The manuals are available online at www.cal-ipc.org/ip/prevention. A training video is also available, which includes content from both manuals.) Best Management Practices should be integrated into all relevant land management activities, and staff should be regularly trained on these practices. Relevant activities include weed management, trail maintenance, road maintenance, fuel modification zone maintenance, and fire-fighting. Not only those working in the field, but those planning activities and procuring materials have a role in prevention and should be trained. Such training should be completed annually, and completion of annual training can be a report item.

3. Early Detection/Rapid Response (EDRR) Plan

EDRR is the best approach to managing invasive plants in that it identifies new problems *before* they have a chance to spread and become significant threats to species, habitats and, potentially, fire cycles. There are a several angles: EDRR includes finding brand new invasive plant species to a region as well as finding new populations of known invasive plant species. EDRR includes both incidental efforts—where those who spend time in the field are asked to report sightings made in the course of other work—as well as targeted search efforts with EDRR as the main focus. OC-CNPS has been doing great work identifying new non-native plants in the region's natural areas and publicizing what they find. Their members and others with basic botanical expertise can serve as an excellent resource for incidental EDRR. Landowners in the Coastal Reserve are recommended to implement routine active EDRR search efforts, as described below. EDRR is important to implement not only at the scale of the entire reserve, but for each Management Unit.

3.1 Species prioritization

New species found on the reserve or in the neighboring region are a top priority. Incidental observations and active scouting should put a premium on identifying anything new, and risk assessment for any new finds should be completed promptly to gauge their ability to spread and have a negative impact. Information on identifying the new species should be shared widely with all reserve landowners and partners.

Finding new populations of known species can also be important for stopping their spread. Using consensus input from the CMT we ranked the known invasive plant species compiled for the Management Plan as shown in the table below. In addition to the species on the reserve, we include also important species not found on the reserve at the current time, since these could appear on the reserve in the future. The full list is provided, but a search list for EDRR surveying will likely be much shorter to be practical. We recommend focusing on a subset of species ranked "High" as selected by the CMT on an annual basis. This list will constantly evolve as new species are found and added.

Species	Common Name
High Priority	
Ailanthus altissima	tree-of-heaven
*Araujia sericifera**	bladderflower*
Arctotheca calendula fertile	fertile capeweed
Arundo donax	giant reed
Asphodelus fistulosus	onionweed
Brassica tournefortii	Sahara mustard
*Centaurea solstitialis**	yellow starthistle*
Chrysanthemoides monilifera ssp. Monilifera	bitou bush
Cirsium vulgare	bull thistle

Delairea odorata	Cape-ivy
*Dittrichia graveolens**	stinkwort*
Ehrharta calycina	perennial veldt grass
Emex spinosa	spiny emex
*Euphorbia terracina**	carnation spurge*
*Euphorbia virgata***	leafy spurge**
Glebionis coronaria	garland chrysanthemum
Hedera sp.	unknown ivy
Hypericum canariense	Canary Island St. Johnswort
*Lepidium appelianum**	hairy whitetop*
Lepidium latifolium	perennial pepperweed
Limonium ramosissimum	Algerian sea lavender
*Parthenium hysterophorus**	Santa Maria feverfew*
Pennisetum setaceum	fountain grass
Plantago arenaria	Indian plantain
Rubus armeniacus	Himalayan blackberry
Senecio linearifolius v. linearifolius	linear-leaved Australian fireweed
Spartium junceum	Spanish broom
Tamarix spp.	tamarisk
Volutaria tubuliflora	Moroccan knapweed
Moderate Priority	
Conium maculatum	poison hemlock
Cortaderia selloana	pampas grass
*Kochia scoparia**	summer cypress*
Lepidium draba	whitetop
*Leucanthemum vulgare***	ox-eye daisy**
Phalaris spp.	hardinggrass
Ricinus communis	castor bean
Robinia pseudoacacia	black locust
Salpichroa origanifolia	lily-of-the-valley vine
Stipa trichotoma	Mexican feather grass
Low Priority	
Carduus pycnocephalus	Italian thistle
Carpobrotus edulis	iceplant
Cynara cardunculus	artichoke thistle
Echium candicans	pride of Madeira
Encelia farinose	brittlebush
Eucalyptus spp.	eucalyptus
Foeniculum vulgare	fennel
Gazania spp.	gazania
Limonium perezii/preauxii	statice
Ludwigia hexapetala	creeping water primrose
Myoporum laetum	lollypop tree

Nicotiana glauca	tree tobacco
Olea europaea	olive
Phoenix canariensis	Canary Island date palm
Salsola tragus	Russian thistle
Schinus terebinthifolius	Brazilian pepper tree
Silybum marianum	milk thistle
Tropaeolum majus	garden nasturtium
Washingtonia robusta	Mexican fan palm

* not known to occur in the Coastal Reserve

** not known to occur in the greater region

3.2 Spatial prioritization

Several types of areas are of particular importance for EDRR because of the way many weeds spread. For instance, the edge of the reserve abuts the developed landscape, with exposure to yard landscaping that may contain known invasive plants or plants that will become a problem in the future. These edge areas have ground and vegetation disturbance from fuel modification, which can provide fertile ground for invasive plants to become established.

Key invasive plant populations located on the perimeter of the reserve were identified based on land manager input and a recent helicopter survey. These populations are included in the management recommendations in Appendix C. For EDRR to be effective, surveillance around the reserve perimeter is desirable because these areas are continually altered by fuel modification activities. Periodic helicopter mapping is likely to identify any new populations in these areas, which somewhat reduces the need for ground surveys.

Other areas of importance for EDRR are those places inside the reserve that have high human traffic (foot, equestrian, or vehicle) because invasive plants often establish in the disturbed areas and can be spread from there. These include parking lots, trail heads, visitor centers, and maintenance facilities. Working with the CMT, we identified these features, and determined the appropriate search frequency (every year, every 2 years, or every 3 years) depending on the perceived risk of new introductions or spread in those areas. Maps for each of the Management Units are included in Appendix D. The labor needed is summarized in the table below, based on generic assumptions for the time needed per facility site and for mile of linear feature. Note that EDRR search areas have only been defined for the most actively managed Management Units.

Mgmt Unit	Owner	Labor*
Aliso	OC Parks	1
Boat Canyon	OC Parks	1
Bommer Canyon	City of Irvine	2
Buck Gully	Newport Beach	1
Coastal Terrace	Crystal Cove SP	3

Dilley	OC Parks	2
Emerald Canyon	OC Parks	1
Laurel Canyon	OC Parks	1
Lower Moro Canyon	Crystal Cove SP	1
Muddy Canyon	OC Parks	1
Nestall & Meadows	OC Parks	1
Quail Trail	City of Irvine	1
Shady Canyon	City of Irvine	1
Sycamore	OC Parks	1
Talbert		1
Top of the World	OC Parks	1
Upper Moro Canyon	Crystal Cove SP	1
Upper Newport Bay	CDFW	2
Willow	OC Parks	2
Wood Canyon	OC Parks	2
TOTAL		32

*Labor in person-days/year

3.3 EDRR Action

Land managers should search the areas identified in the spatial prioritization (shown in Appendix D) at the interval specified, with the goal being to identify new populations of priority species. If particular invasive plant species are already widespread in an area, there may be no need to record new populations. The goal is to identify populations unknown to land managers that have the potential to spread and increase long-term management costs. In addition to the priority species, a surveyor should also always be looking for new invasive species.

If the newly detected population is small and the species can be removed by hand, the surveyor may control the plants immediately upon detection. If the population is larger, however, the surveyor's report will inform future treatment approaches. Depending on the species and the location, this may become a high priority for control or a lesser priority for control. Finally, if a new non-native species is found, an assessment needs to be conducted quickly to ascertain the potential risk, and control action should typically be initiated immediately. In situations where a significant need arises that cannot be met with existing land management capacity, a special request should be directed to NCC for emergency support.

Landowners may want to conduct their own EDRR surveys on their land, or hire a contractor who is well-trained to identify, map, and remove priority species. In addition, committed stewardship volunteers through organizations like IRC could be trained to identify a set of priority species and directed to survey particular areas of the reserve.

Passive EDRR should be supported as much as possible. Hikers and other recreationists can provide eyes and ears on the ground, though most will only be able to recognize a handful of plants. Making sure that more botanically reputable partners like OC-CNPS members are encouraged to report any sightings would leverage an excellent resource. Incidental third-party observations provide an early warning system for invasive plants that can be addressed before they get to the reserve, and NCC support for response should be considering for such populations.

Annual reporting for EDRR activities should capture whether the active survey routes in each Management Unit were completed for that year, what was found, and what if anything was determined to be actionable.

EDRR targets are typically dealt with fairly quickly, within five years. Beyond that point, management of a population has generally become part of ongoing annual management.

3.4 EDRR communications

Streamlined communication is critical for effective EDRR. For an early detection to result in a rapid response, a series of things must happen.

First, information on the detection needs to be communicated to a land manager who can confirm identification and determine how important the species and location make the detection.

Next, an appropriate response action needs to be designed. This may be straightforward, if the landowner is already treating the plant elsewhere in the reserve, but it could be more complicated if this is not the case. A brand new weed may require research to determine a treatment approach, using experts from University of California Cooperative Extension and the land manager community at large through Cal-IPC's network (e.g., CalWeedTalk listserv).

Implementing the response action may require acquiring additional short-term treatment capacity, or shifting existing treatment plans to accommodate a new treatment. Keeping a flexible contractor on retainer for as-needed work may be ideal if possible. Sometimes volunteer labor may be the best option. These are all matters that an invasive plant coordinator for the reserves can oversee.

In some cases, depending on the species and the location, it will be important to communicate with other landowners so that they are aware of a potential threat and be on the lookout. This is especially important for new invasive plant species, since it may be in other places than where it was first identified. Delineating the full extent of a new weed is important for gauging the level of effort that will be needed to treat it successfully.

Several structures can facilitate the needed communication. CMT members provide needed central communication and coordination. Having regular meetings (quarterly is suggested) with interim communications as needed will make sure that all agencies are up-to-speed with each other's detections. Because Jutta Burger of IRC is also active with OC-CNPS, she provides an important link to their detection activities. It's important to maintain this link.

CMT members may also benefit from participating in the Santa Ana River/Orange County Weed Management Area in order to share information with other regional partners. If this existing WMA is not active or does not serve the regional interests of the reserve well, there may be benefit to creating a new Orange County WMA.

3.5 EDRR training

It is essential that land managers and anyone conducting EDRR surveys are well trained on the identification of the priority weed species. Regular trainings, at least once a year, should be held with specimens (fresh ideally, pressed otherwise) of each plant. A slide show and printed materials should be prepared showing each plant in the wild and at different life stages. These materials can also help train passive detectors.

Beyond identification, land managers and surveyors need training on how to map and report observations. We recommend using Calflora's Observer application for smart phone, which takes a GPS reading and provides room for photos and notes. This information can them be simply uploaded to the online Calflora database. The new EDRR email alert function that Cal-IPC is working on with Calflora will then send automated messages to those people who have joined an Orange County EDRR group on Calflora specifically to track new species to the region.

An outside third party like Cal-IPC may be useful in organizing such trainings, using local expertise for peer-to-peer training and bringing in outside expertise as needed. Curriculum has been developed, and a network of expert instructors is available for such courses, which include a course on Biology and Identification of Invasive Plants and another on Wildland Weed Mapping.

Appendix A: Invasive Plant Lists

For this plan we collated all existing plant lists that we found. The following table shows invasive plant species found in one or more of the following lists:

- Harmsworth Associates (the species they have treated) [HA]
- Habitat and Restoration Enhancement Plan for NROC, 2003
- Wildland Conservation Science (the species they mapped by helicopter in 2014)
- Back Country Council (from their 2013 agreement)
- Irvine Ranch Conservancy (species they are managing)
- Orange County Chapter of the California Native Plant Society (their EDRR list)
- California State Parks (EDRR surveillance species from Crystal Cove SP)
- Orange County Parks (species they are managing)

Numerical codes are used in the table to indicated distinct levels from each list, as described below. These were structured so that "1" indicates the higher priority species.

- Harmsworth Associates (HA) – 1=treating/mapping all populations found of this species, 2=treating this species only opportunistically
- Habitat and Restoration Enhancement Plan (HREP) – 1=high priority, 2=moderate priority, 3= low priority, as interpreted through descriptions in LSA report.
- Wildland Conservation Science (WCS) – 1=high priority, 2=moderate priority, 3= low priority, based on dividing their range of weighted priority (Table 12) scores into 3 bins (≥15.00="1", ≥14.00="2", <14.00="3").
- Back Country Council (BCC) – 1=emergent, 2=target, 3=track.
- Irvine Ranch Conservancy (IRC) – 1=eradication, 2=target.
- Orange County Chapter of the California Native Plant Society (CNPS) – all=1 since they are all listed as EDRR targets.
- California State Parks (CSP) – all=1 since they are from the Crystal Cove surveillance list.
- Orange County Parks (OCP) – all=1 since it's their short list.

The Core Management Team (CMT) reviewed the species and selected their collective top priorities for management and for surveillance. These are shown in the final two columns. For CMT Treatment Type, 1=eradicate across the entire subregion, 2=eradicate in those watersheds where feasible and otherwise contain, and 3=control opportunistically. For CMT Surveillance Priority, 1=high, 2=moderate and 3=low. Species without CMT priority scores were considered not to be a priority.

Species	Common Name	HA	HREP	WCS	BCC	IRC	CNPS	CSP	OCP	CMT Trtmnt Type	CMT Survey Priority
Acacia cyclops	cyclops acacia			3	3						
Agave americana	Century Plant			2							
Ageratina adenophora	sticky eupatorium		2								
Ailanthus altissima	tree-of-heaven		1		1	2				2	1
Araujia sericifera	bladderflower				1		1	1		2	1
Arctotheca calendula	fertile capeweed							1		3	2
Arundo donax	giant reed		1	1	2	1				2	1
Asphodelus fistulosus	onionweed			1			1	1		2	1
Atriplex semibaccata	Australian saltbush		2	2							
Avena sp.	oats		3								
Brachypodium distachyon	purple false brome		3								
Brassica nigra	black mustard		2								
Brassica sp.	unknown mustard			3							
Brassica tournefortii	Sahara mustard	1		1	1	1	1	1		2	1
Bromus sp.	brome		2								
Buddleja davidii	butterflybush			2							
Cactoideae sp.	unknown cactus			2							
Callistemon sp.	bottlebrush			2							
Carduus pycnocephalus	Italian thistle		2	3					1	3	3
Carpobrotus edulis	iceplant		1	1						3	3
Centaurea melitensis	tocalote		1								
Centaurea solstitialis	yellow starthistle		1		1	1	1			1	1
Chrysanthemoides	bitou bush						1			1	1
Cirsium vulgare	bull thistle		2	1	3	2				2	1
Conium maculatum	poison hemlock		2	3	3				1	2	2
Cortaderia selloana	pampas grass	2	1	2	2	2				2	2
Cynara cardunculus	artichoke thistle	1	1	3	2	2				2	2
Cyperus papyrus	papyrus			2							
Delairea odorata	Cape-ivy						1			1	1
Dittrichia graveolens	stinkwort						1	1		1	1
Echium candicans	pride of Madeira			3						3	3
Ehrharta calycina	perennial veldt grass	1	2		2		1			2	1
Emex spinosa	spiny emex				1	1	1	1		2	1
Encelia farinosa	brittlebush		3	2						3	3
Eriodium sp.	filaree		3								
Eucalyptus sp.	eucalyptus			3						3	3
Euphorbia terracina	carnation spurge							1		1	1
Euphorbia virgata	leafy spurge							1		1	1
Foeniculum vulgare	fennel	2	1	2	3				1	2	3
Gazania sp.	gazania		3	3						3	3
Glebionis coronaria	garland	1	1	2	2	1				2	1
Grass sp.	unknown grass			3							
Hedera sp.	unknown ivy			1							1
Hedypnois cretica	Crete weed		2								
Hirschfeldia incana	summer mustard		1								
Hordeum sp.	barley		2								
Hypericum canariense	Canary Island St.	1		1	1		1	1		1	1
Kochia scoparia	summer cypress						1			2	2
Lactuca serriola	wild lettuce			2							
Lepidium appelianum	hairy whitetop							1		1	1
Lepidium draba	whitetop						1			2	2
Lepidium latifolium	perennial pepperweed			1	1	1	1	1		2	1
Leucanthemum vulgare	ox-eye daisy							1		2	2
Limonium perezii/preauxii	statice							1		3	3
Limonium ramosissimum	Algerian sea lavender			3						1	1
Lolium sp.	rye		2								
Ludwigia hexapetala	creeping water						1			3	3

Marrubium vulgare	horehound		3	3							
Medicago polymorpha	bur clover		3								
Melilotus indica	yellow sweet clover		3								
Mesembryanthemum	crystalline iceplant		2								
Myoporum laetum	lollypop tree			2	3					3	3
Nerium oleander	oleander			3							
Nicotiana glauca	tree tobacco	2	3	3	3				1	3	3
Olea europaea	olive			1						3	3
Opuntia ficus-indica	Mission cactus			2							
Paraserianthes lophantha	plume acacia			2							
Pennisetum setaceum	fountain grass		2	2	3					2	1
Phalaris sp.	hardinggrass		2	1						2	2
Phoenix canariensis	Canary Island date			3	1					3	3
Picris echioides	prickly sowthistle		3	3							
Pinus sp.	unknown pine tree			3							
Piptatherum miliaceum	smilo grass			3							
Plantago arenaria	Indian plantain							1		1	1
Ricinus communis	castor bean	2	2	3	3	2				2	2
Robinia pseudoacacia	black locust			3			1			2	2
Rubus armeniacus	Himalayan blackberry						1			1	1
Salpichroa origanifolia	lily-of-the-valley vine						1	1		2	2
Salsola tragus	Russian thistle		2							3	3
Schinus molle	Peruvian pepper tree		2	3							
Schinus terebinthifolius	Brazilian pepper tree		2	2	3					2	3
Senecio linearifolius v.	Linear-leaved						1			1	1
Silybum marianum	milk thistle		2	2						3	3
Sonchus sp.	sow thistle		3								
Spartium junceum	Spanish broom		2		1	1				2	1
Stipa trichotoma	Mexican feather grass			2						2	2
Tamarix sp.	tamarisk		1	1	2	1		1		2	1
Tree sp.	unknown tree			2							
Tropaeolum majus	garden nasturtium			2						2	3
Ulmus parvifolia	Chinese elm			2							
Vinca major	periwinkle		2								
Volutaria tubuliflora	Moroccan knapweed					1	1			1	1
Washingtonia robusta	Mexican fan palm		3	2						3	3
Xanthium sp.	cocklebur		3	3							
Yucca sp.	unknown yucca			2							

Appendix B: Impact Scoring of Invasive Plants

In order to prioritize management of particular species, an impact score was calculated for each. Since most populations in the Coastal Subregion are Category 2 species (where a decision much be made between eradication and containment approaches) and most populations are found outside of Core Areas and Investment Areas (where eradication is highly recommended), the impact score helps prioritize between species and populations.

The overall impact was derived from the following sources:

1. Orange County Chapter of the California Native Plant Society score. CNPS scores ranged from 1 (high priority) to 3 (low priority). In order to work with additive systems where a higher score indicates a higher priority, we inverted the CNPS scores by subtracting them from 4, so that a 1 becomes a 3, and a 3 becomes a 1.
2. San Diego Plant Assessment scores for the San Diego Association of Government's Environmental Mitigation Program, from 2012. These are scored from a low of 2.2 to a high of 8.9. The list was divided into three bins, with >6.0 getting a "3", 5.0 to 6.0 getting a "2", and <5.0 getting a "1".
3. Wildland Conservation Science's weighted priority score from Table 12 of their 2014 report, with ≥15.00 getting a "3", ≥14.00 getting a "2", and <14.00 getting a "1".
4. California Invasive Plant Council statewide ratings, with a "High" getting a "3", a "Moderate" getting a "2", and a "Limited" getting a "1".

Impact scores were generated for all species categorized by the CMT as either treatment types 1 or 2 (those categorized as treatment type 3 are managed opportunistically so prioritization is less useful). Scores were based on the above sources in the order they are listed (based on the recommendation of the CMT). A score from OC-CNPS is the most local, and was used as the impact score for any species on the list. Next, if a species had not been scored by OC-CNPS, the San Diego score was taken because of its immediate proximity and detailed analysis. Next, if neither OC-CNPS nor San Diego had a score, the WCS score was used. Finally, if none of the other three had scored the species, the statewide Cal-IPC rating was used. For several species identified by State Parks as targets, none of these lists had evaluated impact; these species were given a "1" for impact.

Category 2 Species Impact Scores (arranged alphabetically by species)

Species	Common Name	CNPS	SD	WCS	CIPC	Impact
Ailanthus altissima	tree-of-heaven		3		2	3
Araujia sericifera	Bladderflower	1.25				1.25
Arundo donax	giant reed		3	3	3	3
Asphodelus fistulosus	Onionweed	2.25	1	3	2	2.25
Brassica tournefortii	Sahara mustard	2		3	3	2
Centaurea solstitialis	yellow starthistle	2.75			3	2.75
Chrysanthemoides monilifera	bitou bush	2.5				2.5
Cirsium vulgare	bull thistle		1	3	2	1
Conium maculatum	poison hemlock			1	2	1
Cortaderia selloana	pampas grass		3	3	3	3
Cynara cardunculus	artichoke thistle		3	1	2	3
Delairea odorata	Cape-ivy	2.5	2		3	2.5
Dittrichia graveolens	stinkwort	2.75	2		2	2.75
Ehrharta calycina	perennial veldt grass	3	2		3	3
Emex spinosa	spiny emex	2	1		2	2
Euphorbia terracina	carnation spurge		2		2	2
Euphorbia virgata	leafy spurge				2	2
Foeniculum vulgare	fennel		3	3	3	3
Glebionis coronaria	garland chrysanthemum			2	2	2
Hypericum canariense	Canary Island St. Johnswort	2.5	2	3	2	2.5
Kochia scoparia	summer cypress	1.25				1.25
Lepidium appelianum	hairy whitetop					1
Lepidium draba	whitetop	1.5	2		2	1.5
Lepidium latifolium	perennial pepperweed	2	3	3	3	2
Leucanthemum vulgare	ox-eye daisy				2	2
Limonium ramosissimum	Algerian sea lavender			1	2	1
Pennisetum setaceum	fountain grass		2	2	2	2
Phalaris sp.	hardinggrass			3	2	3
Plantago arenaria	Indian plantain					1
Ricinus communis	castor bean		2	1	1	2
Robinia pseudoacacia	black locust	1.25		2	1	1.25
Rubus armeniacus	Himalayan blackberry	3			3	3
Salpichroa origanifolia	lily-of-the-valley vine	1.5				1.5
Schinus terebinthifolius	Brazilian pepper tree		2	2	1	2
Senecio linearifolius	Linear-leaved Australian	2.5				2.5
Spartium junceum	Spanish broom		2		3	2
Stipa trichotoma	Mexican feather grass			2		2
Tamarix sp.	tamarisk		3	3	2	3
Tropaeolum majus	garden nasturtium			2		2
Volutaria tubuliflora	Moroccan knapweed	3				3

Species Impact Scores (arranged by impact score, highest to lowest)

Species	Common Name	CNPS	SD	WCS	CIPC	Impact
Rubus armeniacus	Himalayan blackberry	3			3	3
Volutaria tubuliflora	Moroccan knapweed	3				3
Ailanthus altissima	tree-of-heaven		3		2	3
Arundo donax	giant reed		3	3	3	3
Cortaderia selloana	pampas grass		3	3	3	3
Cynara cardunculus	artichoke thistle		3	1	2	3
Ehrharta calycina	perennial veldt grass	3	2		3	3
Foeniculum vulgare	fennel		3	3	3	3
Phalaris sp.	hardinggrass			3	2	3
Tamarix sp.	tamarisk		3	3	2	3
Centaurea solstitialis	yellow starthistle	2.75			3	2.75
Dittrichia graveolens	stinkwort	2.75	2		2	2.75
Chrysanthemoides monilifera	bitou bush	2.5				2.5
Delairea odorata	Cape-ivy	2.5	2		3	2.5
Hypericum canariense	Canary Island St. Johnswort	2.5	2	3	2	2.5
Senecio linearifolius	Linear-leaved Australian fireweed	2.5				2.5
Asphodelus fistulosus	onionweed	2.25	1	3	2	2.25
Euphorbia terracina	carnation spurge		2		2	2
Euphorbia virgata	leafy spurge				2	2
Brassica tournefortii	Sahara mustard	2		3	3	2
Emex spinosa	spiny emex	2	1		2	2
Glebionis coronaria	garland chrysanthemum			2	2	2
Lepidium latifolium	perennial pepperweed	2	3	3	3	2
Leucanthemum vulgare	ox-eye daisy				2	2
Pennisetum setaceum	fountain grass		2	2	2	2
Ricinus communis	castor bean		2	1	1	2
Schinus terebinthifolius	Brazilian pepper tree		2	2	1	2
Spartium junceum	Spanish broom		2		3	2
Stipa trichotoma	Mexican feather grass			2		2
Tropaeolum majus	garden nasturtium			2		2
Lepidium draba	whitetop	1.5	2		2	1.5
Salpichroa origanifolia	lily-of-the-valley vine	1.5				1.5
Kochia scoparia	summer cypress	1.25				1.25
Araujia sericifera	bladderflower	1.25				1.25
Robinia pseudoacacia	black locust	1.25		2	1	1.25
Lepidium appelianum	hairy whitetop					1
Plantago arenaria	Indian plantain					1
Cirsium vulgare	bull thistle		1	3	2	1
Conium maculatum	poison hemlock			1	2	1
Limonium ramosissimum	Algerian sea lavender			1	2	1

Appendix C: Priority Management Actions

Each of the following set of tables shows the recommended actions for a particular Management Unit. These tables were generated from a GIS compilation of invasive plant populations from three sources:

- Wildland Conservation Science 2015 aerial weed survey;
- Harmsworth & Associates annual surveys
- Calflora online database (www.calflora.org) where observations by OC-CNPS and others are recorded. This data was accessed in June 2016, and observations contributed subsequently are not included.

While this GIS compilation is relatively complete, additional data may be added over time to keep it current. Such data include more recent observations contributed to Calflora, as well as datasets from landowners and managers such as Irvine Ranch Conservancy. In using the following tables to plan and prioritize management, land managers should make sure to consult any other relevant data sources for invasive plant populations within a given Management Unit.

The tables below describe management priorities for each Management Unit in the following fashion. The tables list the invasive plant species found in the Management Unit (with the exception of plant species that are classified as region-wide eradication targets—if any of these are found in the Management Unit, these plants are called out below the main table, and are considered the top priority).

Within the tables, prioritization proceeds as follows. Populations found within Core Areas or Investment Areas are a top priority for eradication. If one needs to prioritize among these plant species, the accompanying impact scores can be used. Of course, practical considerations for each population, such as ease of access, may also be factors.

For the remaining populations, which are found outside Core Areas or Investment Areas, populations, land managers need to decide whether to pursue eradication or containment. In general we recommend eradication as a goal for a particular population or species to limit the need for ongoing control. Again, impact scores for each species can help set priorities.

Labor estimates, based on acreage and number of populations, are shown in person-days per year to help managers plan and budget. Likewise, the estimated years to eradication are also shown to help with planning and budgeting, and also as a timeframe for tracking progress toward eradication.

ALISO	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	10	116.9	12.81	-	-	133	5
Cortaderia selloana	3	51	29.1	4.59	-	-	71	5
Cynara cardunculus	3	27	43.8	4.66	-	-	60	10

Foeniculum vulgare	3	11	1.1	0.06	-	-	6	10
Tamarix sp.	3	13	0.4	0.17	-	-	8	10
Pennisetum setaceum	2	3	0.3	0.03	-	-	2	5
Schinus terebinthifolius	2	1	0.0	0.00	-	-	1	5
Conium maculatum	1	20	86.4	7.83	-	-	127	10
Totals		**136**	**278**	**30.16**	**-**	**-**	**408**	

Plus special Category 1 regional eradication target:

Species	**Pops** (#)	**Gross** (acres)	**Net** (acres)	**Time** (years)
Hypericum canariense	1	0.1	0.02	10

BOAT CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	4	0.0	0.01	0.01	-	2	5
Cynara cardunculus	3	6	4.8	0.09	0.06	-	4	10
Brassica tournefortii	2	1	0.0	0.00	-	-	1	5
Pennisetum setaceum	2	1	0.9	0.05	-	-	1	10
Totals		**12**	**6**	**0.15**	**0.07**	**-**	**8**	

Plus Category 3 species found in a Core Area, recommended for eradication:

	Pops	Gross	Net
Species	(#)	(acres)	(acres)
Carpobrotus edulis	1	0.03	0.029

BOMMER CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	3	0.0	0.00	-	-	2	5
Cynara cardunculus	3	43	138.5	4.30	-	-	86	10
Foeniculum vulgare	3	6	0.3	0.07	-	-	4	10
Ricinus communis	2	2	0.1	0.02	-	-	1	20
Conium maculatum	1	4	8.0	3.41	-	-	36	10
Totals		**58**	**147**	**7.81**	**-**	**-**	**129**	

BONITA CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Lepidium latifolium	2	1	0.1	0.02	-	-	1	10
Araujia sericifera	1.25	1	0.0	0.00	-	-	1	10
Totals		**2**	**0**	**0.02**	**-**	**-**	**1**	

BONITA CREEK	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cynara cardunculus	3	5	2.2	0.02	-	-	3	10
Totals		**5**	**2**	**0.02**	**-**	**-**	**3**	

BUCK GULLY	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cynara cardunculus	3	15	13.6	1.77*	-	-	25	10
Foeniculum vulgare	3	2	5.3	0.27	-	-	5	10
Glebionis coronaria	2	5	5.2	0.24	-	-	6	10
Totals		**22**	**24**	**2.28**	**-**	**-**	**36**	

COASTAL TERRACE	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	2	0.0	0.00	-	0.00	1	5
Cortaderia selloana	3	1	0.0	0.00	-	0.00	1	5
Cynara cardunculus	3	30	1.1	0.06	-	0.06	16	10
Foeniculum vulgare	3	13	4.2	0.96	-	0.96	16	10
Emex spinosa	2	2	0.0	0.00	-	0.00	1	10
Pennisetum setaceum	2	4	0.1	0.04	-	0.04	2	5
Ricinus communis	2	18	1.5	0.09	-	0.09	10	20
Schinus terebinthifolius	2	2	0.6	0.04	-	0.04	2	5
Spartium junceum	2	1	0.0	0.00	-	0.00	1	20
Tropaeolum majus	2	4	1.5	0.37	-	0.37	6	10
Lepidium draba	1.5	1	0.0	0.00	-	0.00	1	10
Conium maculatum	1	8	4.8	1.60	-	1.60	20	10
Totals		**86**	**14**	**3.17**	**-**	**3.16**	**76**	

Plus Category 3 species found in an Investment Area, recommended for eradication:

Species	Pops (#)	Gross (acres)	Net (acres)
Carpobrotus edulis	2	0.133	0.1016
Echium candicans	1	0.006	0.0031
Limonium perezii	1	0.000	0.0001
Myoporum laetum	4	0.009	0.0090
Nicotiana glauca	3	0.018	0.0032
Phoenix canariensis	1	0.001	0.0006

COYOTE CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	22	7.8	0.35	-	-	16	5
Cynara cardunculus	3	30	249.4	2.59	-	-	54	10
Foeniculum vulgare	3	16	0.6	0.14	-	-	9	10
Phalaris sp.	3	1	0.0	0.00	-	-	1	5
Tamarix sp.	3	9	0.6	0.03	-	-	5	10
Glebionis coronaria	2	1	129.9	1.30	-	-	20	10
Pennisetum setaceum	2	1	0.0	0.00	-	-	1	5
Ricinus communis	2	1	0.0	0.00	-	-	1	20
Schinus terebinthifolius	2	1	0.0	0.04	-	-	1	5
Conium maculatum	1	2	10.5	0.52	-	-	9	10
Limonium ramosissimum	1	3	211.6	2.12	-	-	33	10
Totals		**87**	**610**	**7.10**	**-**	**-**	**149**	

DILLEY	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	4	0.4	0.15	-	-	4	5
Cortaderia selloana	3	13	1.2	0.08	-	-	8	5
Cynara cardunculus	3	15	10.0	0.25	-	-	11	10
Foeniculum vulgare	3	8	0.3	0.07	-	-	5	10
Tamarix sp.	3	1	1.0	0.04	-	-	1	10
Brassica tournefortii	2	1	0.0	0.00	-	-	1	10
Cirsium vulgare	2	3	0.4	0.05	-	-	2	10
Lepidium latifolium	2	1	0.0	0.00	-	-	1	10
Pennisetum setaceum	2	6	9.5	0.25	-	-	7	5
Stipa trichotoma	2	6	0.5	0.01	-	-	3	5
Conium maculatum	1	7	2.8	1.42	-	-	18	10
Totals		**65**	**26**	**2.33**	**-**	**-**	**59**	

EMERALD CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	11	0.3	0.04	0.03	-	6	5
Cynara cardunculus	3	14	15.3	0.44	0.02	-	14	10
Ehrharta calycina	3	13	31.4	0.98	0.17	-	21	20
Asphodelus fistulosus	2.25	2	0.0	0.00	-	-	1	10
Brassica tournefortii	2	5	0.0	0.00	-	-	3	10
Conium maculatum	1	3	2.3	0.51	0.0002	-	7	10
Totals		**48**	**49**	**1.97**	**0.23**	**-**	**51**	

Plus Category 3 species found in a Core Area, recommended for eradication:

	Pops	Gross	Net
Species	(#)	(acres)	(acres)
Nicotiana glauca	5	0.62	0.598

LAUREL CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	6	0.8	0.09	-	-	4	5
Cortaderia selloana	3	7	0.5	0.17	0.001	-	5	5
Cynara cardunculus	3	17	6.8	0.57	0.02	-	17	10
Ehrharta calycina	3	5	5.9	0.30	0.01	-	7	20
Foeniculum vulgare	3	5	1.1	0.08	-	-	4	10
Phalaris sp.	3	2	0.0	0.00	-	-	1	5
Schinus terebinthifolius	2	4	2.0	0.36	-	-	6	5
Stipa trichotoma	2	1	0.0	0.00	-	-	1	5
Robinia pseudoacacia	1.25	1	1.9	0.29	-	-	3	10
Conium maculatum	1	3	0.3	0.14	0.002	-	3	10
Totals		**51**	**19**	**2.00**	**0.03**	**-**	**50**	

LOWER MORO CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	2	0.2	0.01	-	-	1	5
Cortaderia selloana	3	16	2.1	0.08	-	-	9	5
Cynara cardunculus	3	56	134.9	8.40	-	0.02	154	10
Foeniculum vulgare	3	7	4.4	0.08	-	-	5	10
Tamarix sp.	3	8	0.1	0.05	-	-	5	10
Asphodelus fistulosus	2.25	1	0.0	0.00	-	-	1	10
Emex spinosa	2	2	0.0	0.00	-	-	1	10
Ricinus communis	2	6	1.5	1.49	-	-	18	20
Schinus terebinthifolius	2	2	0.1	0.06	-	-	2	5
Tropaeolum majus	2	1	0.3	0.08	-	-	1	10
Conium maculatum	1	4	46.6	8.32	-	-	85	10
Totals		**105**	**190**	**18.56**	**-**	**0.02**	**281**	

Plus special Category 1 regional eradication target:

	Pops	Gross	Net	Time
Species	(#)	(acres)	(acres)	(years)
Delairea odorata	1		0.00	5

MUDDY CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	34	2.5	0.25	-	-	20	5
Cynara cardunculus	3	23	35.9	0.68	0.25	-	22	10
Foeniculum vulgare	3	6	0.8	0.03	-	-	3	10
Tamarix sp.	3	1	0.0	0.00	-	-	1	10
Glebionis coronaria	2	2	0.2	0.00	-	-	1	10
Pennisetum setaceum	2	1	0.1	0.01	-	-	1	5
Conium maculatum	1	2	1.0	0.21	-	-	3	10
Totals		**69**	**41**	**1.18**	**0.25**	**-**	**50**	

NEEDS NAME 1	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	4	9.0	1.06	-	-	13	5
Cortaderia selloana	3	4	0.6	0.02	-	-	2	5
Cynara cardunculus	3	3	0.4	0.02	-	-	2	10
Foeniculum vulgare	3	4	5.0	0.05	-	-	3	10
Pennisetum setaceum	2	1	0.5	0.01	-	-	1	5
Schinus terebinthifolius	2	1	0.0	0.00	-	-	1	5
Robinia pseudoacacia	1.25	2	1.0	0.14			2	10
Conium maculatum	1	4	1.6	0.26	-	-	5	10
Totals		**23**	**18**	**1.56**	**-**	**-**	**28**	

NESTALL & MEADOWS	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	2	0.3	0.02	0.01	-	1	5
Cortaderia selloana	3	49	6.1	0.54	0.12	-	33	5
Cynara cardunculus	3	29	70.7	2.85	0.01	-	57	10
Foeniculum vulgare	3	19	9.4	0.15	0.01	-	12	10
Tamarix sp.	3	1	0.0	0.00	-	-	1	10
Glebionis coronaria	2	3	8.2	0.08	-	-	3	10
Pennisetum setaceum	2	1	0.0	0.00	-	-	1	5
Stipa trichotoma	2	2	0.1	0.02	-	-	1	5
Conium maculatum	1	14	23.7	5.87	-	-	66	10
Totals		**120**	**119**	**9.54**	**0.14**	**-**	**174**	

QUAIL HILL	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cynara cardunculus	3	13	39.4	2.38	-	-	42	10
Foeniculum vulgare	3	9	36.3	0.38	-	-	10	10
Tamarix sp.	3	4	0.0	0.01	-	-	2	10
Pennisetum setaceum	2	1	0.5	0.38	-	-	4	5
Ricinus communis	2	2	0.0	0.01	-	-	1	20
Totals		**29**	**76**	**3.16**	**-**	**-**	**60**	

QUAIL TRAIL	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	4	0.0	0.01	-	-	2	5
Cynara cardunculus	3	36	125.1	9.24	-	-	157	10
Foeniculum vulgare	3	22	93.3	1.43	-	-	32	10
Tamarix sp.	3	2	0.1	0.04	-	-	1	10
Brassica tournefortii	2	1	0.1	0.02	-	-	1	10
Glebionis coronaria	2	1	0.4	0.00	-	-	1	10
Lepidium latifolium	2	3	3.9	0.03	-	-	2	10
Pennisetum setaceum	2	8	12.0	2.19	-	-	26	5
Ricinus communis	2	5	0.1	0.09	-	-	3	20
Schinus terebinthifolius	2	1	0.0	0.03	-	-	1	5
Conium maculatum	1	5	5.8	0.55	-	-	11	10
Totals		**88**	**241**	**13.61**	**-**	**-**	**236**	

SAN JOAQUIN Management Unit has only a special Category 1 regional eradication target:

	Pops	Gross	Net	Time
Species	(#)	(acres)	(acres)	(years)
Senecio linearifolius v. linearifolius	2	2.3	0.35	10

SHADY CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	8	7.7	0.08	-	-	5	5
Cynara cardunculus	3	43	55.3	1.21	0.03	-	40	10
Cirsium vulgare	2	1	0.0	0.00	0.001	-	1	10
Conium maculatum	1	6	3.0	0.83	0.77	-	11	10
Totals		**58**	**66**	**2.13**	**0.80**	**-**	**57**	

SYCAMORE	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	4	9.6	0.10	0.09	-	3	5
Cynara cardunculus	3	28	32.9	0.57	0.14	-	23	10
Foeniculum vulgare	3	6	0.9	0.03	-	-	3	10
Brassica tournefortii	2	2	6.0	0.02	-	-	1	10
Pennisetum setaceum	2	1	0.6	0.01	0.006	-	1	5
Stipa trichotoma	2	1	0.0	0.00	-	-	1	5
Conium maculatum	1	7	6.3	1.89	0.83	-	22	10
Totals		**49**	**56**	**2.63**	**1.07**	**-**	**54**	

TOP OF THE WORLD	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Arundo donax	3	2	0.0	0.04	-	-	1	5
Cortaderia selloana	3	21	8.9	0.31	-	-	15	5
Cynara cardunculus	3	9	13.5	0.47	-	-	12	10
Ehrharta calycina	3	1	1.1	0.01	-	-	1	20
Foeniculum vulgare	3	18	13.7	0.24	-	-	13	10
Phalaris sp.	3	1	87.5	4.37	-	-	66	5
Emex spinosa	2	1	5.5	0.20	-	-	3	10
Schinus terebinthifolius	2	1	0.2	0.00	-	-	1	5
Robinia pseudoacacia	1.25	1	1.4	0.42	-	-	5	10
Conium maculatum	1	9	75.3	7.31	-	-	114	10
Totals		**64**	**207**	**13.37**	**-**	**-**	**230**	

UPPER MORO CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	25	1.4	0.17	0.04	0.0002	14	10
Cynara cardunculus	3	30	67.7	0.76	0.11	0.06	26	20
Ehrharta calycina	3	1	1.2	0.01	0.01	-	1	10
Tamarix sp.	3	2	0.0	0.03	0.005	-	1	5
Brassica tournefortii	2	1	0.4	0.02	0.02	-	1	5
Emex spinosa	2	1	0.0	0.00	-	-	1	5
Schinus terebinthifolius	2	1	0.0	0.00	-	-	1	10
Conium maculatum	1	8	14.2	2.34	0.51	0.0006	27	5
Totals		**69**	**85**	**3.34**	**0.69**	**0.06**	**72**	

Plus Category 3 species found in a Core Area, recommended for eradication:

Species	Pops (#)	Gross (acres)	Net (acres)
Silybum marianum	1	1.83	0.073
Nicotiana glauca	1	0.04	0.004

UPPER NEWPORT BAY	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	4	7.4	1.03	-	-	12	5
Foeniculum vulgare	3	9	4.2	0.32	-	-	9	10
Ricinus communis	2	3	0.5	0.02	-	-	2	20
Totals		**16**	**12**	**1.37**	**-**	**-**	**23**	

Plus special Category 1 regional eradication target:

Species	Pops (#)	Gross (acres)	Net (acres)	Time (years)
Volutaria tubuliflora	1		0.29	10

VALIDO & BADLANDS	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	12	15.5	2.92	-	-	35	5
Cynara cardunculus	3	1	0.0	0.04	-	-	1	10
Foeniculum vulgare	3	6	5.7	0.38	-	-	9	10
Tamarix sp.	3	1	0.8	0.08	-	-	2	10
Pennisetum setaceum	2	5	27.7	2.79	-	-	30	5
Limonium ramosissimum	1	1	0.3	0.00	-	-	1	10
Totals		**26**	**50**	**6.23**	**-**	**-**	**78**	

WILLOW	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	9	0.2	0.04	0.02	-	5	5
Cynara cardunculus	3	7	3.8	0.12	0.11	-	5	10
Ehrharta calycina	3	3	8.9	0.09	0.09	-	3	20
Foeniculum vulgare	3	12	2.1	0.03	-	-	6	10
Tamarix sp.	3	1	0.0	0.00	0.005	-	1	10
Pennisetum setaceum	2	7	1.7	0.02	-	-	4	5
Ricinus communis	2	3	0.1	0.01	-	-	2	20
Stipa trichotoma	2	2	0.0	0.00	-	-	1	5
Conium maculatum	1	11	2.8	0.34	0.09	-	9	10
Totals		**55**	**20**	**0.64**	**-**	**-**	**35**	

Plus special Category 1 regional eradication target:

	Pops	Gross	Net	Time
Species	(#)	(acres)	(acres)	(years)
Hypericum canariense	1	8.0	0.08	10

Plus Category 3 species found in a Core Area, recommended for eradication:

	Pops	Gross	Net
Species	(#)	(acres)	(acres)
Nicotiana glauca	2	0.40	0.004
Carduus pycnocephalus	1	0.44	0.022

WOOD CANYON	Impact	Pops	Gross	Net	in Core	in Invst	Labor	Time
Species		(#)	(acres)	(acres)	(acres)	(acres)	(p-d/y)	(years)
Cortaderia selloana	3	33	0.8	0.42	-	-	21	5
Cynara cardunculus	3	40	75.8	7.31	-	-	130	10
Foeniculum vulgare	3	6	2.7	0.04	-	-	4	10
Tamarix sp.	3	1	0.0	0.00	-	-	1	10
Cirsium vulgare	2	1	0.0	0.00	-	-	1	10
Glebionis coronaria	2	2	0.4	0.04	-	-	1	10
Conium maculatum	1	10	27.2	1.18	-	-	23	10
Totals		**93**	**107**	**9.00**	**-**	**-**	**179**	

Appendix D: EDRR Search Maps

The following maps, one per Management Unit, show linear features (trails and roads) and facilities that are recommended for regular surveillance to detect new invasive plants. Depending on relative vulnerability to new introductions, each site or linear feature is recommended for searching once every one, two or three years.

Time required was calculated for each search area:

Management Unit	Days
Aliso	1
Boat Canyon	1
Bommer Canyon	2
Buck Gully	1
Coastal Terrace	3
Dilley	2
Emerald Canyon	2
Laurel Canyon	1
Lower Moro Canyon	1
Muddy Canyon	1
Nestall & Meadows	1
Quail Hill	1
Quail Trail	1
Shady Canyon	2
Sycamore	1
Talbert	1
Top of the World	2
Upper Moro Canyon	1
Upper Newport Bay	2
Valido & Badlands	1
Willow	2
Wood Canyon	2
Total	26

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.15 0.3 Miles

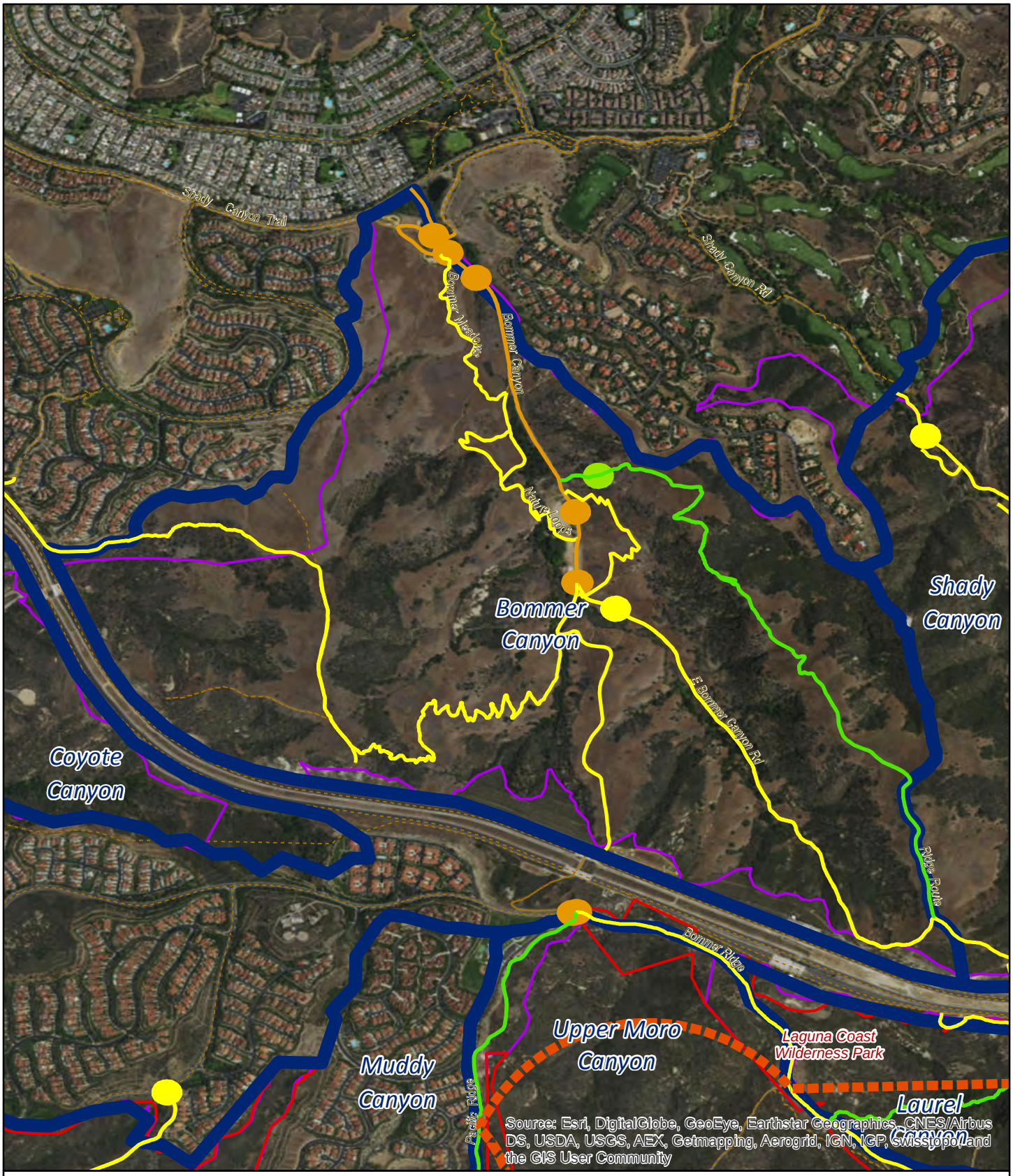
~DRAFT~

EDRR Search Area Map

Upper Newport Bay

Upper Newport Bay/Bonita Canyon

Managed by: 90/10: DFW/OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.15 0.3 Miles

~DRAFT~

EDRR Search Area Map

Bommer Canyon

Inland San Joaquin Hills

Managed by: City of Irvine

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.1 0.2 Miles

~DRAFT~

EDRR Search Area Map

Quail Hill

Inland San Joaquin Hills

Managed by: City of Irvine

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.125 0.25 Miles

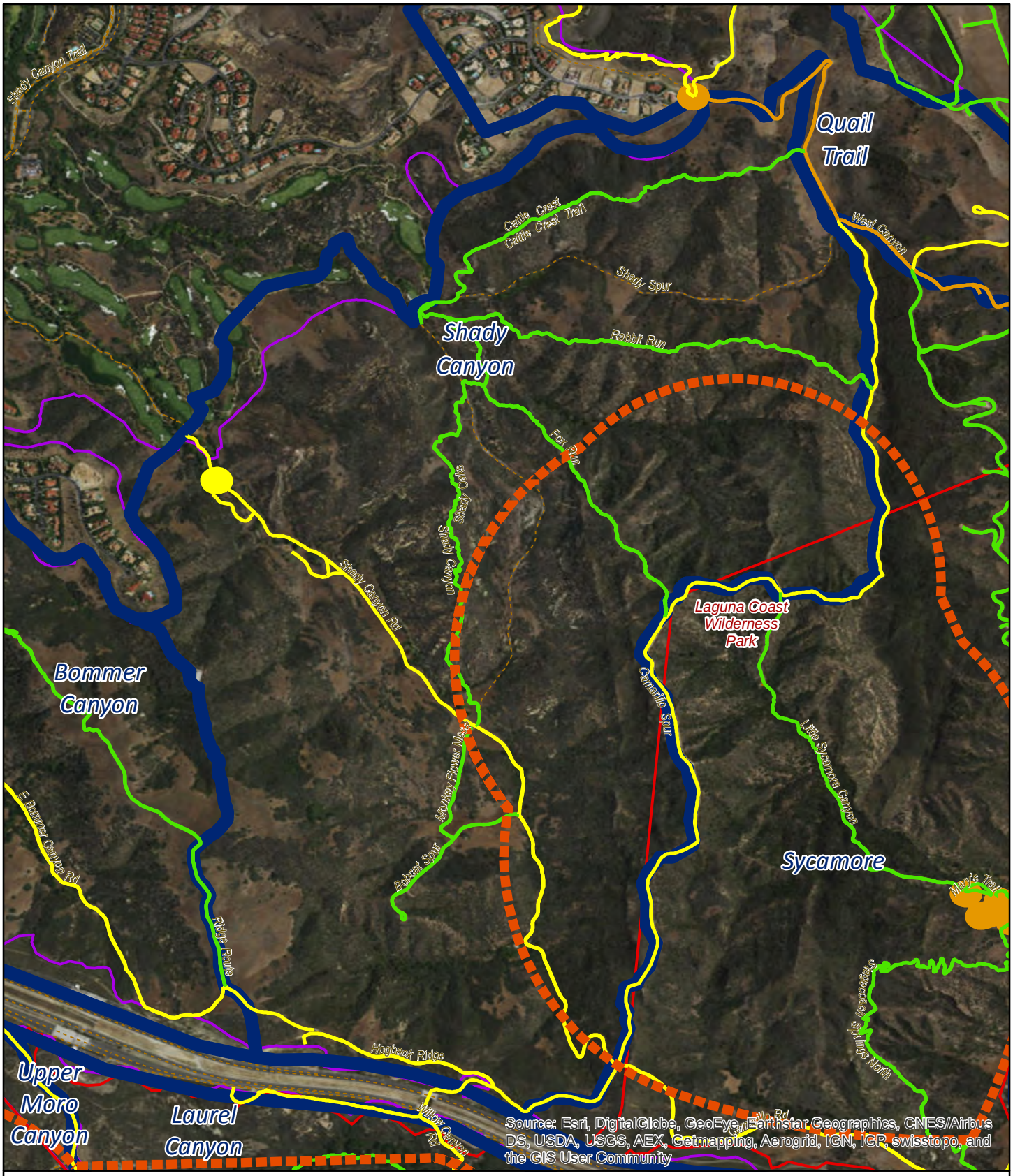
~DRAFT~

EDRR Search Area Map

Quail Trail

Inland San Joaquin Hills

Managed by: City of Irvine

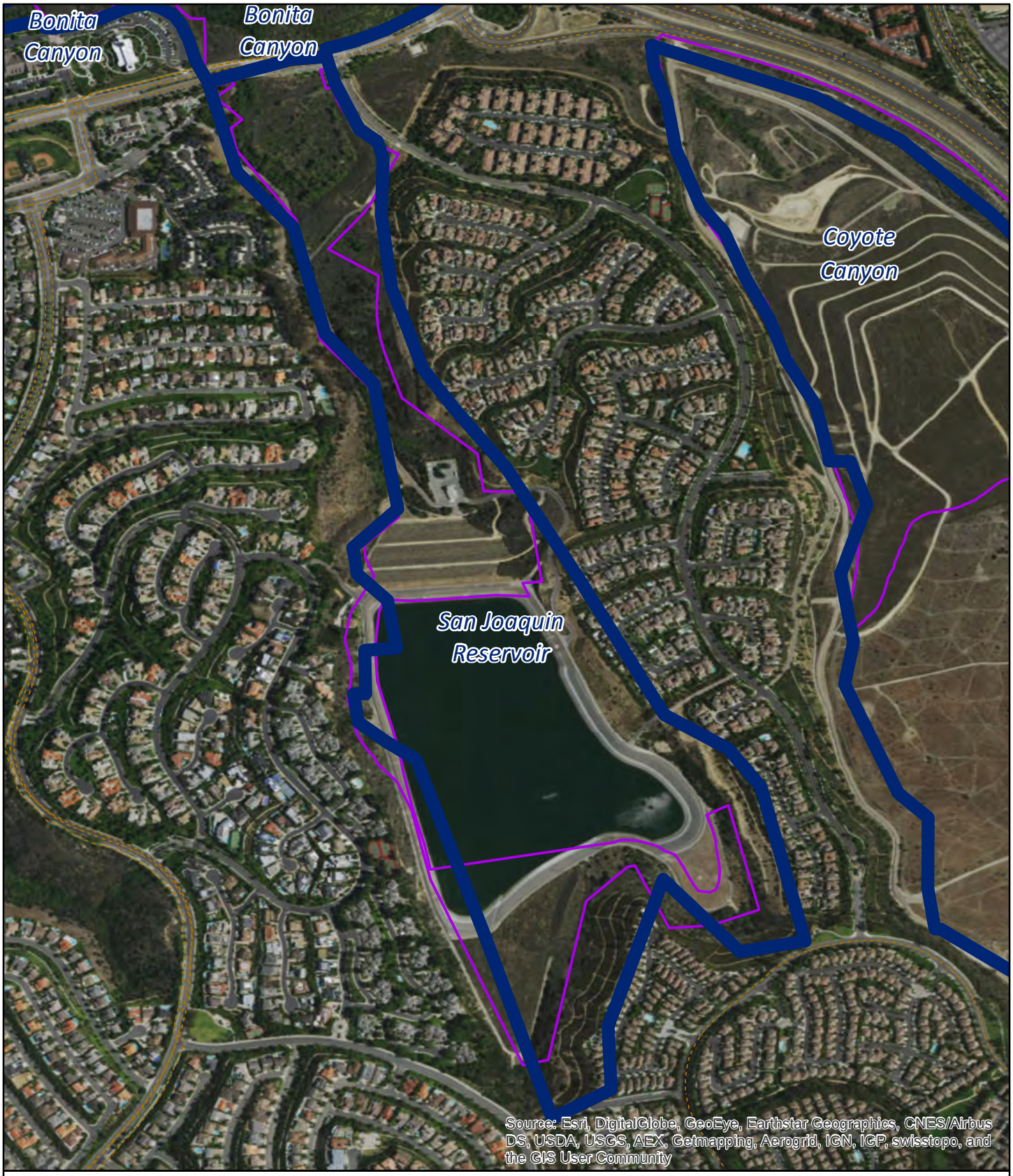


Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.15 0.3 Miles

~DRAFT~
EDRR Search Area Map
Shady Canyon
Inland San Joaquin Hills
Managed by: City of Irvine



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.075 0.15 Miles

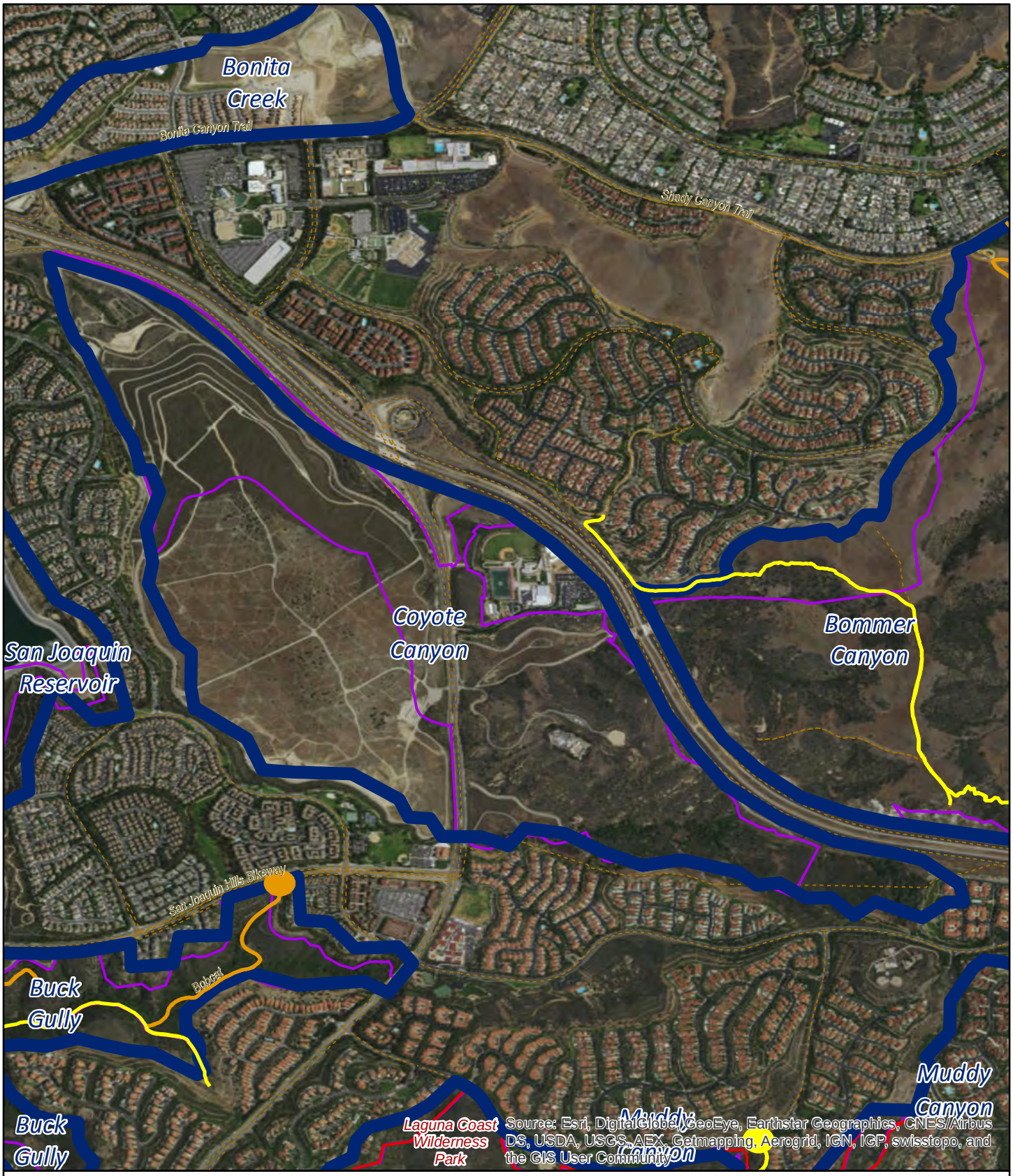
~DRAFT~

EDRR Search Area Map

San Joaquin Reservoir

Upper Newport Bay/Bonita Canyon

Managed by: City of Irvine/Met Water



Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.15 0.3 Miles

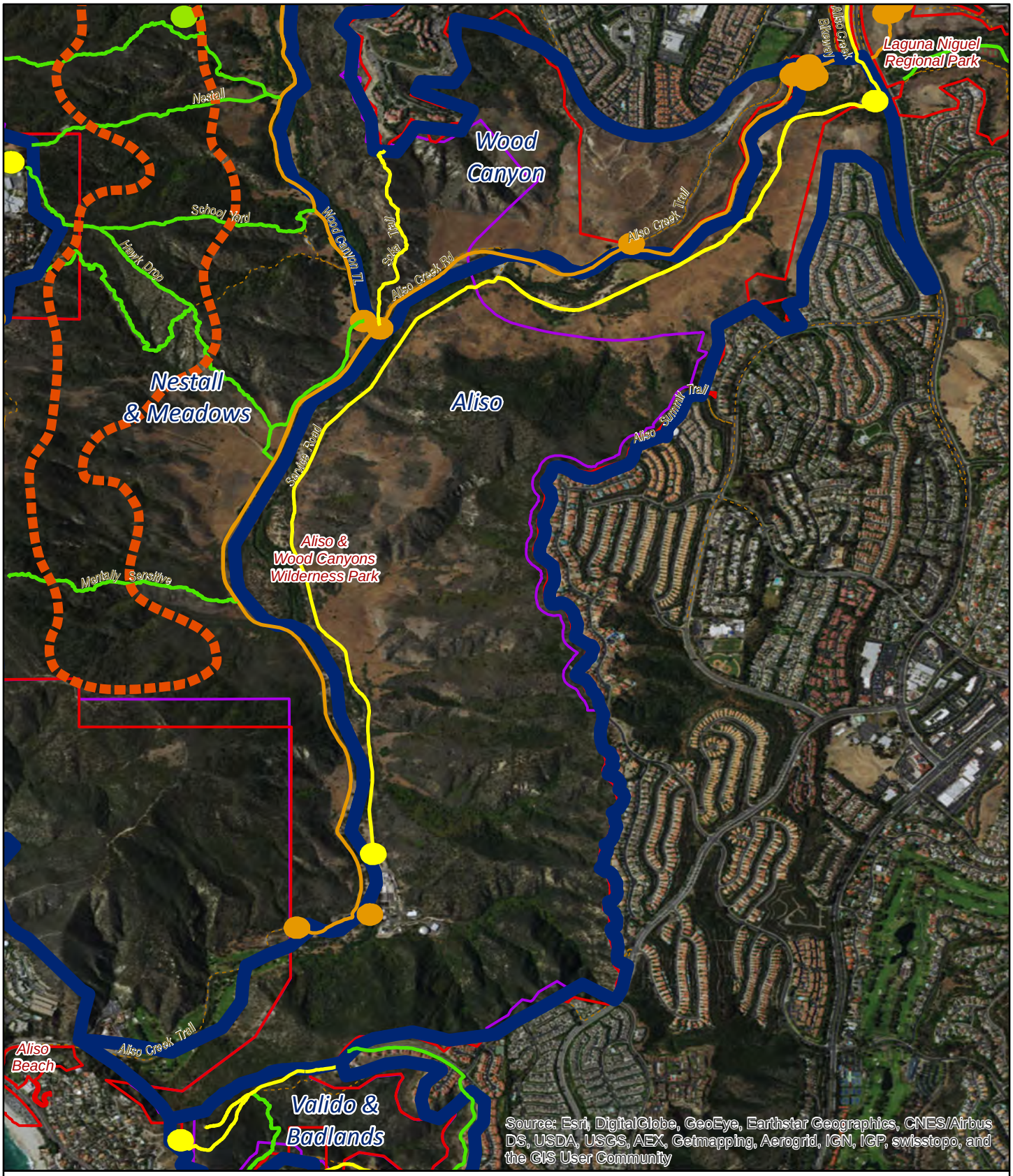
~DRAFT~
EDRR Search Area Map
Coyote Canyon
Upper Newport Bay/Bonita Canyon
Managed by: IRC

Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.175 0.35 Miles

~DRAFT~
EDRR Search Area Map
Buck Gully
Upper Newport Bay/Bonita Canyon
Managed by: Newport Beach



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.175 0.35 Miles

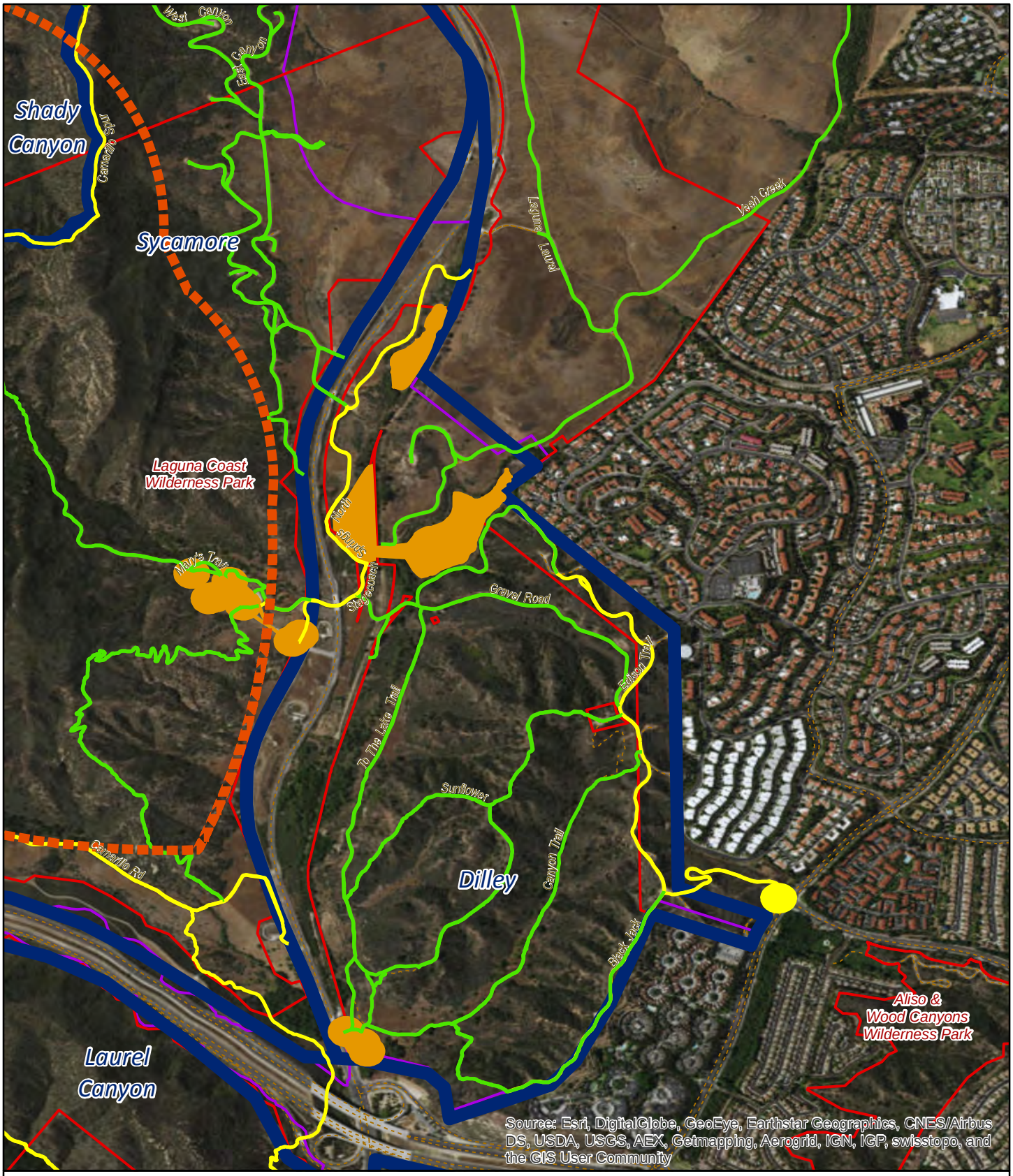
~DRAFT~

EDRR Search Area Map

Aliso

Aliso-Wood Canyon Regional Park

Managed by: OC Parks

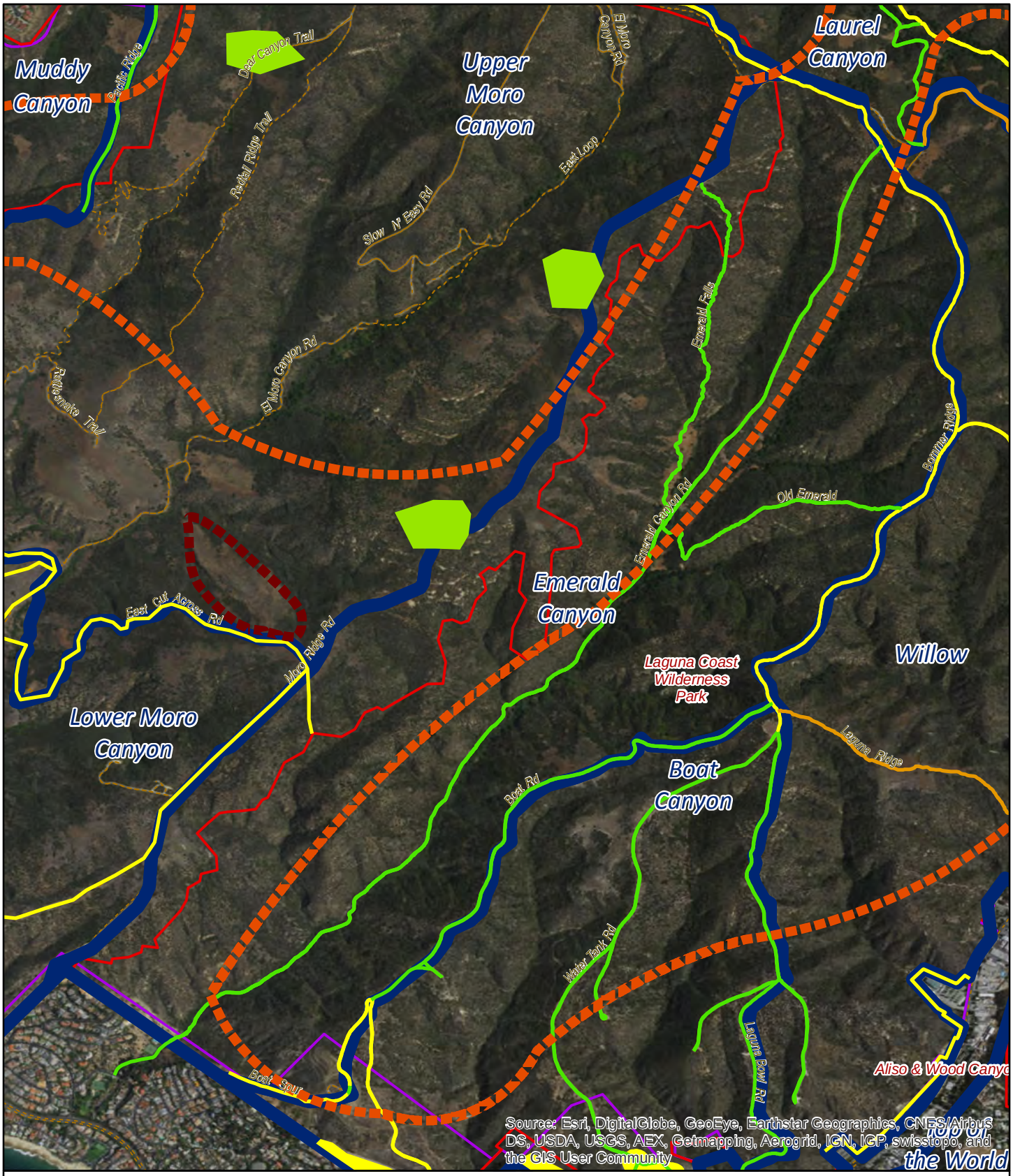


Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.125 0.25 Miles

~DRAFT~
EDRR Search Area Map
Dilley
Inland San Joaquin Hills
Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.15 0.3 Miles

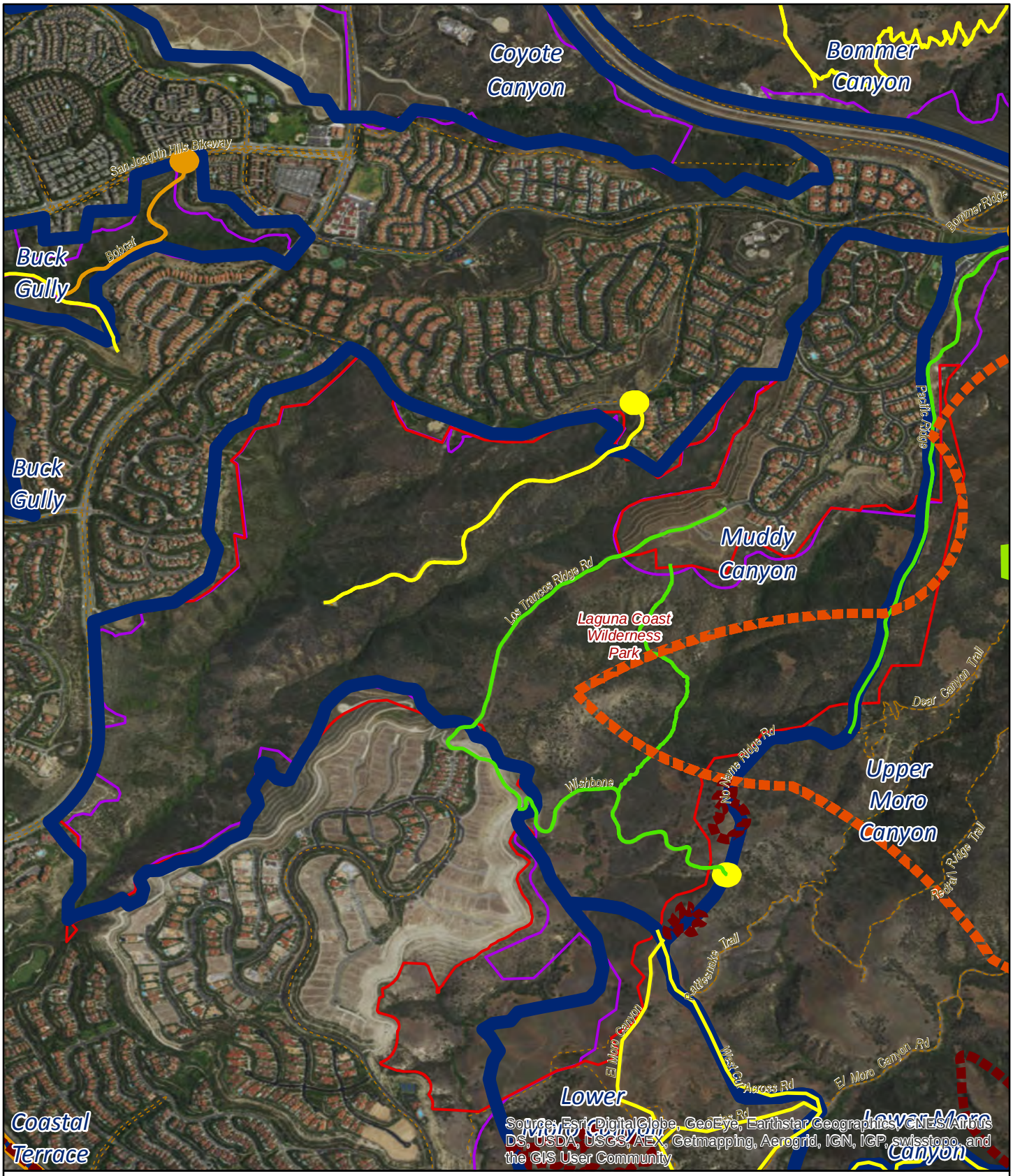
~DRAFT~

EDRR Search Area Map

Emerald Canyon

Coastal San Joaquin Hills

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.15 0.3 Miles

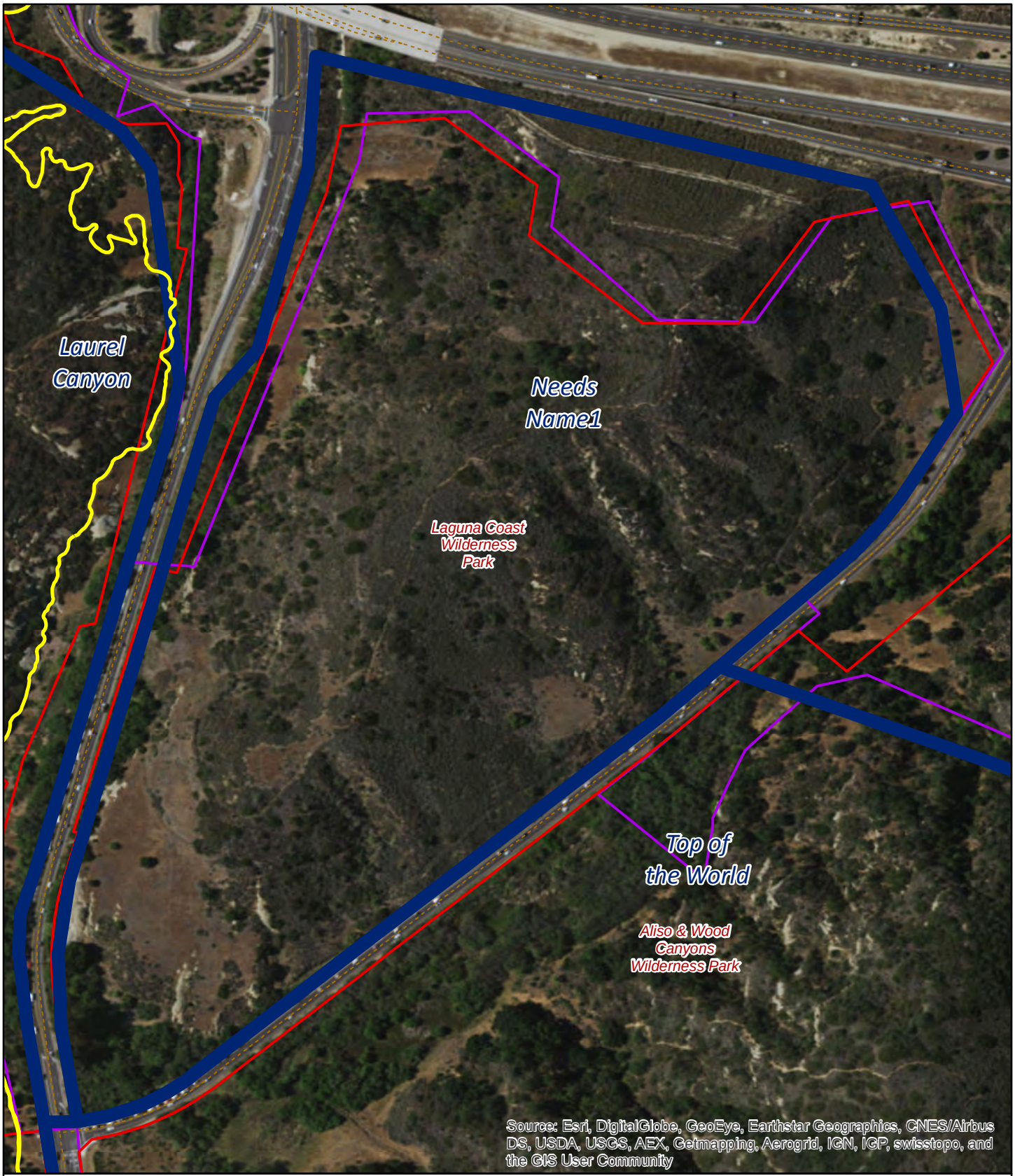
~DRAFT~

EDRR Search Area Map

Muddy Canyon

Coastal San Joaquin Hills

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.035 0.07 Miles

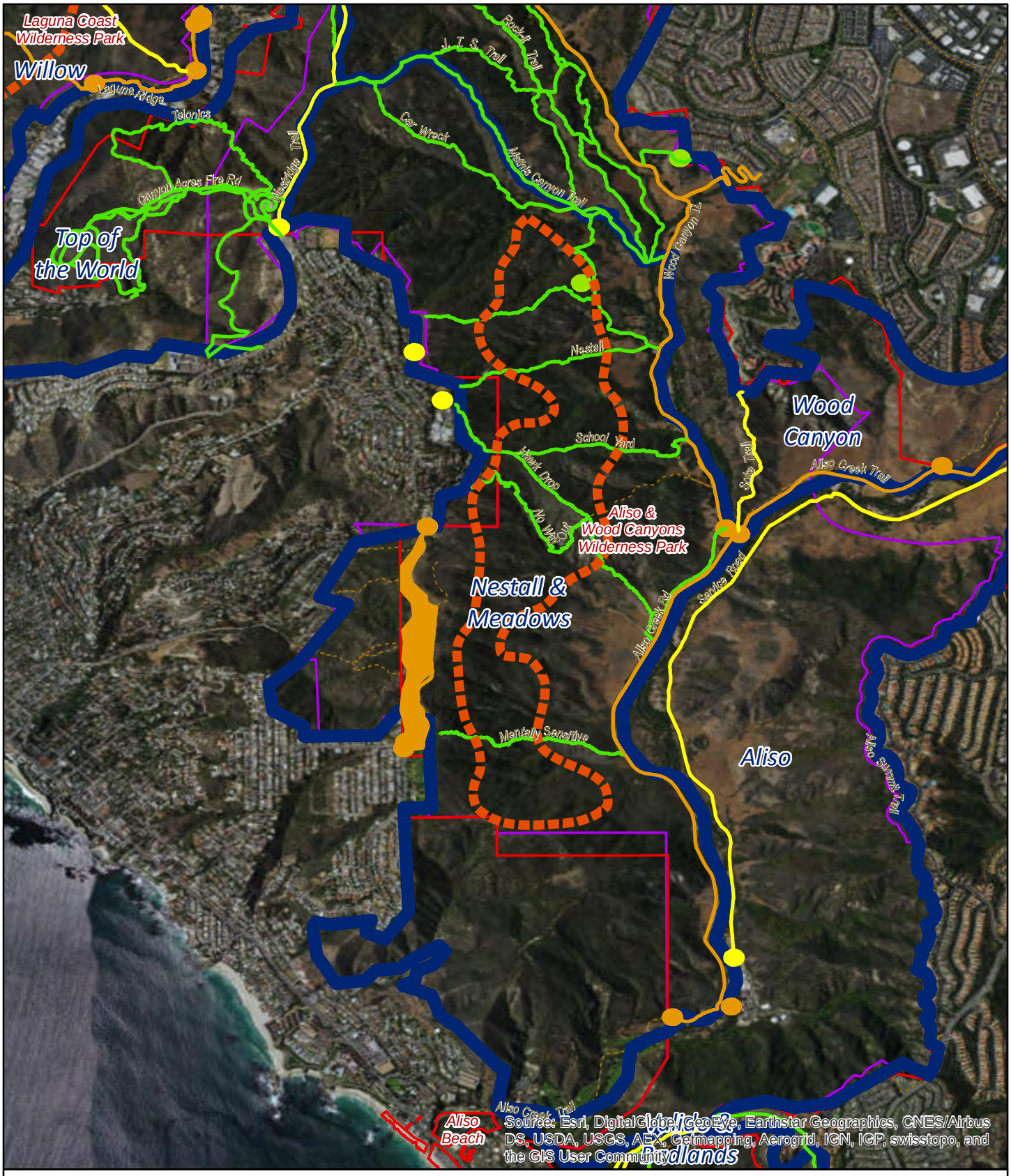
~DRAFT~

EDRR Search Area Map

Needs Name1

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High	*Survey every 1 year*
Medium	*Survey every 2 years*
Low	*Survey every 3 years*

OC Parks Boundary

Trails

0 0.225 0.45 Miles

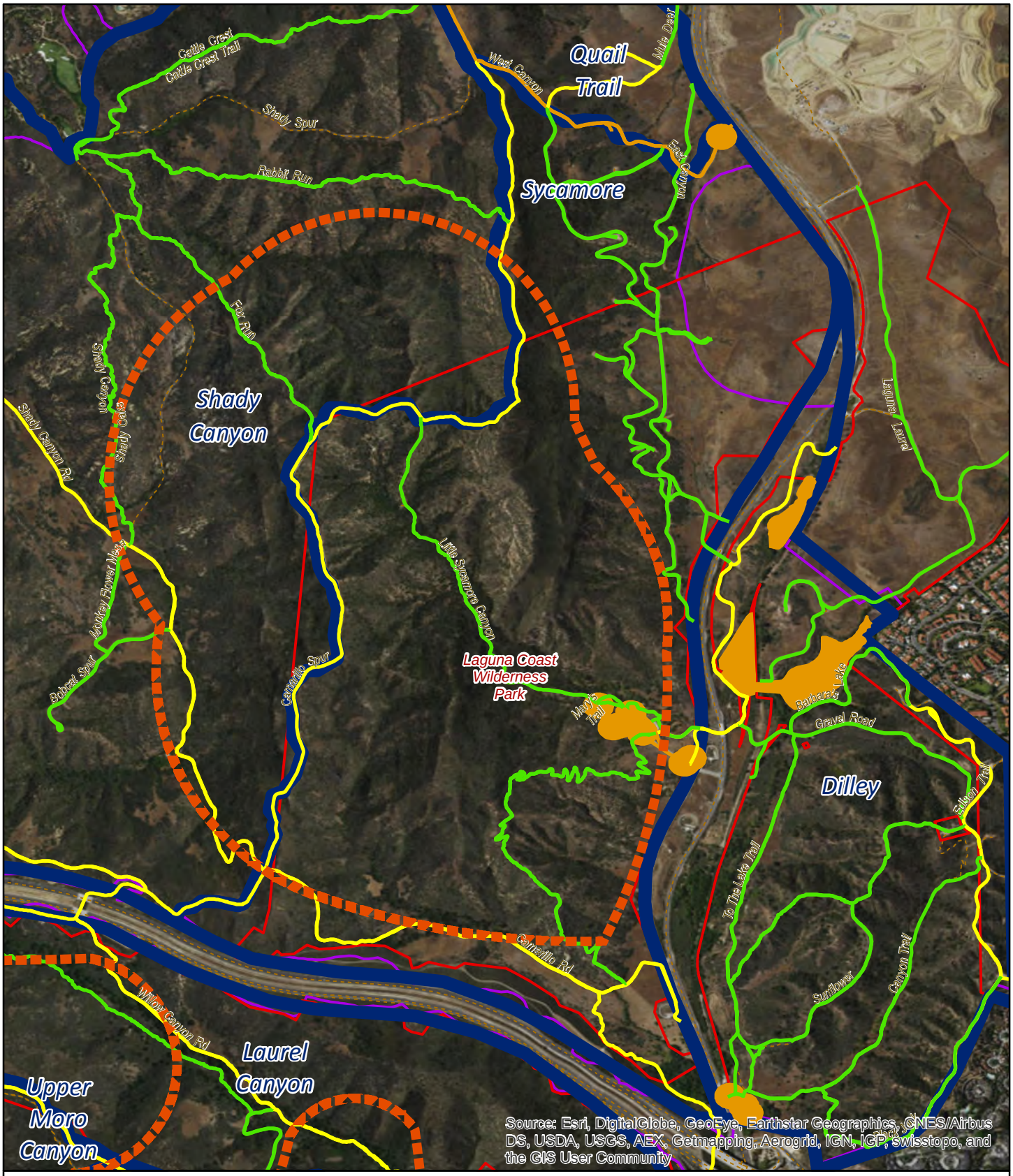
~DRAFT~

EDRR Search Area Map

Nestall & Meadows

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.15 0.3 Miles

~DRAFT~
EDRR Search Area Map
Sycamore
Inland San Joaquin Hills
Managed by: OC Parks

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.1 0.2 Miles

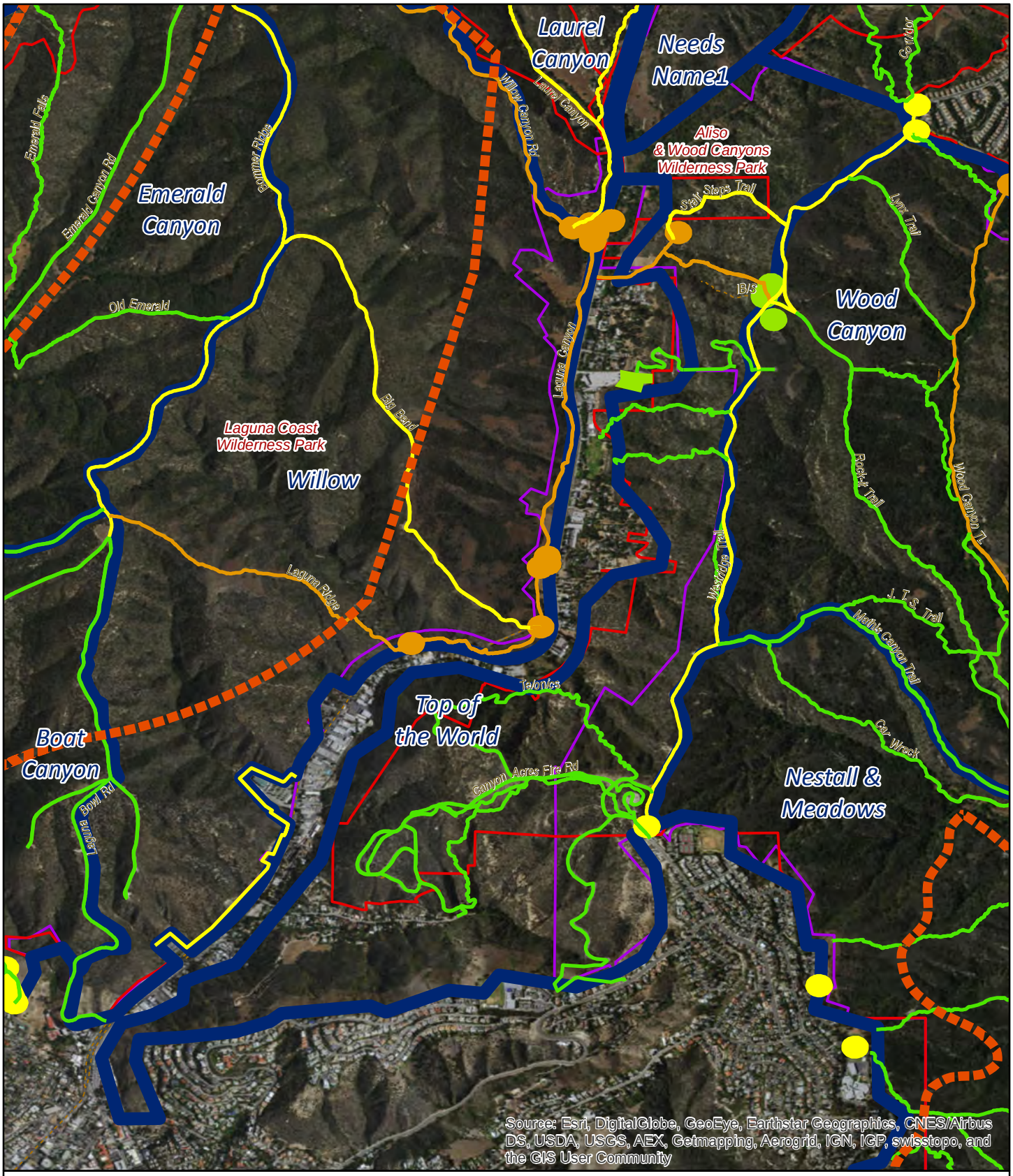
~DRAFT~

EDRR Search Area Map

Talbert

Coastal Talbert

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.175 0.35 Miles

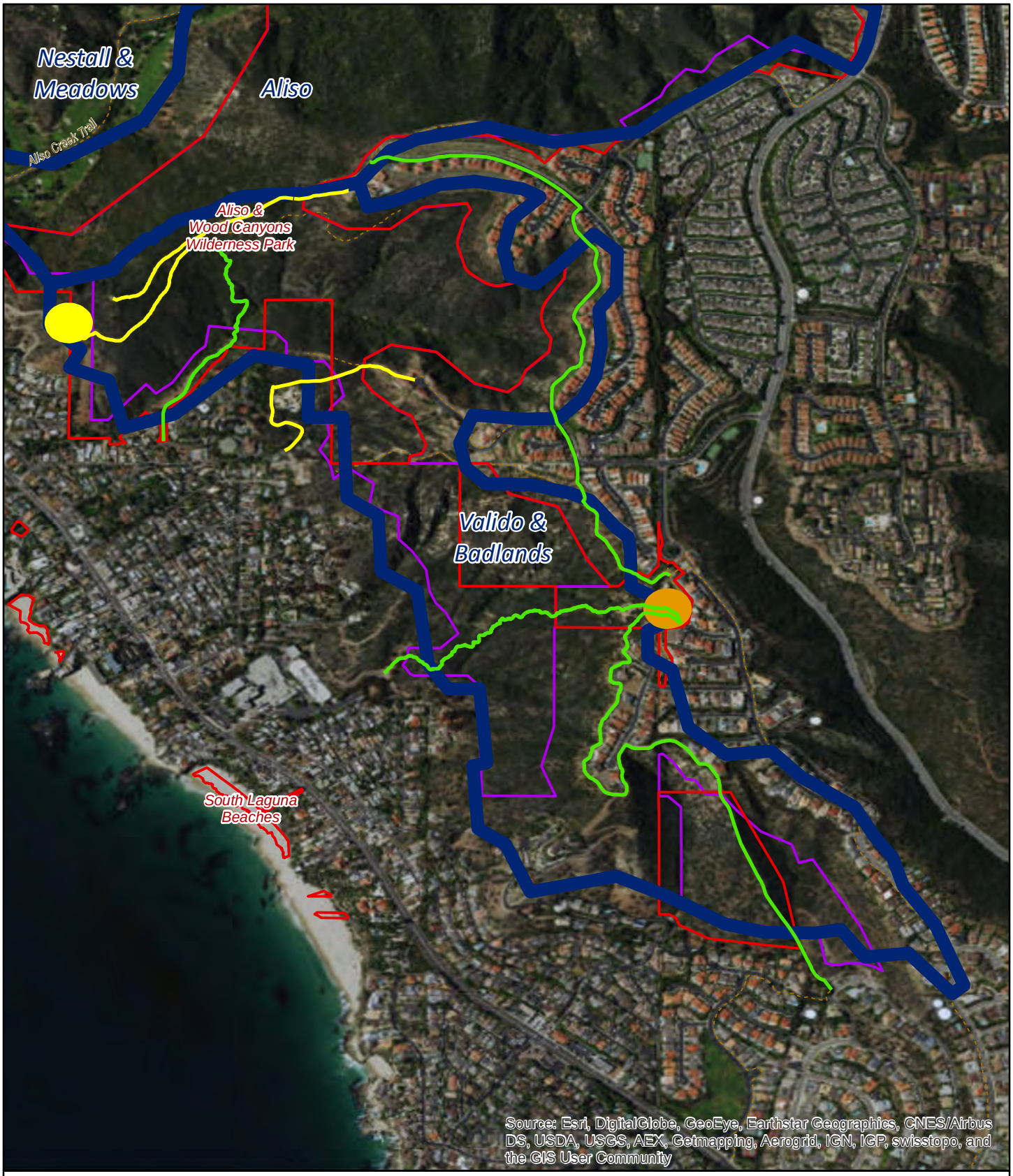
~DRAFT~

EDRR Search Area Map

Top of the World

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.1 0.2 Miles

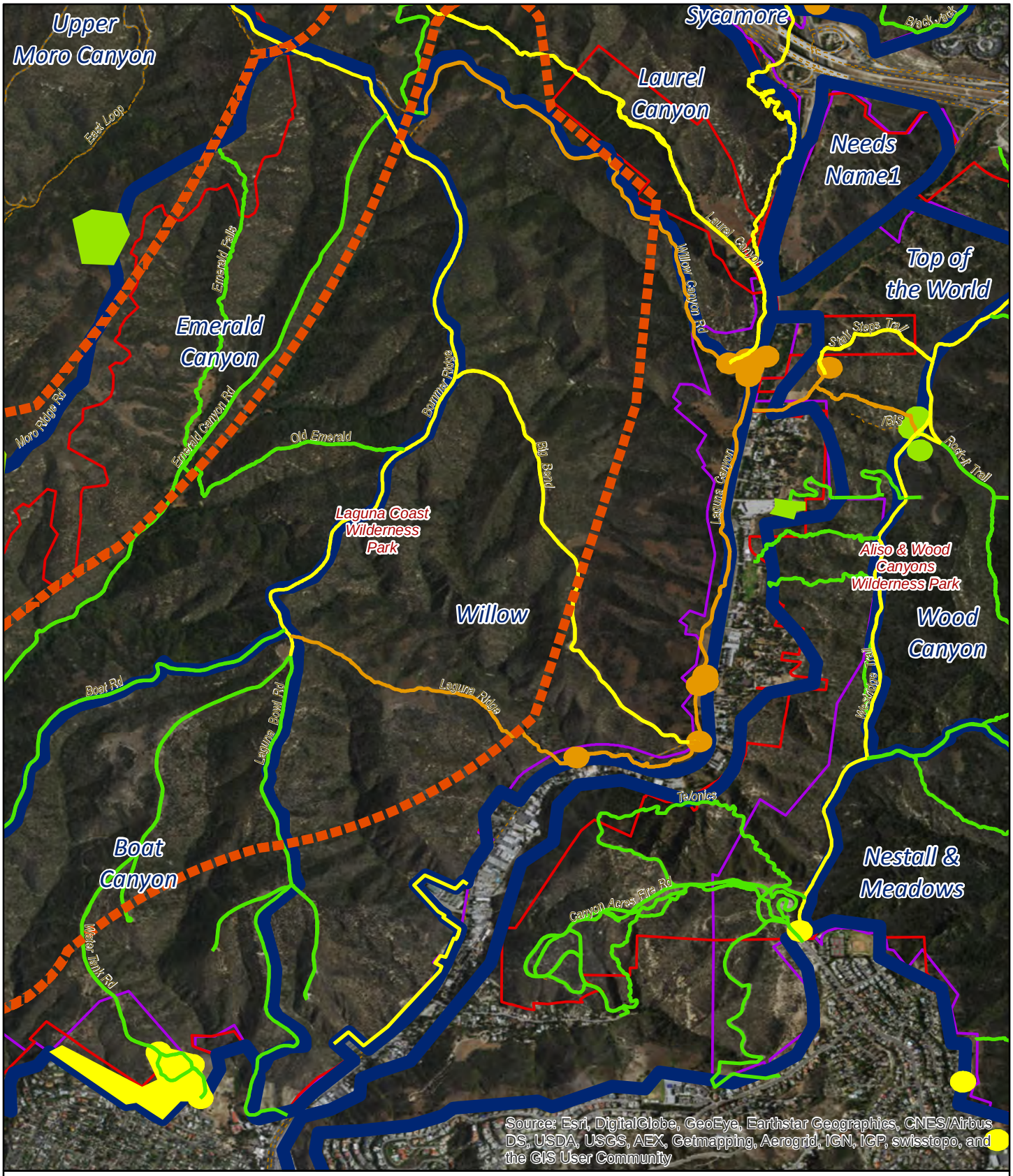
~DRAFT~

EDRR Search Area Map

Valido & Badlands

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.175 0.35 Miles

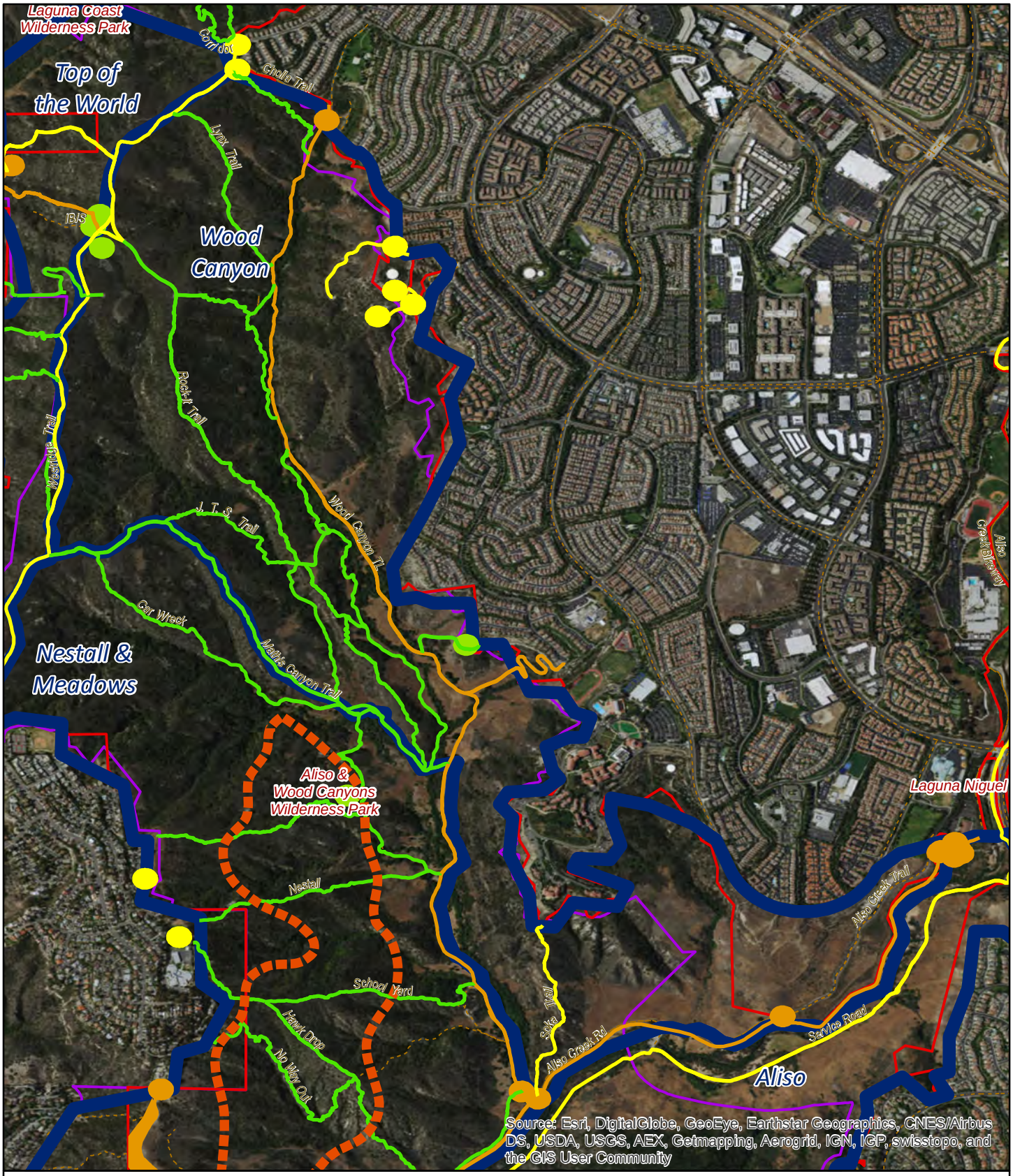
~DRAFT~

EDRR Search Area Map

Willow

Coastal San Joaquin Hills

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.175 0.35 Miles

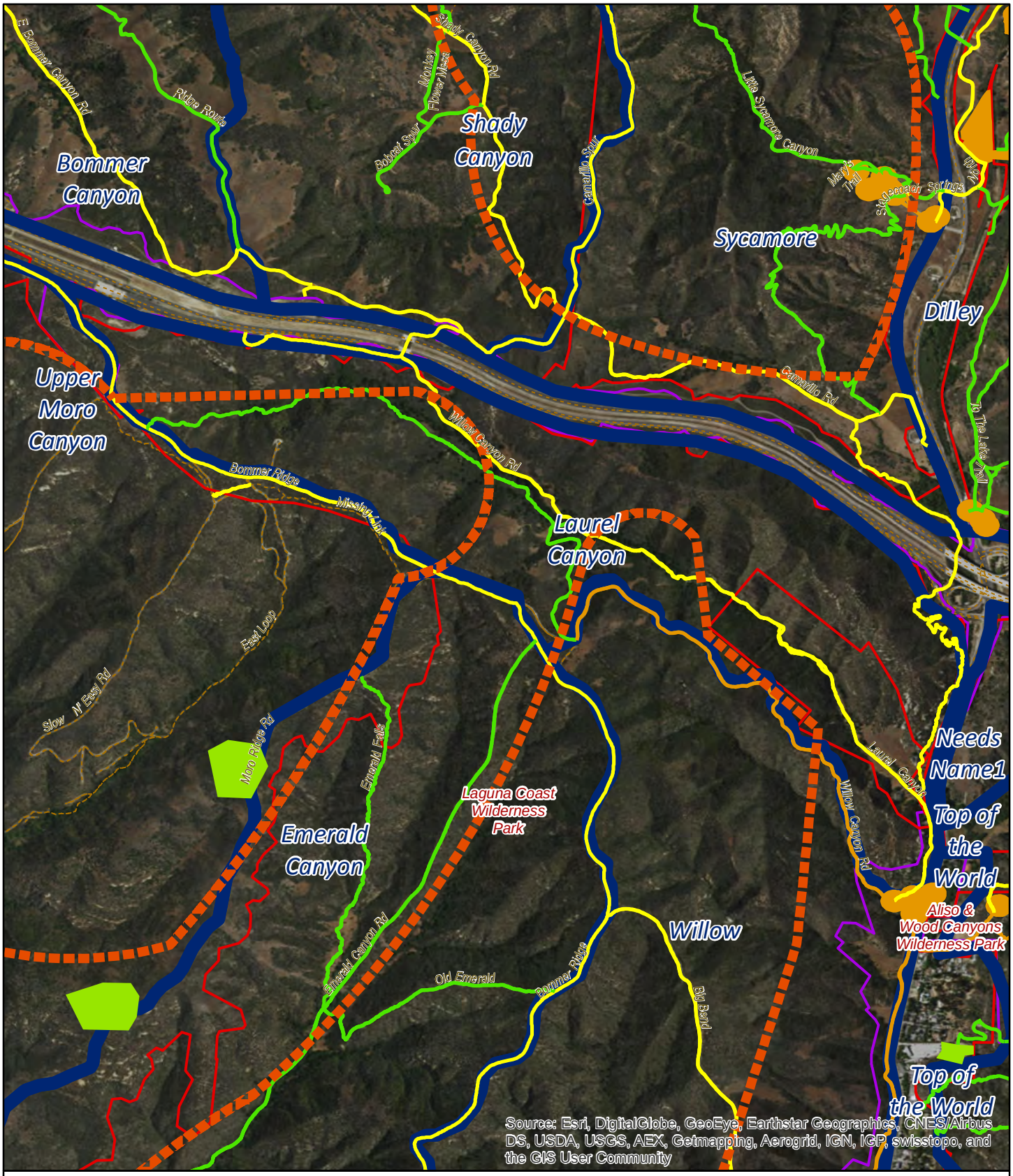
~DRAFT~

EDRR Search Area Map

Wood Canyon

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.175 0.35 Miles

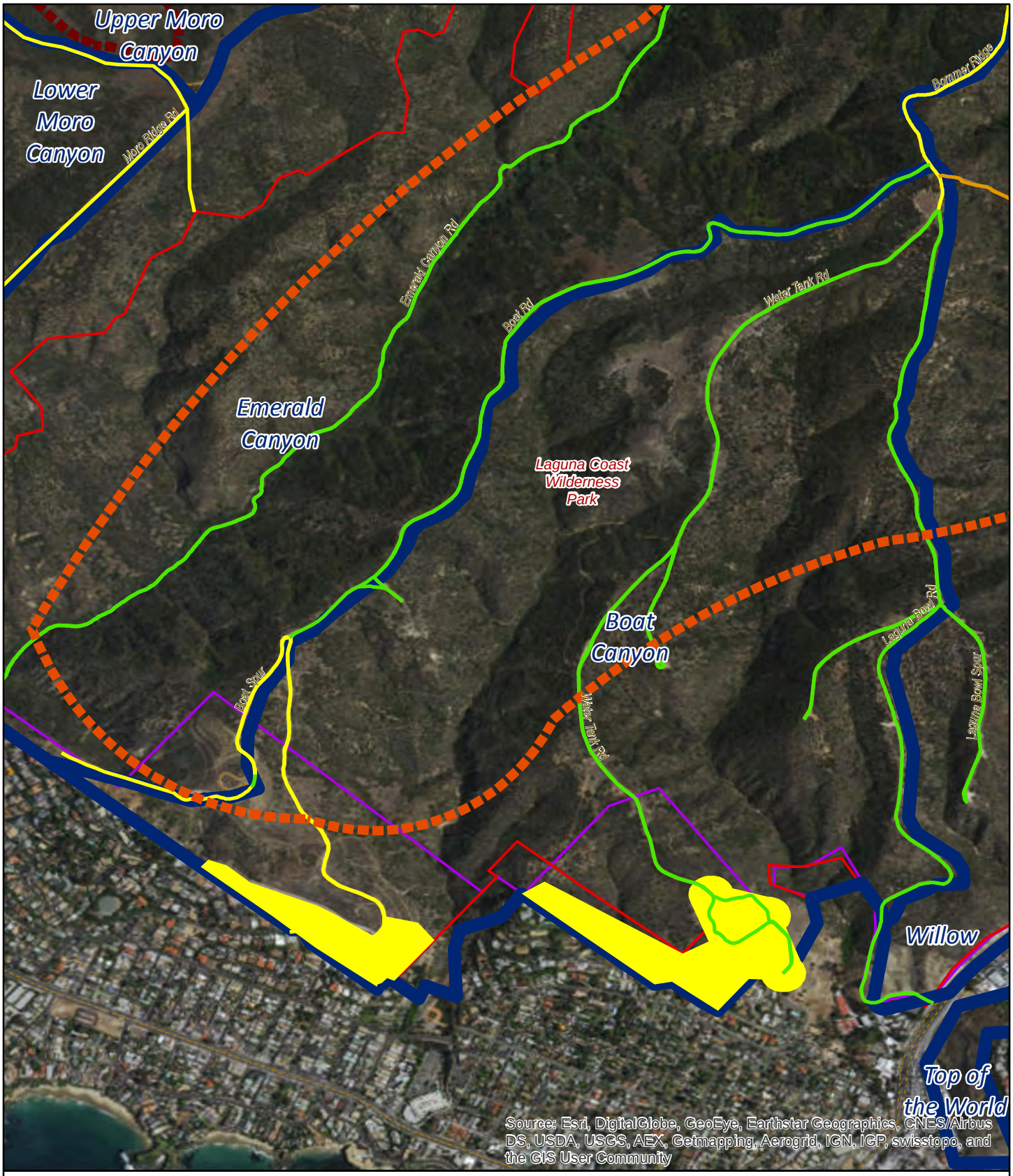
~DRAFT~

EDRR Search Area Map

Laurel Canyon

Coastal San Joaquin Hills

Managed by: OC Parks & State Reserve



Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.1 0.2 Miles

~DRAFT~
EDRR Search Area Map
Boat Canyon
Coastal San Joaquin Hills
Managed by: OC Parks?

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.1 0.2 Miles

~DRAFT~

EDRR Search Area Map

Bonita Canyon

Upper Newport Bay/Bonita Canyon

Managed by: OC Parks?

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.1 0.2 Miles

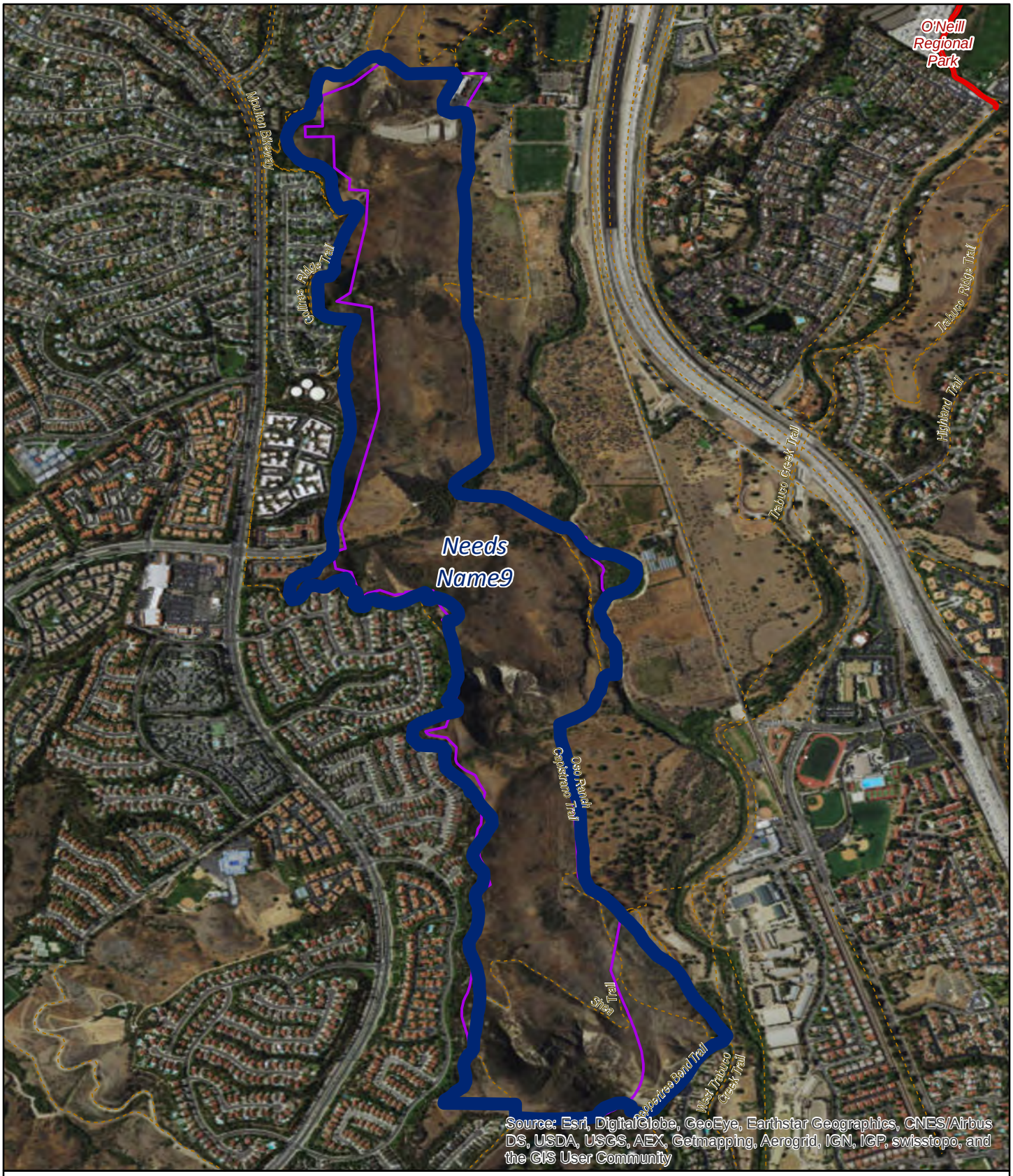
~DRAFT~

EDRR Search Area Map

Bonita Creek

West San Joaquin Hills

Managed by: OC Parks?



Invasive Plant Management Units
NCCP Reserve Boundary
High Value Areas
Core Area
Investment Area

EDRR Survey Priority
High *Survey every 1 year*
Medium *Survey every 2 years*
Low *Survey every 3 years*
OC Parks Boundary
Trails

0 0.125 0.25 Miles

~DRAFT~
EDRR Search Area Map
Needs Name9
Inland Salt Creek
Managed by: OC Parks?

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.2 0.4 Miles

~DRAFT~

EDRR Search Area Map

Coastal Terrace

Coastal San Joaquin Hills

Managed by: State Parks

Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.125 0.25 Miles

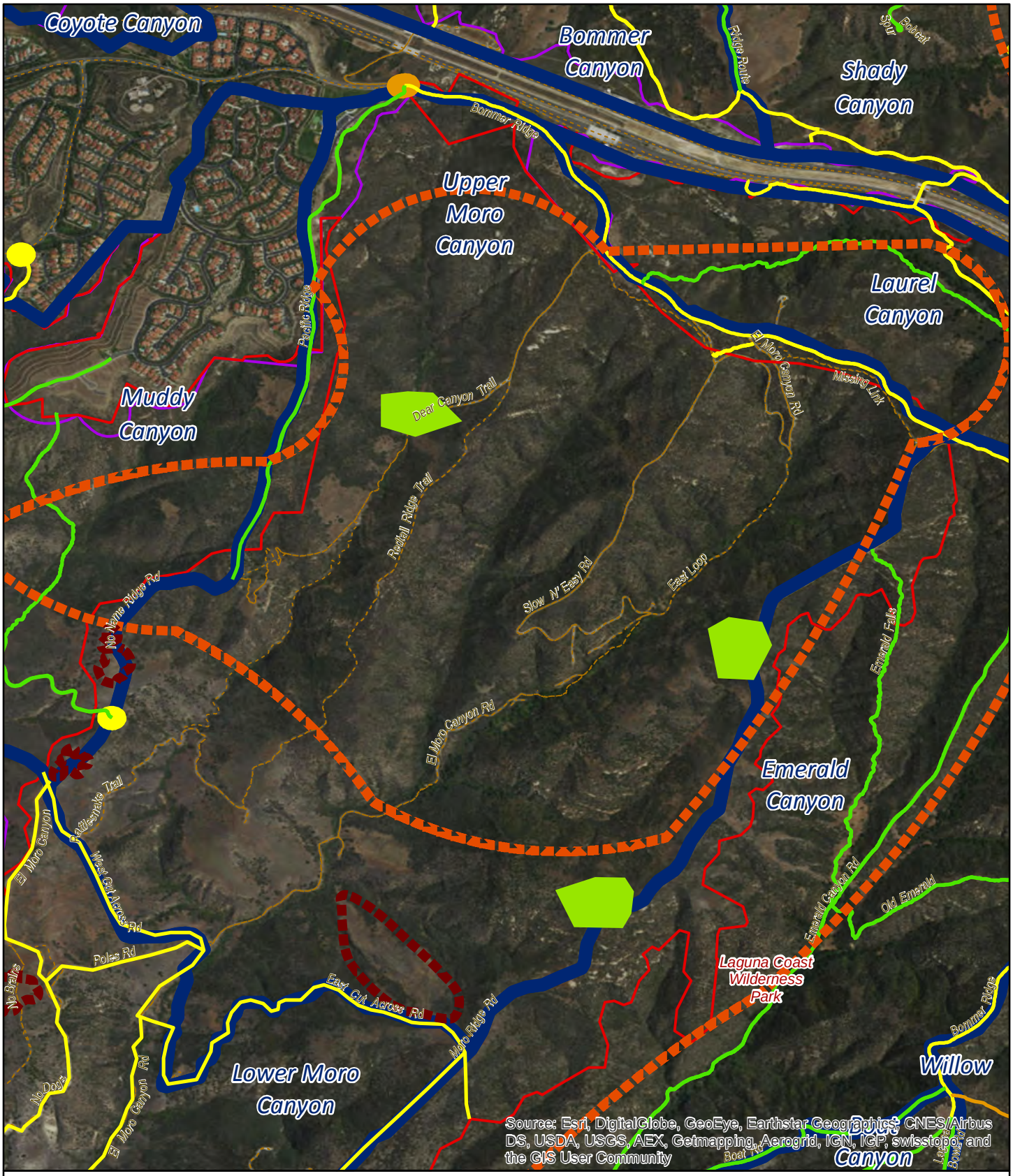
~DRAFT~

EDRR Search Area Map

Lower Moro Canyon

Coastal San Joaquin Hills

Managed by: State Parks



Invasive Plant Management Units

NCCP Reserve Boundary

High Value Areas

Core Area

Investment Area

EDRR Survey Priority

High *Survey every 1 year*

Medium *Survey every 2 years*

Low *Survey every 3 years*

OC Parks Boundary

Trails

0 0.15 0.3 Miles

~DRAFT~

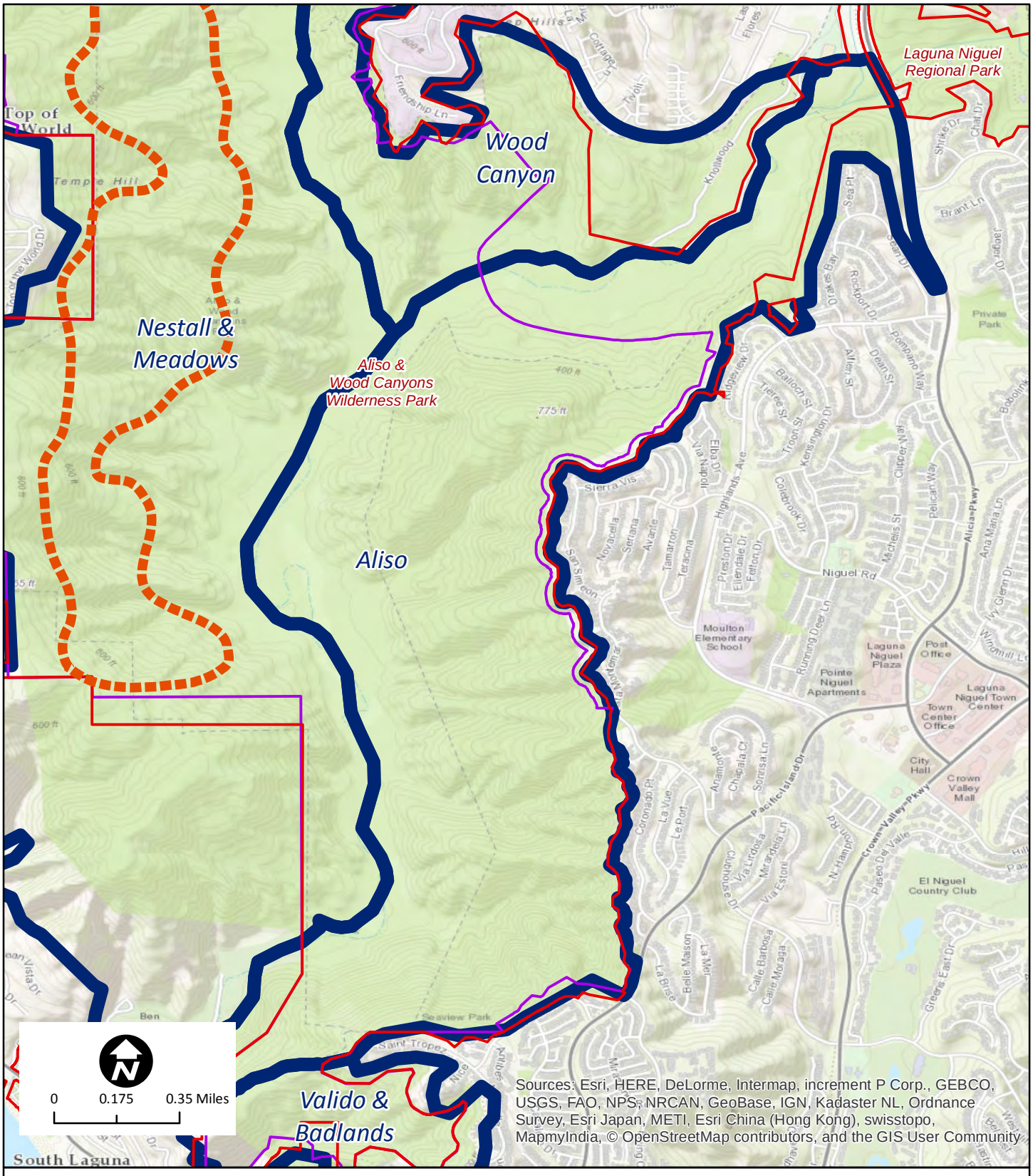
EDRR Search Area Map

Upper Moro Canyon

Coastal San Joaquin Hills

Managed by: State Parks

Appendix E: Management Unit Maps



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

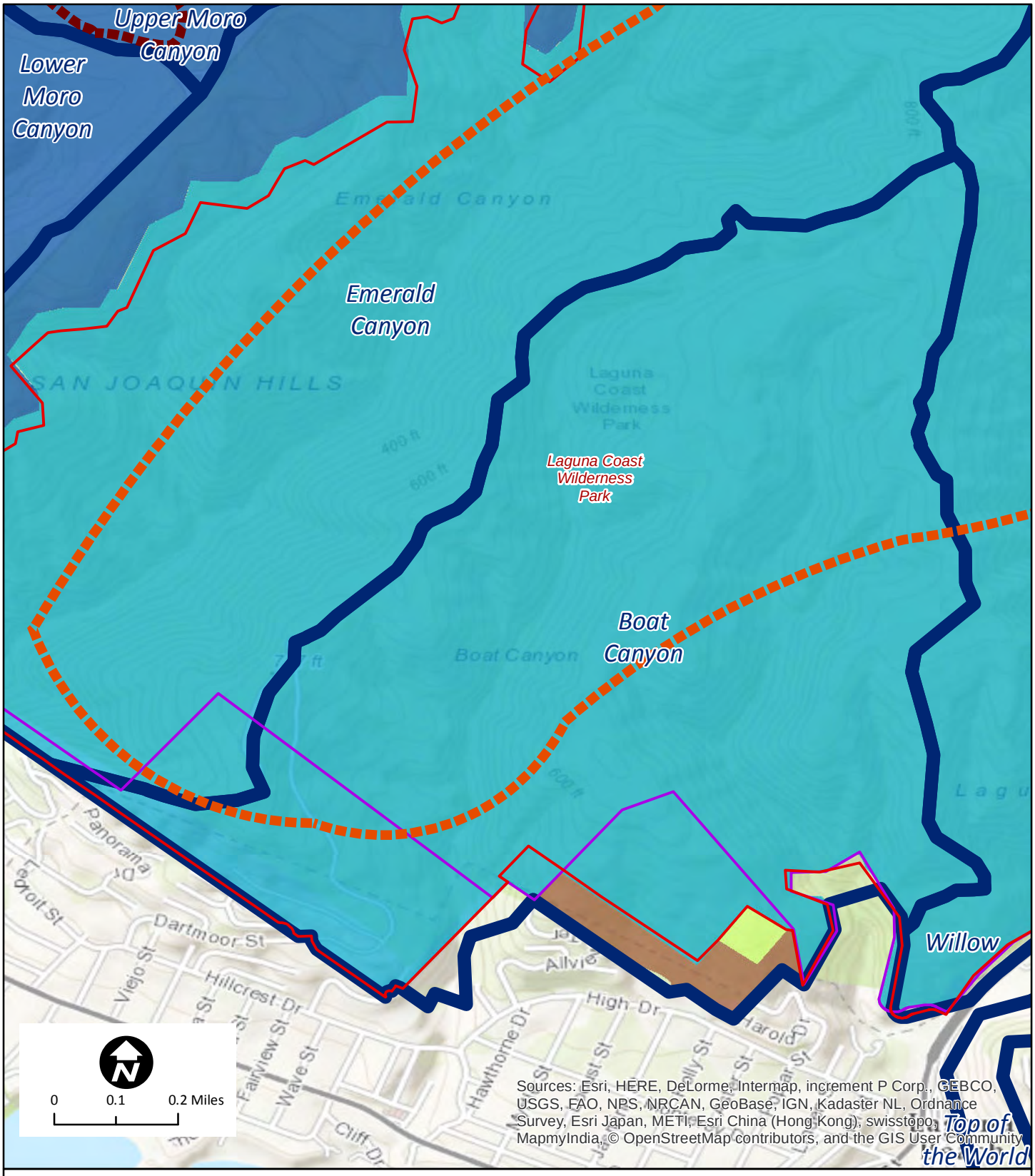
- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

~DRAFT~

Invasive Plant Management Areas and Ownership

Aliso

Aliso-Wood Canyon Regional Park
Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach

- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

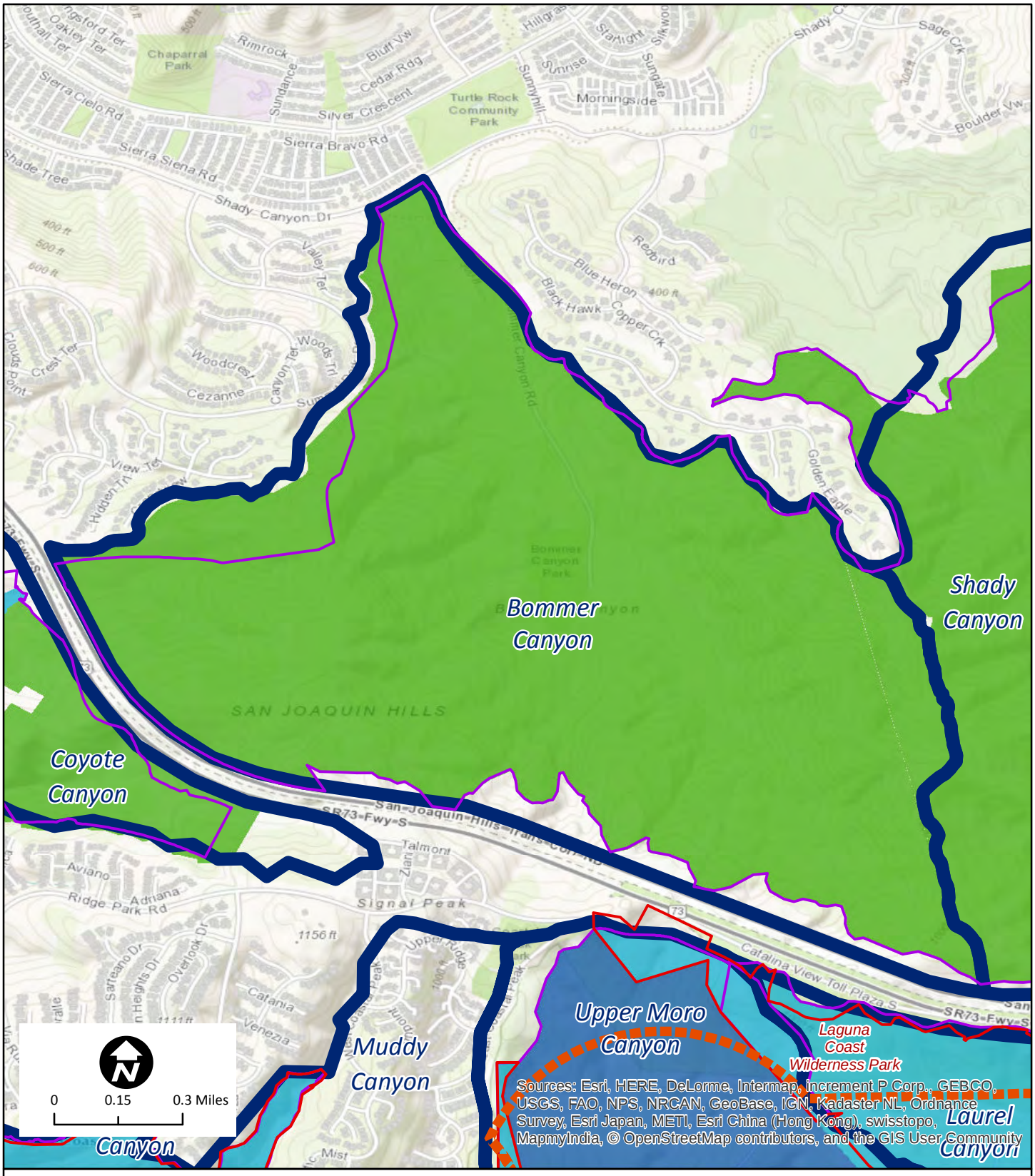
~DRAFT~

Invasive Plant Management Areas and Ownership

Boat Canyon

Coastal San Joaquin Hills

Managed by: OC Parks?



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

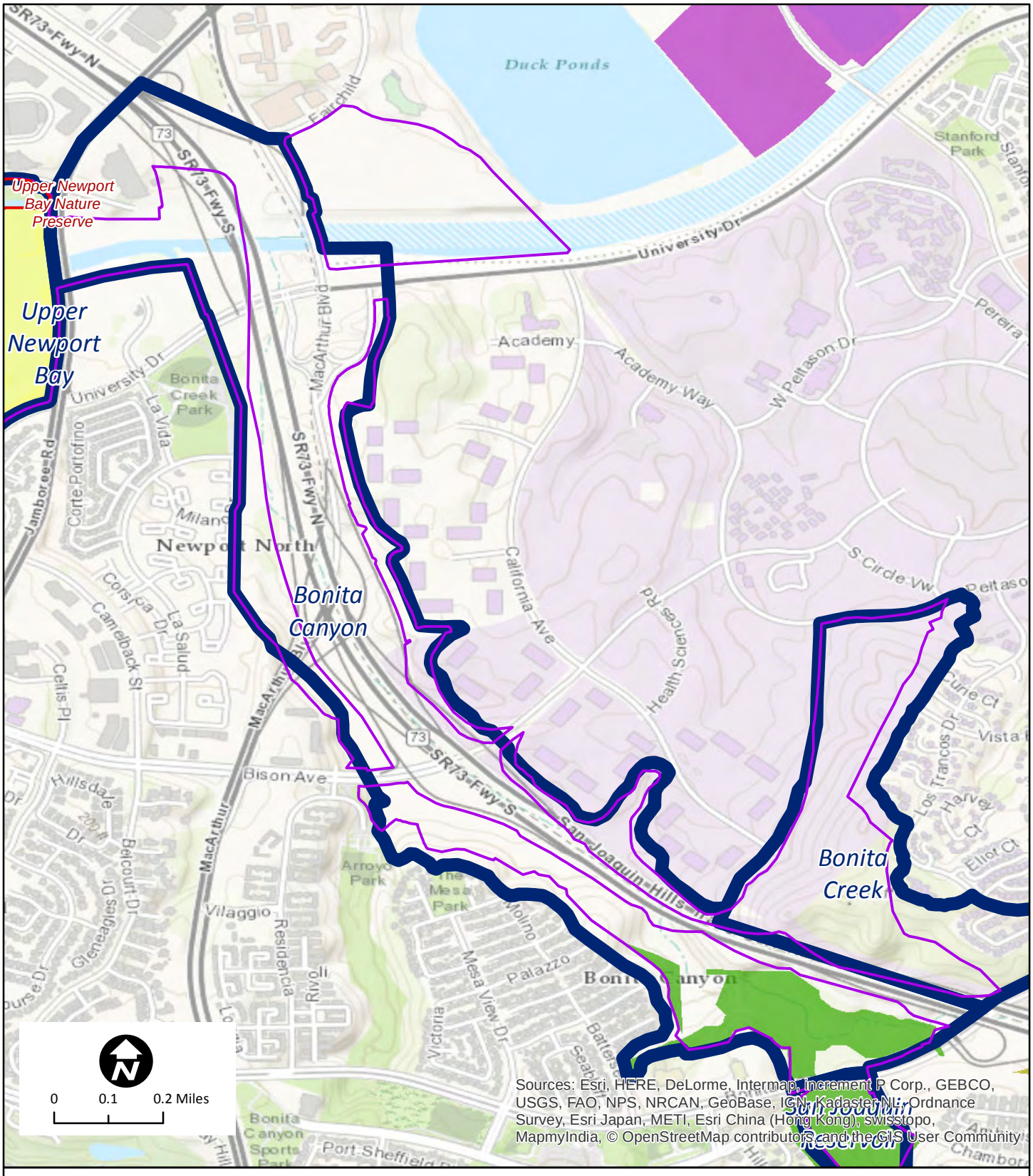
~DRAFT~

Invasive Plant Management Areas and Ownership

Bommer Canyon

Inland San Joaquin Hills

Managed by: City of Irvine



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

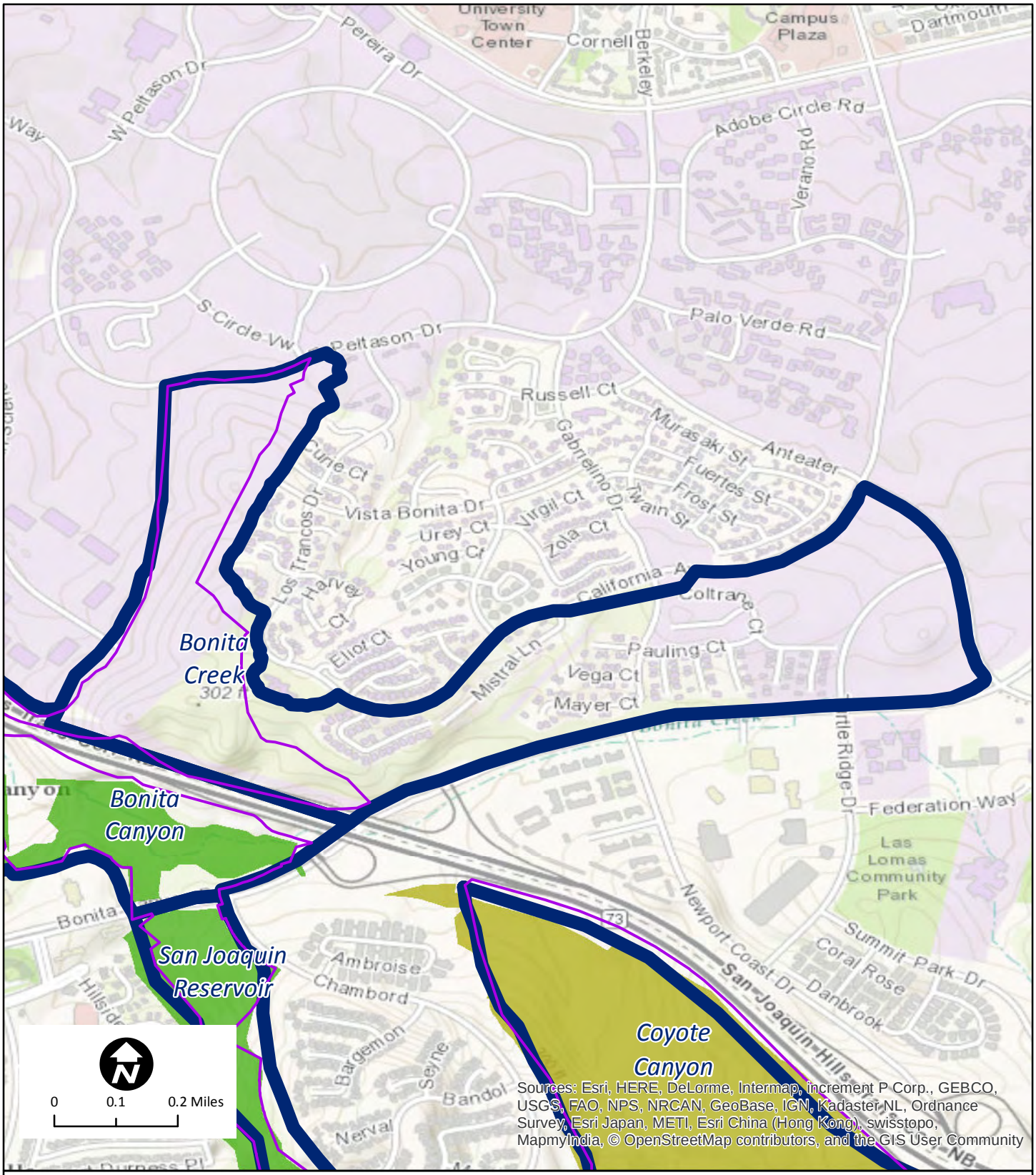
~DRAFT~

Invasive Plant Management Areas and Ownership

Bonita Canyon

Upper Newport Bay/Bonita Canyon

Managed by: OC Parks?



High Value Areas
- Core Area
- Investment Area
- Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

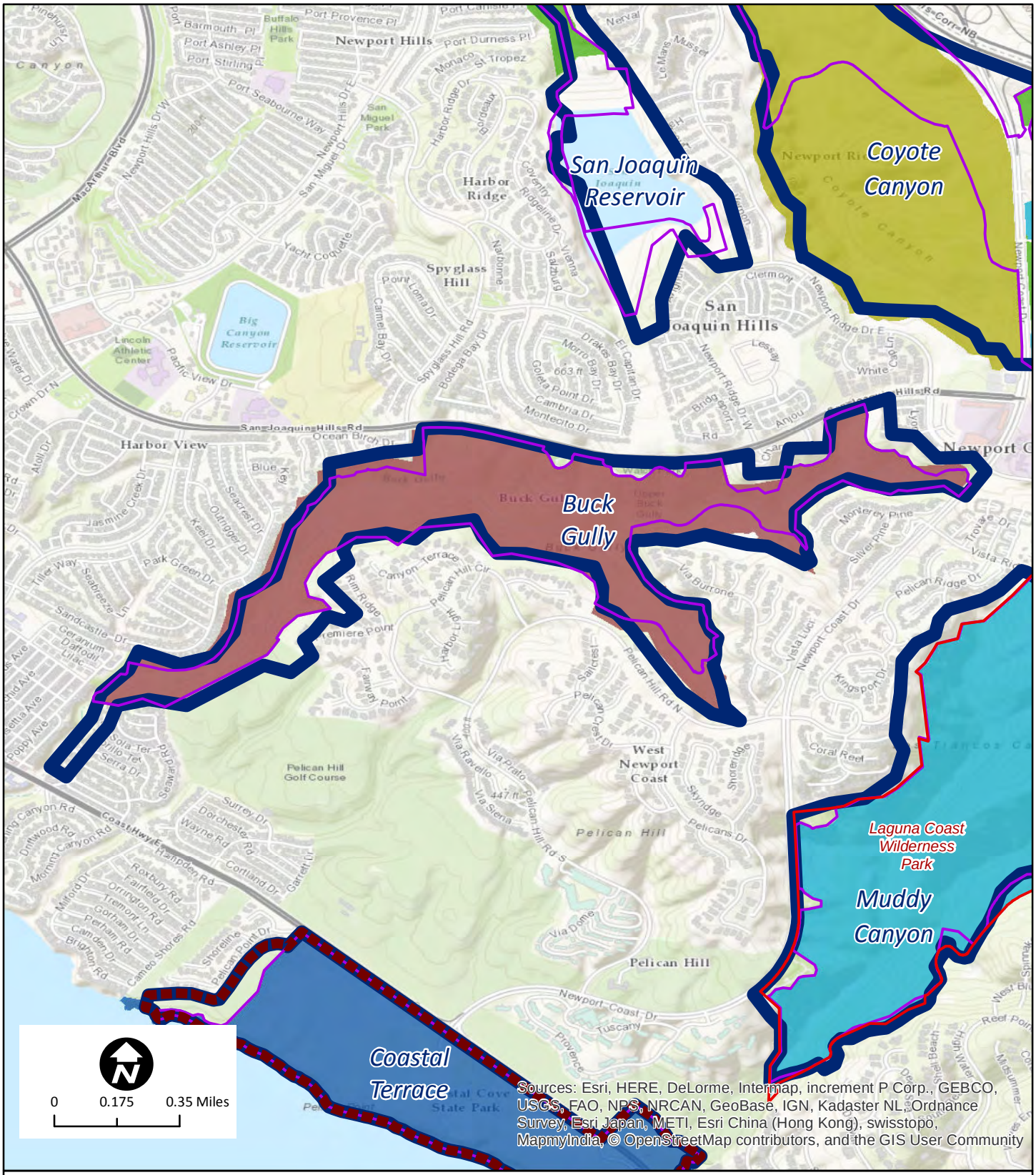
~DRAFT~

Invasive Plant Management Areas and Ownership

Bonita Creek

West San Joaquin Hills

Managed by: OC Parks?



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

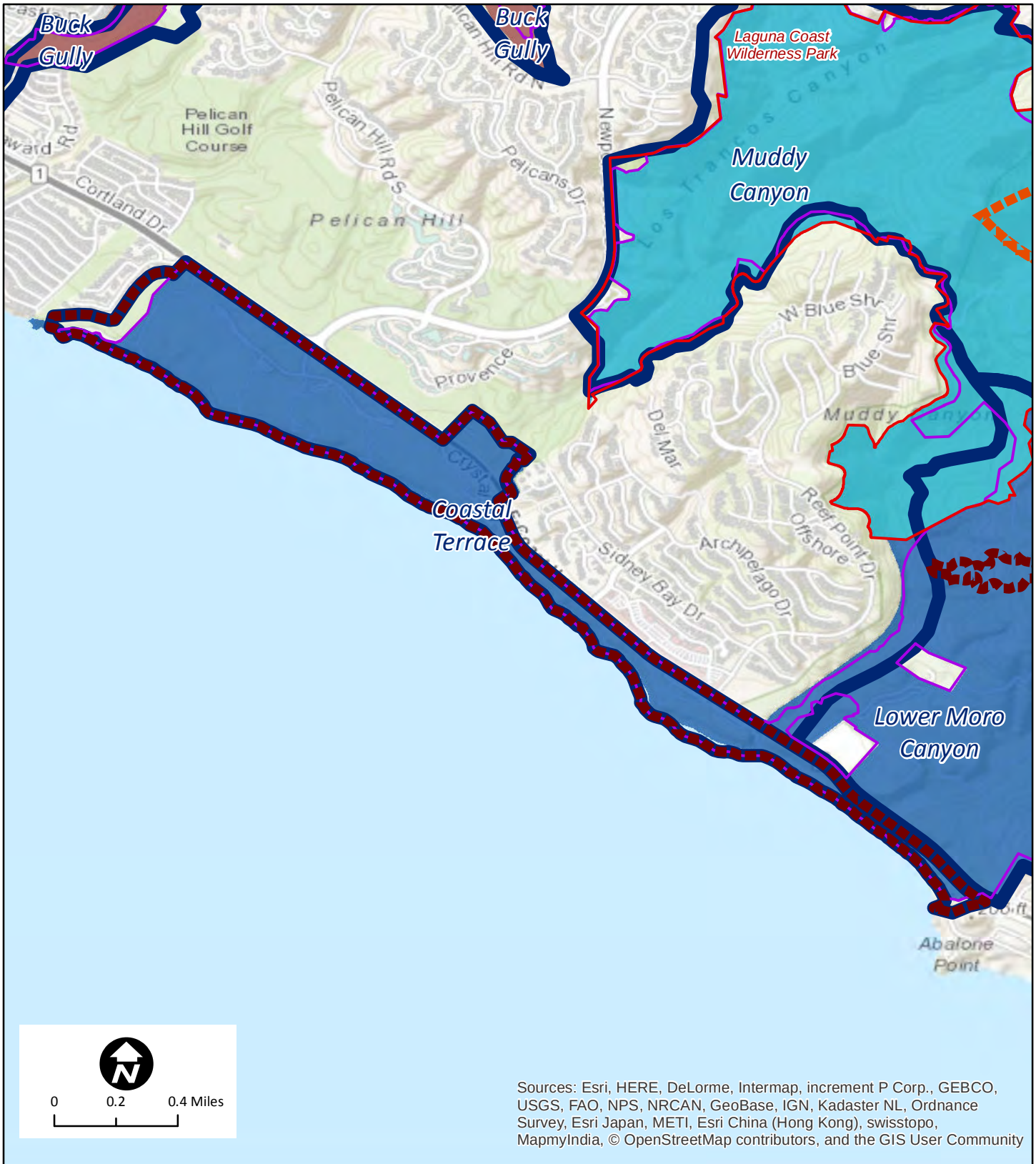
~DRAFT~

Invasive Plant Management Areas and Ownership

Buck Gully

Upper Newport Bay/Bonita Canyon

Managed by: Newport Beach



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

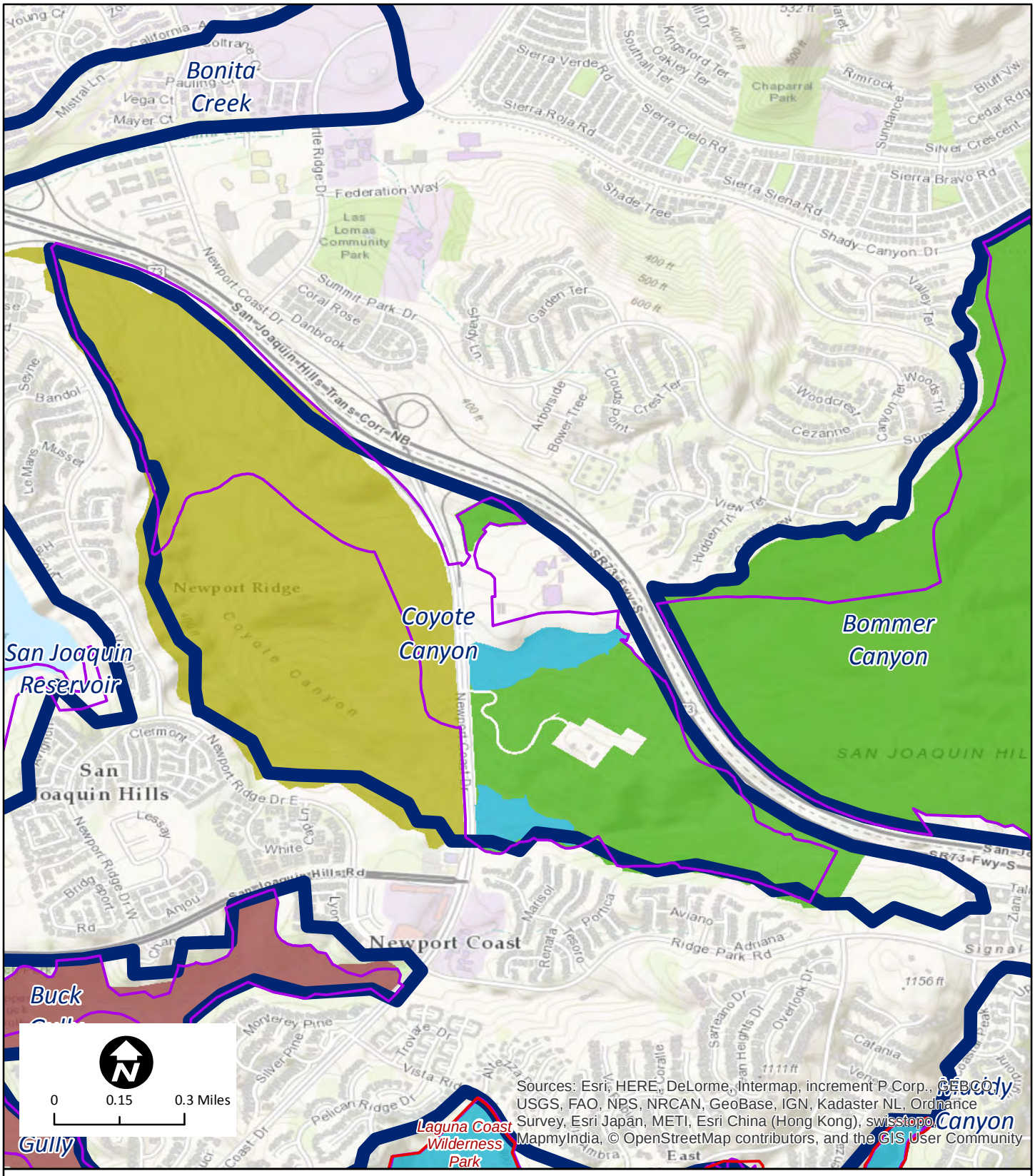
~DRAFT~

Invasive Plant Management Areas and Ownership

Coastal Terrace

Coastal San Joaquin Hills

Managed by: State Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

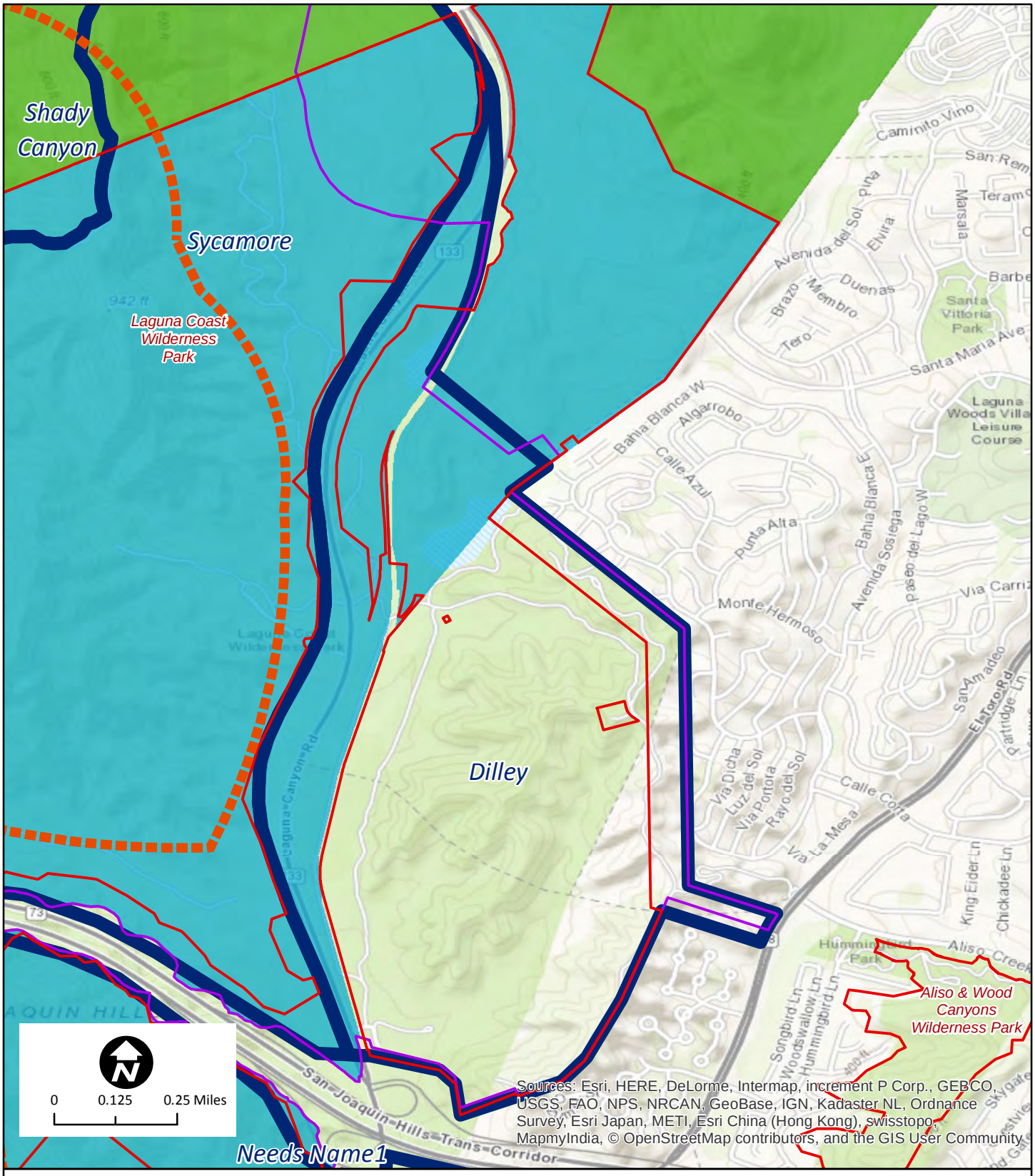
~DRAFT~

Invasive Plant Management Areas and Ownership

Coyote Canyon

Upper Newport Bay/Bonita Canyon

Managed by: IRC



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

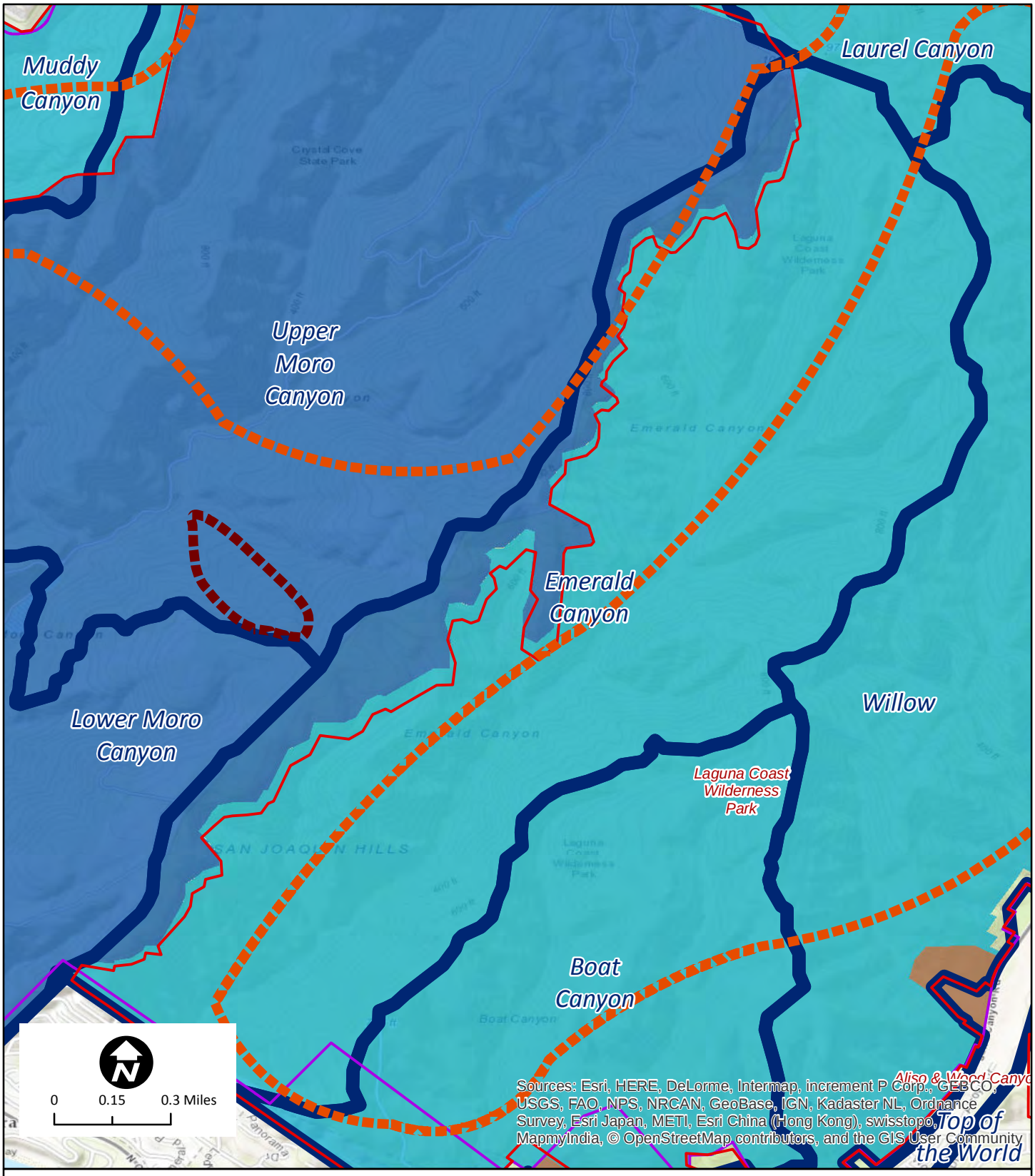
~DRAFT~

Invasive Plant Management Areas and Ownership

Dilley

Inland San Joaquin Hills

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

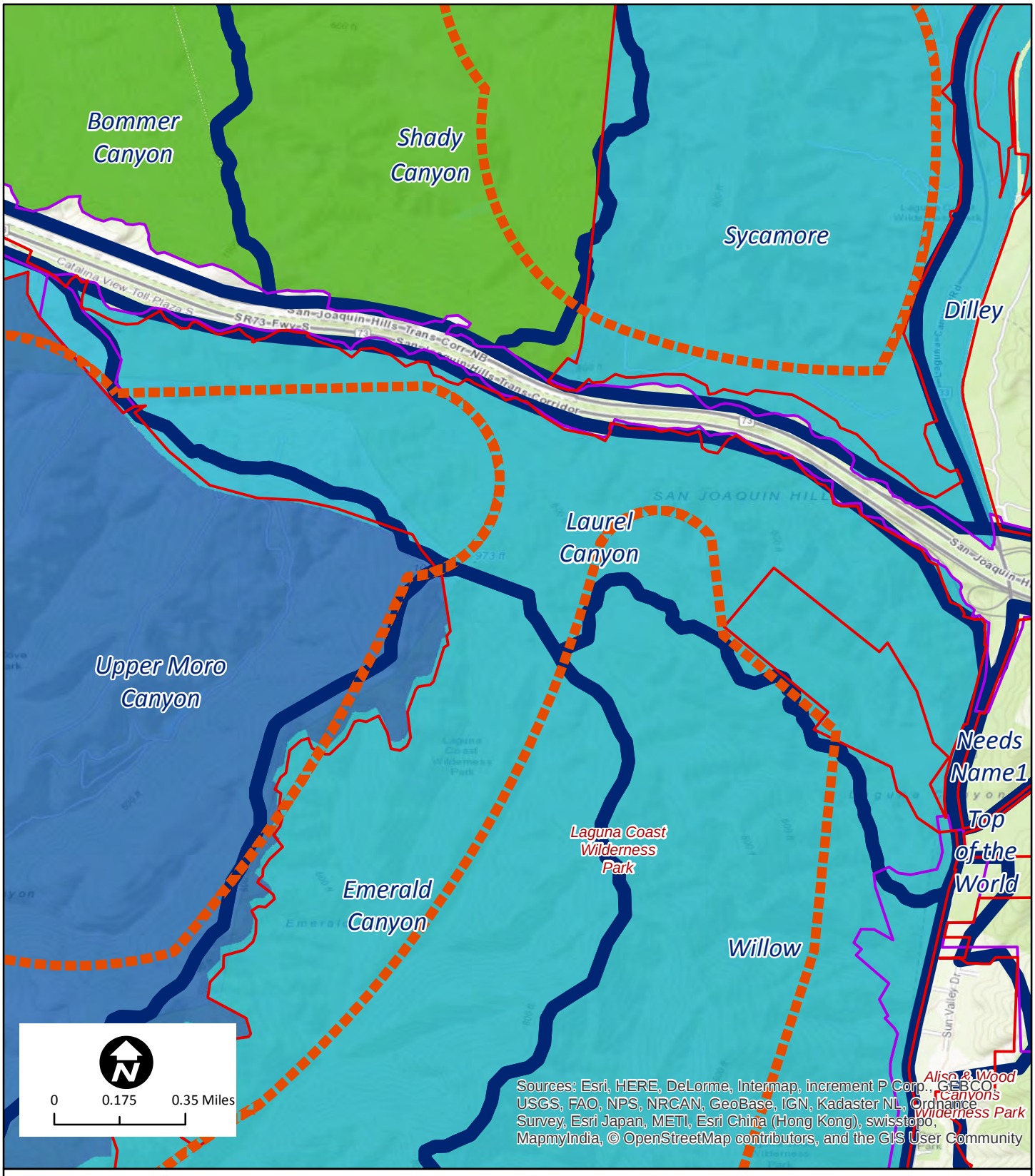
~DRAFT~

Invasive Plant Management Areas and Ownership

Emerald Canyon

Coastal San Joaquin Hills

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

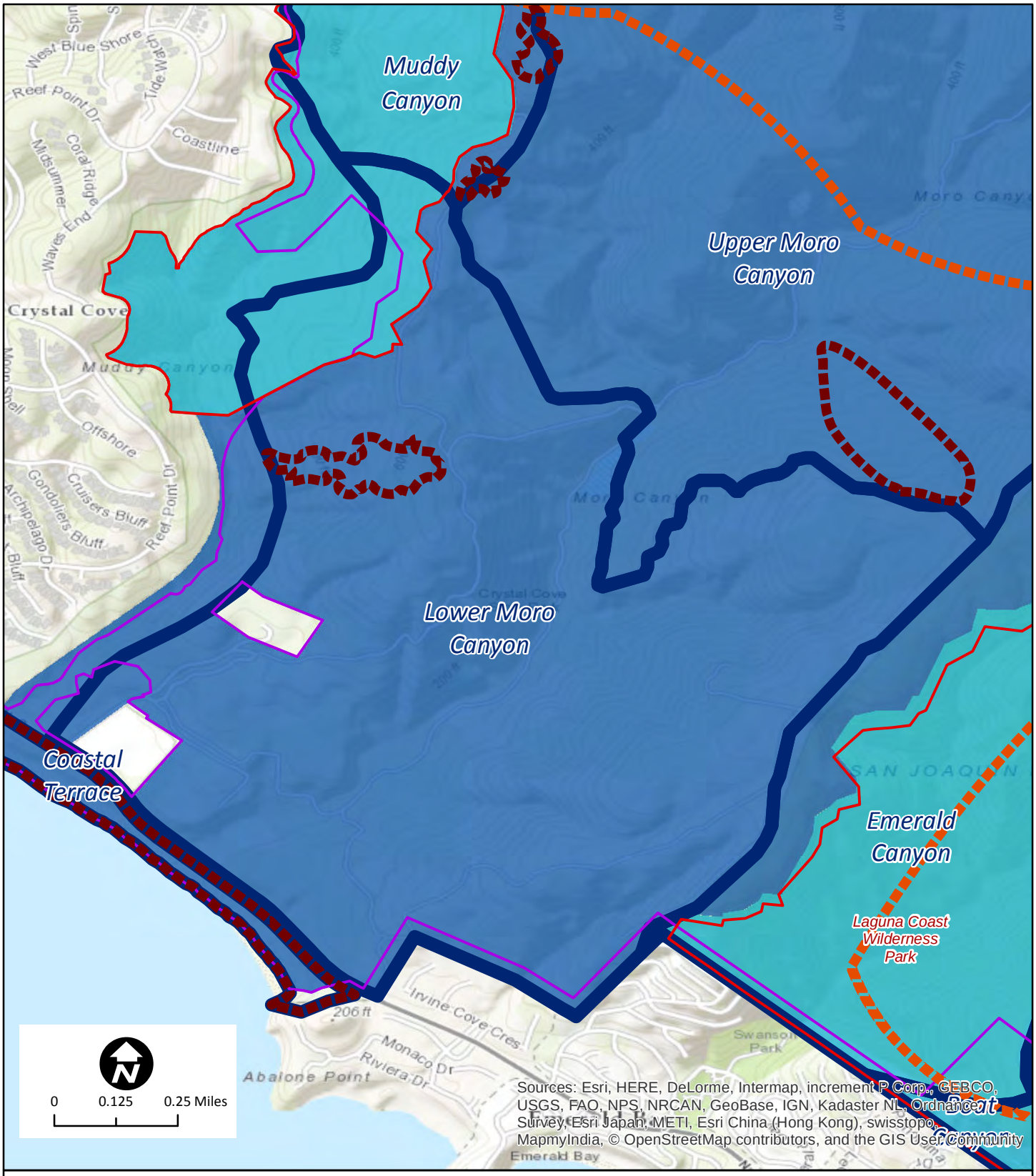
~DRAFT~

Invasive Plant Management Areas and Ownership

Laurel Canyon

Coastal San Joaquin Hills

Managed by: OC Parks & State Reser



High Value Areas
- Core Area
- Investment Area
- Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

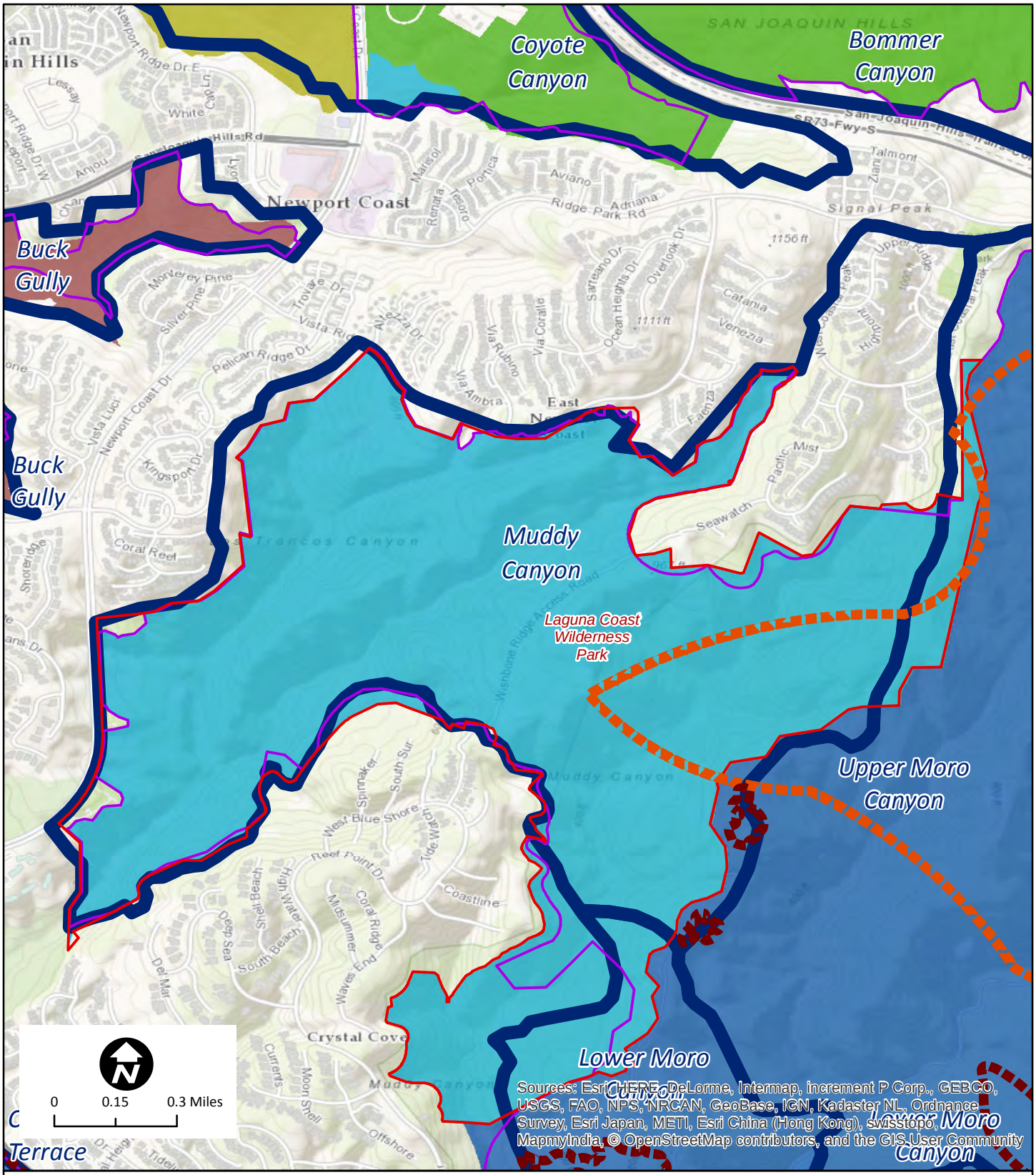
~DRAFT~

Invasive Plant Management Areas and Ownership

Lower Moro Canyon

Coastal San Joaquin Hills

Managed by: State Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

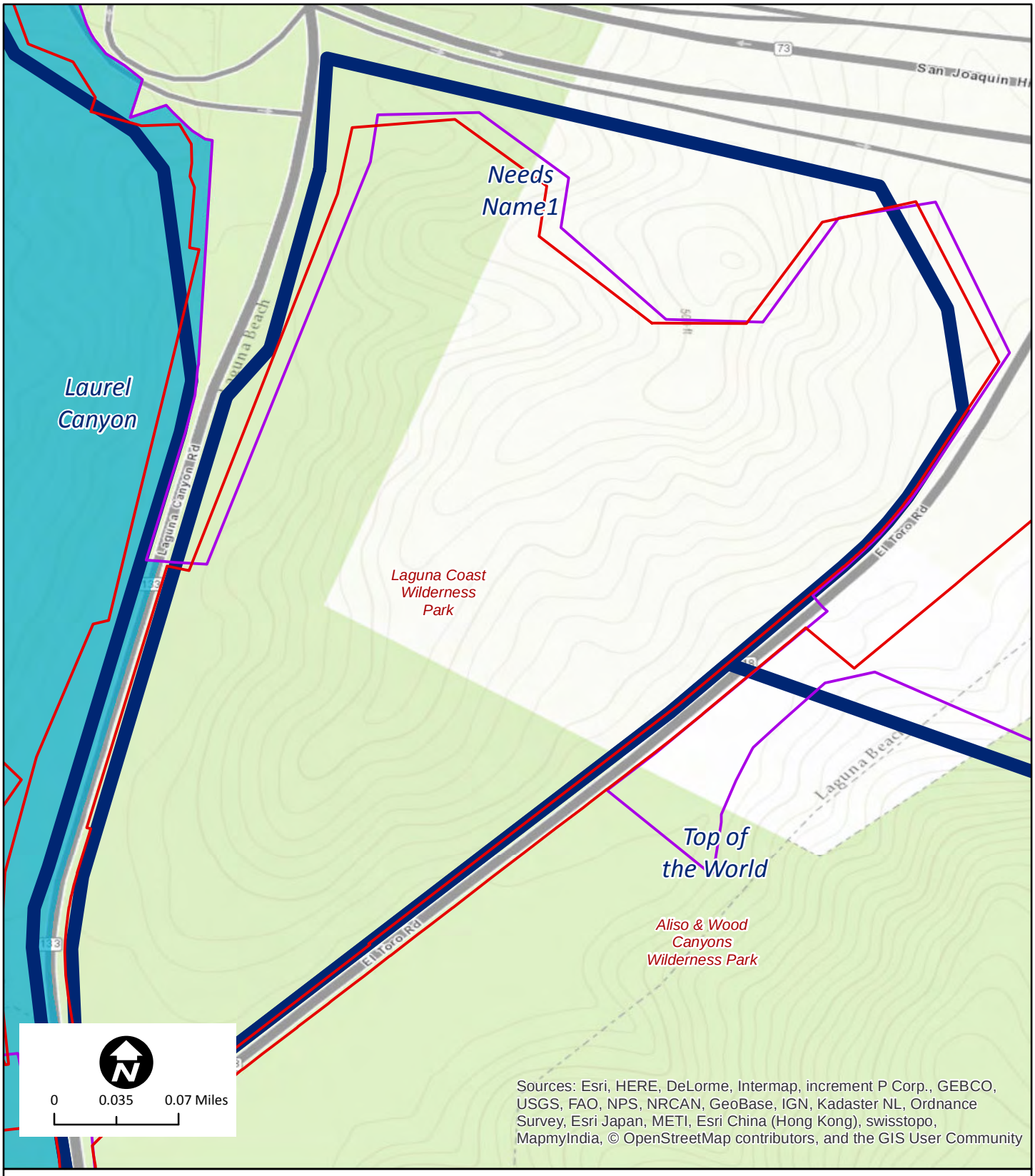
~DRAFT~

Invasive Plant Management Areas and Ownership

Muddy Canyon

Coastal San Joaquin Hills

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

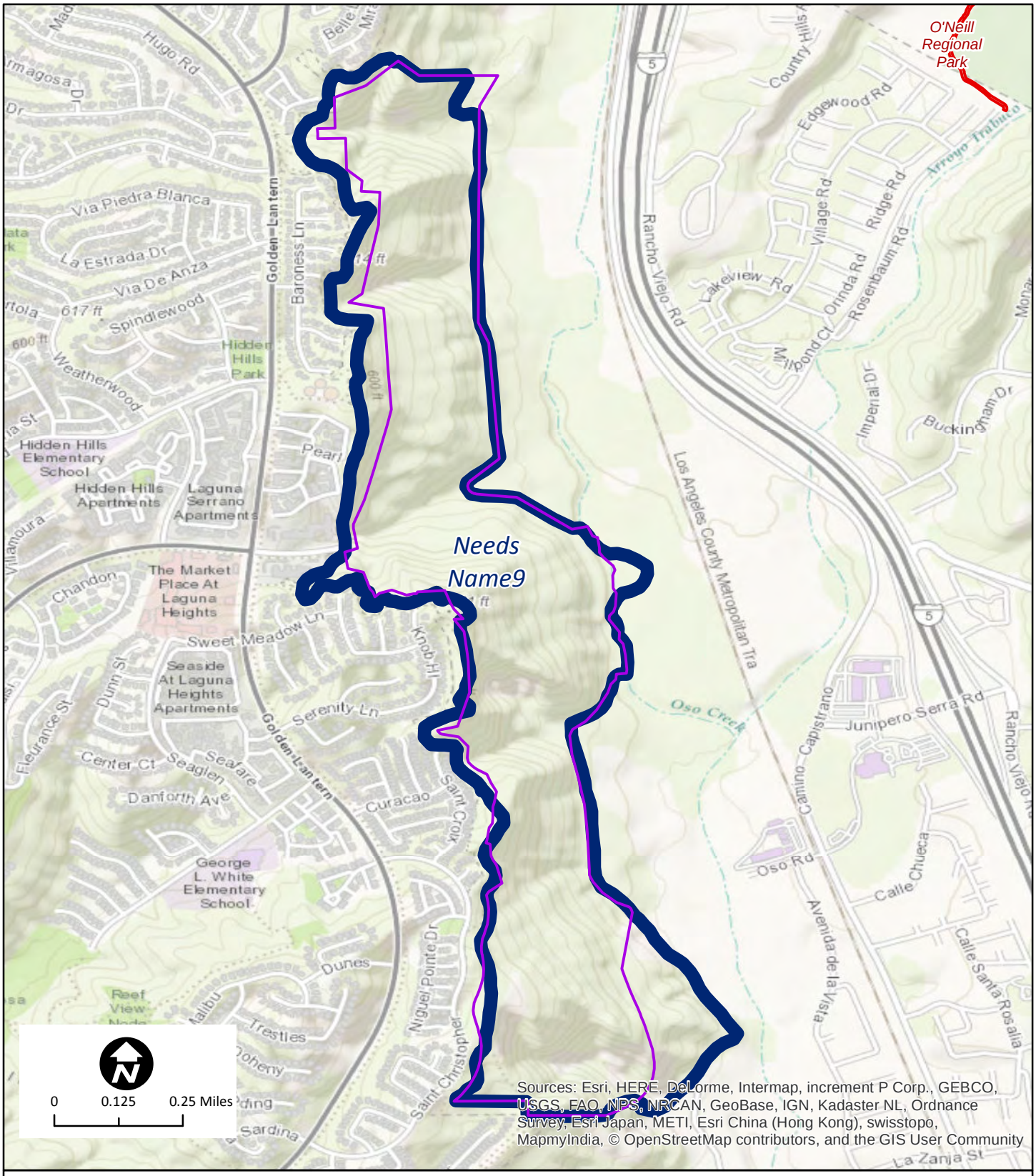
~DRAFT~

Invasive Plant Management Areas and Ownership

Needs Name1

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

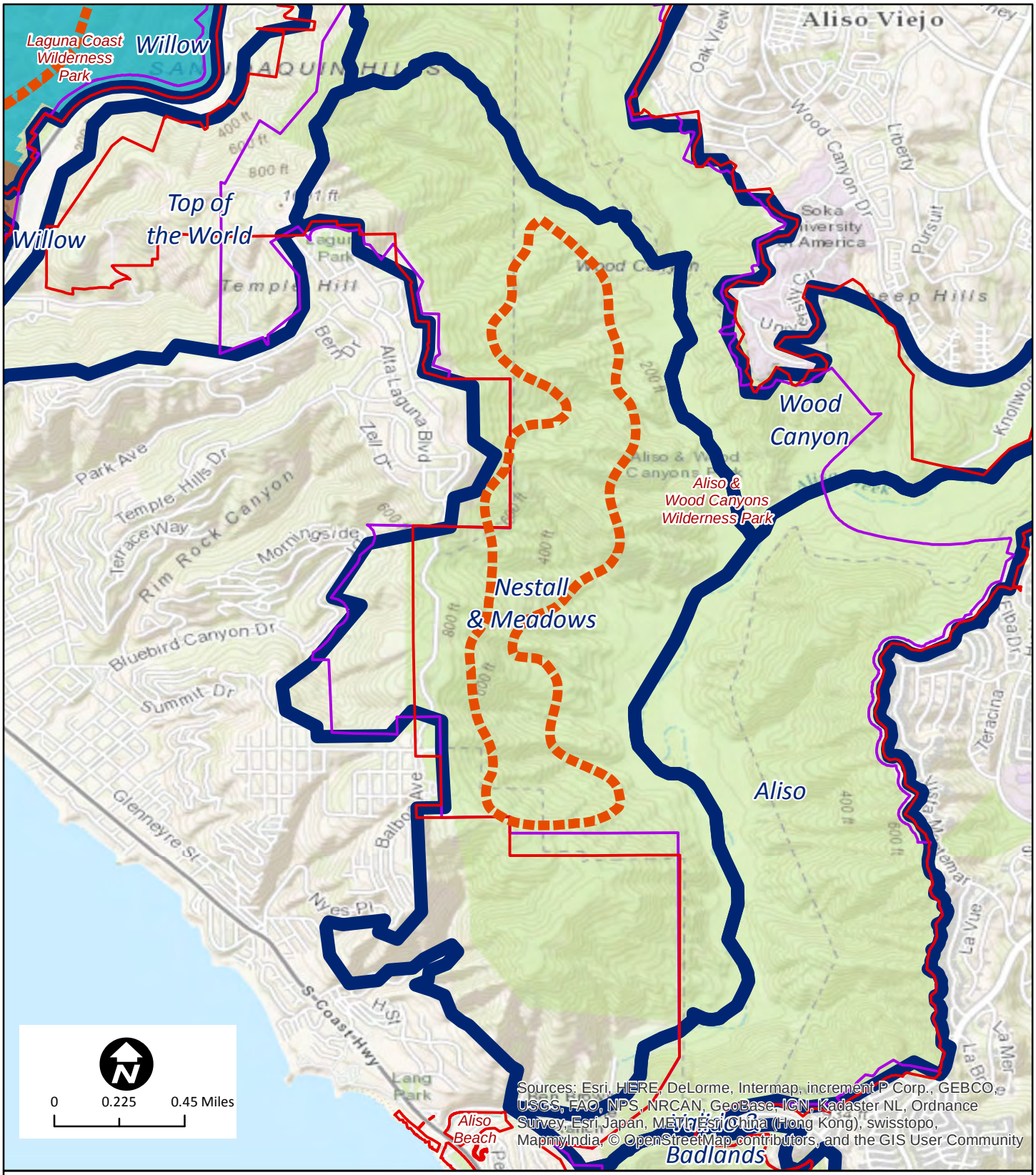
~DRAFT~

Invasive Plant Management Areas and Ownership

Needs Name9

Inland Salt Creek

Managed by: OC Parks?



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

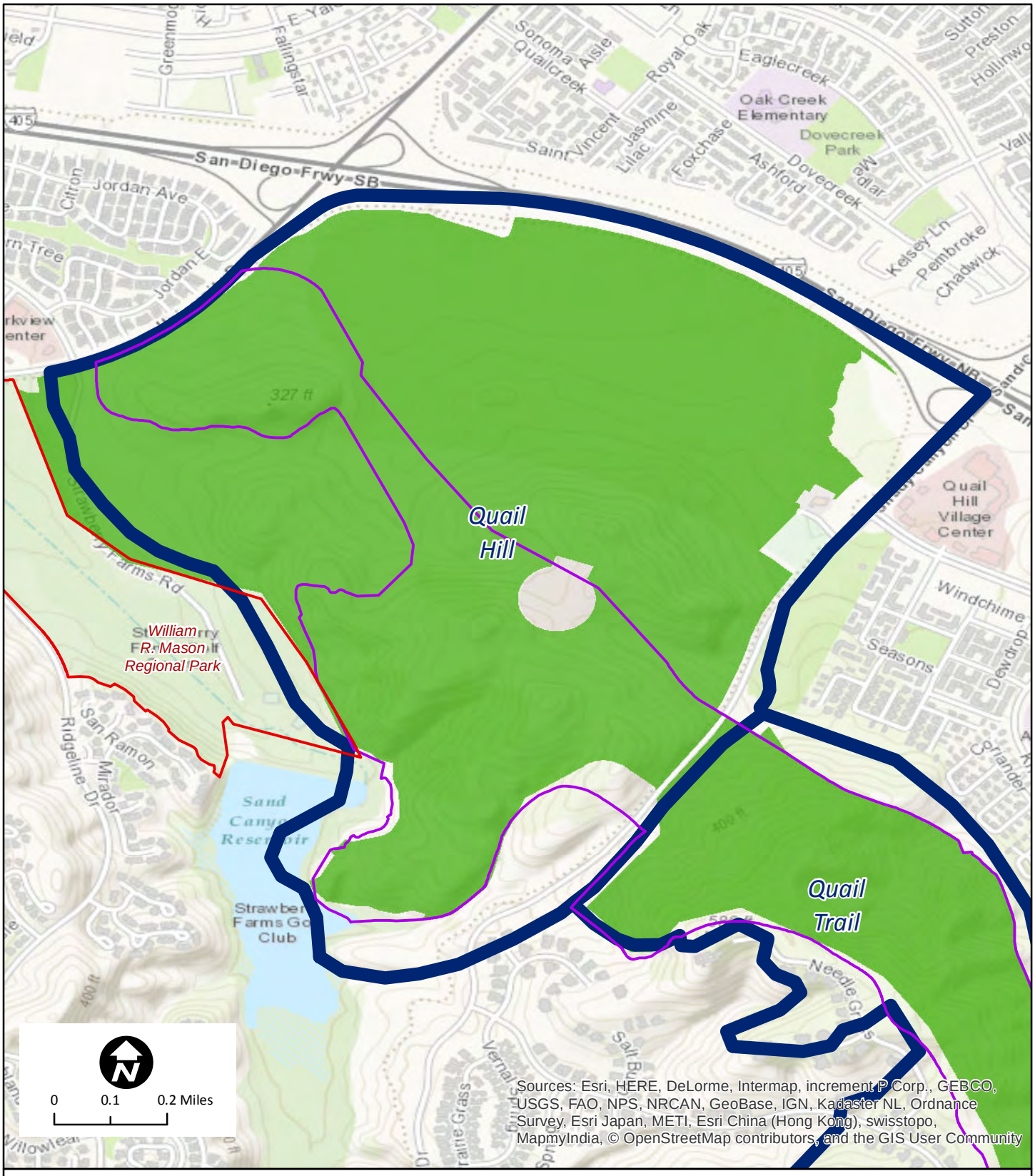
- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

~DRAFT~

Invasive Plant Management Areas and Ownership

Nestall & Meadows

Aliso-Wood Canyon Regional Park
Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

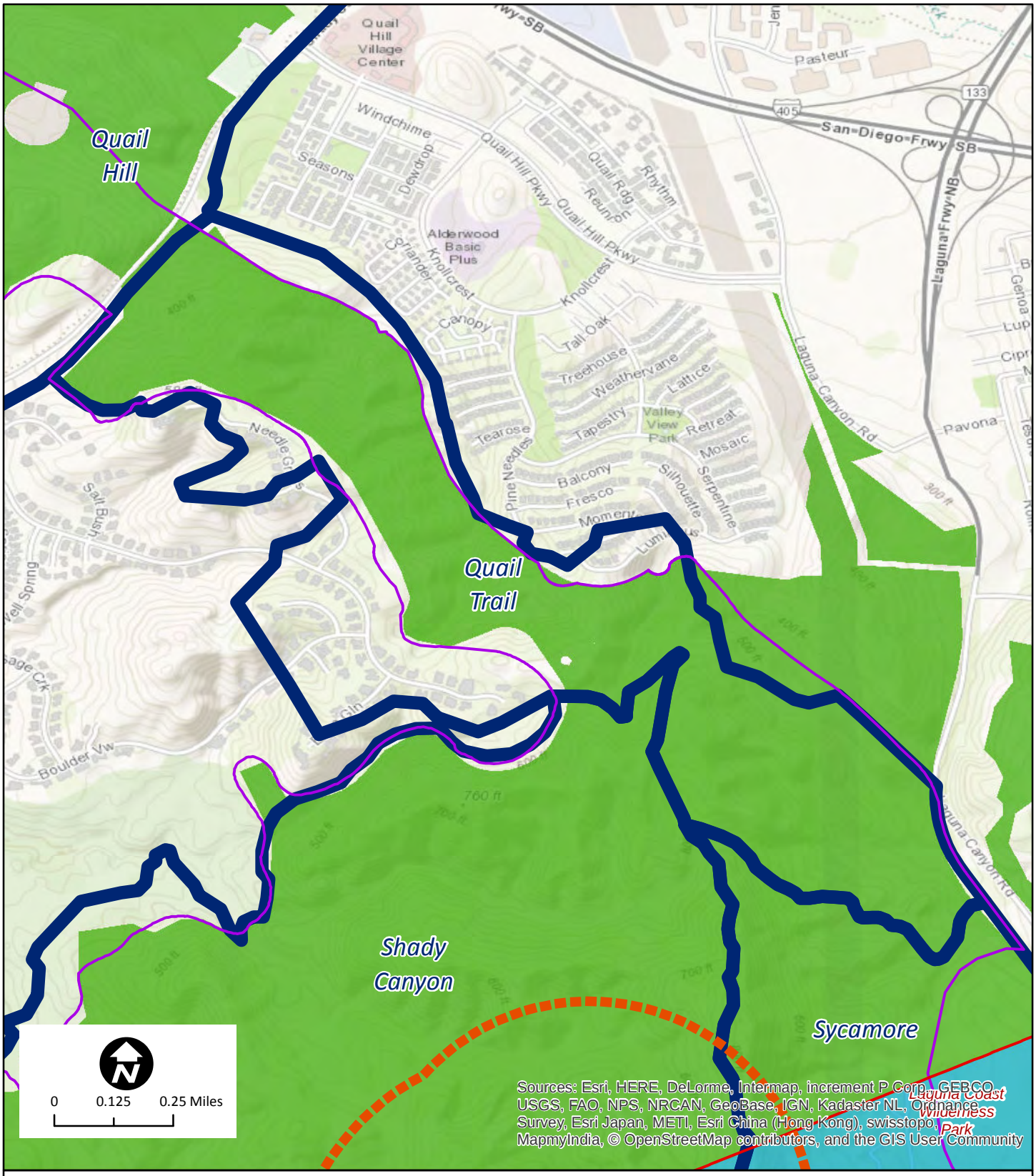
~DRAFT~

Invasive Plant Management Areas and Ownership

Quail Hill

Inland San Joaquin Hills

Managed by: City of Irvine



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

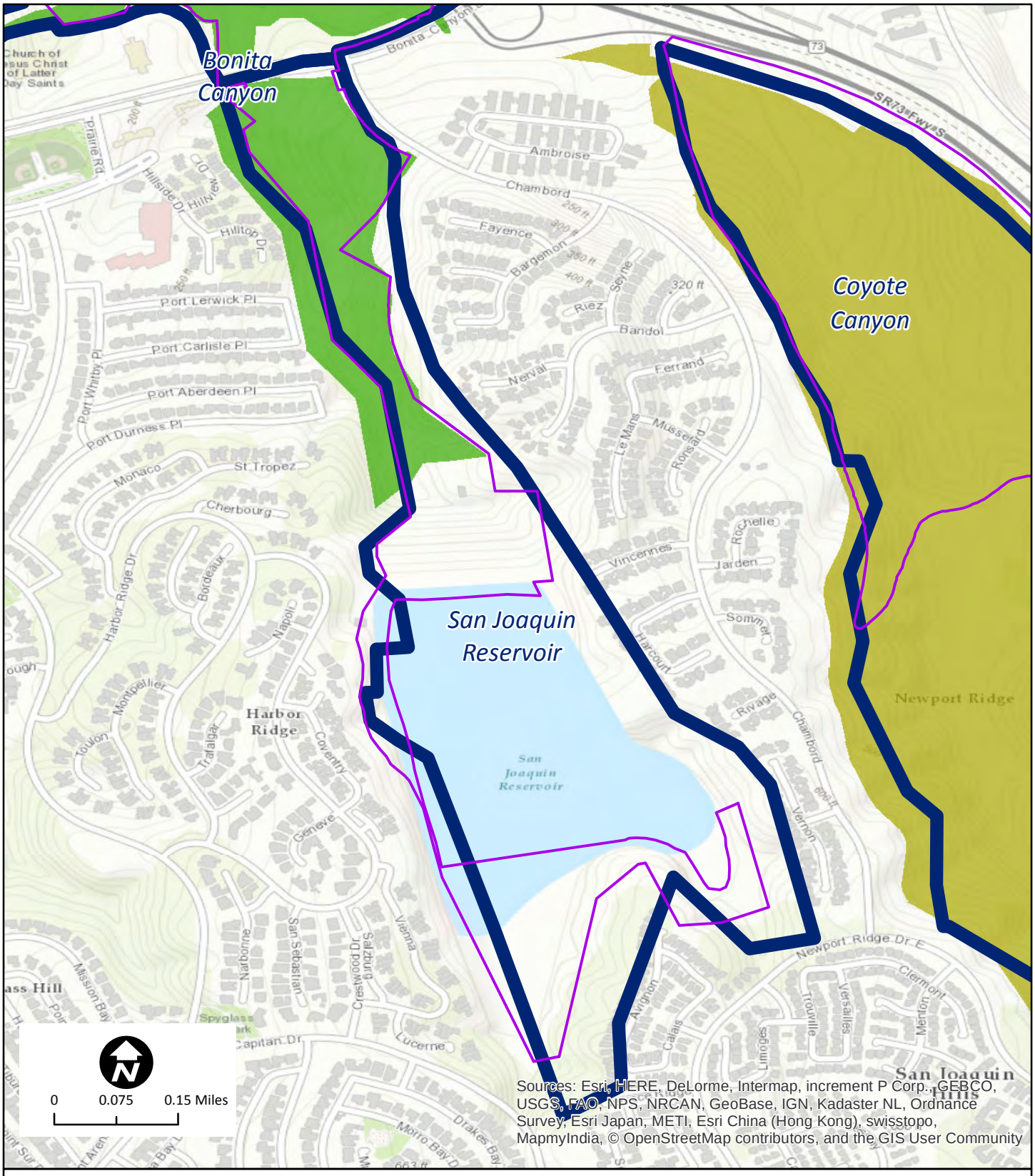
~DRAFT~

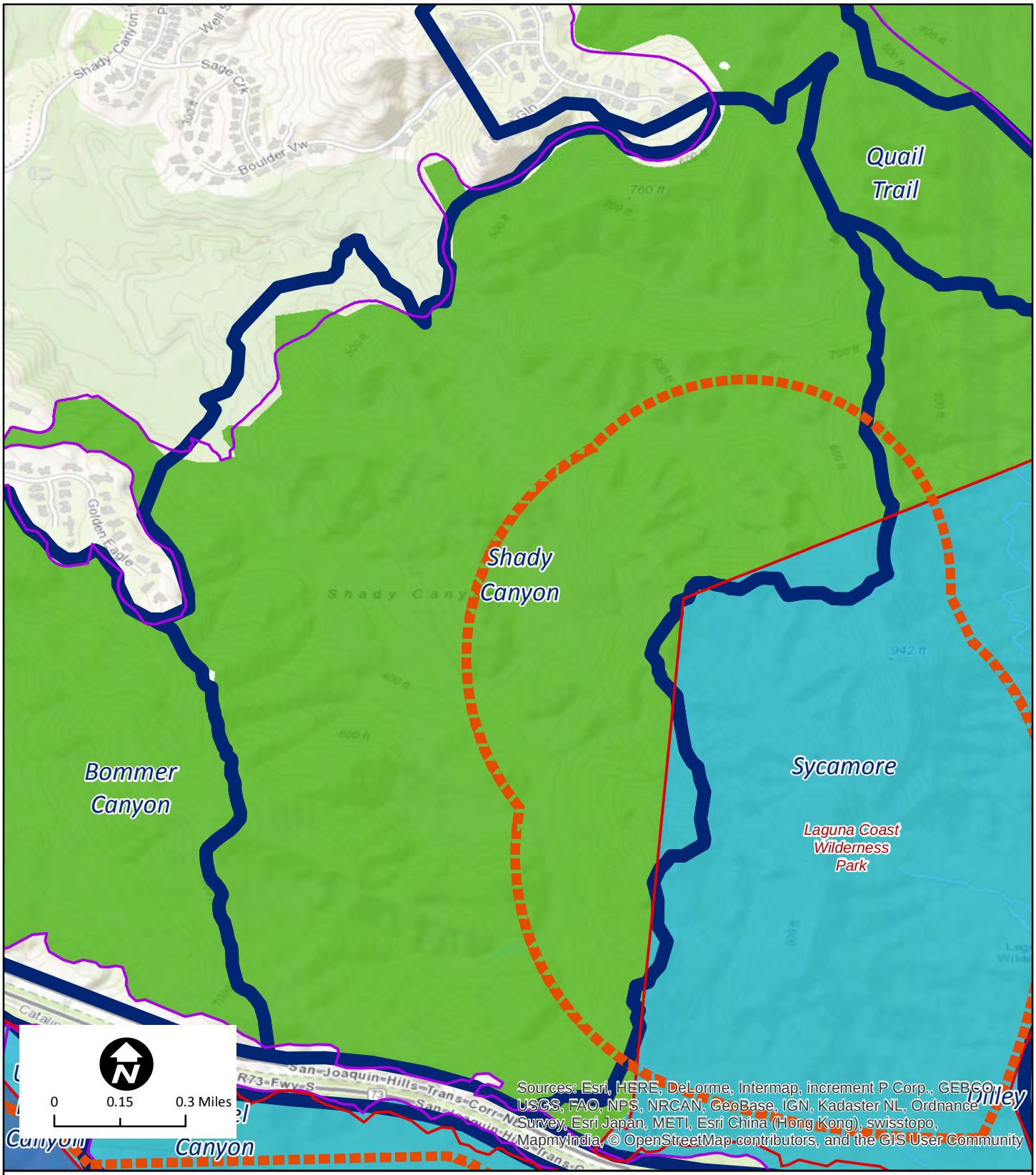
Invasive Plant Management Areas and Ownership

Quail Trail

Inland San Joaquin Hills

Managed by: City of Irvine


Bonita Canyon
Coyote Canyon
San Joaquin Reservoir
Harbor Ridge
Newport Ridge
Bonita Canyon Dr
SR73 Fwy S
Ambroise
Chambord
Fayence
Bargemon
Riez
Bandol
Nerval
Ferrand
Le Mans
Mussel rd
Ronsard
Rochelle
Jarden
Vincennes
Harcourt
Rivage
Chambord
Vernon
Newport Ridge Dr E
Clermont
Versailles
Trouville
Limoges
Calais
Avignon
Merlon
Port Lerwick Pl
Port Carlisle Pl
Port Aberdeen Pl
Port Dunness Pl
Port Whitby Pl
Hillside Dr
Hilltop Dr
Prairie Rd
Monaco
St Tropez
Cherbourg
Bordeaux
Napoli
Harbor Ridge Dr
Montpellier
Toulon
Trafalgar
Coventry
Geneve
Narborne
San Sebastian
Crestwood Dr
Salzburg
Vienna
Lucerne
Capitan Dr
Spyglass
Mission Bay
Morro Bay Dr
Drakes Bay
San Joaquin Hills
0
0.075
0.15 Miles
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
High Value Areas
Core Area
Investment Area
Invasive Plant Management Units
OC Parks Boundary
NCCP Reserve Boundary
California Dept. of Fish + Wildlife
City of Irvine
Irvine Water District
Laguna Beach
Laguna Beach Water District
Newport Beach
OC Parks
Other
OC Waste
State of California
The Irvine Company
~DRAFT~
Invasive Plant Management Areas and Ownership
San Joaquin Reservoir
Upper Newport Bay/Bonita Canyon
Managed by: City of Irvine/Met Wat



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

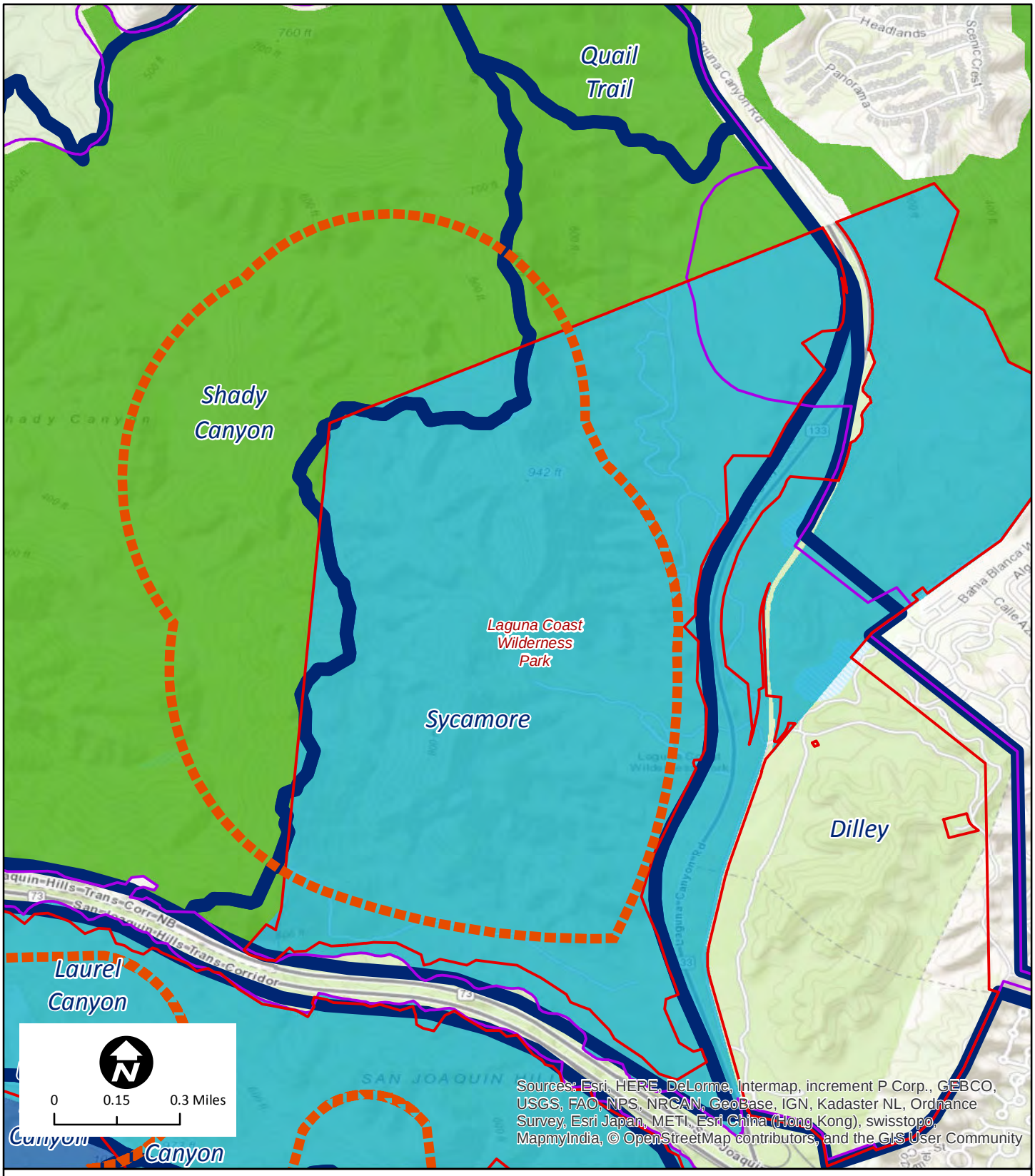
~DRAFT~

Invasive Plant Management Areas and Ownership

Shady Canyon

Inland San Joaquin Hills

Managed by: City of Irvine



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach

- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

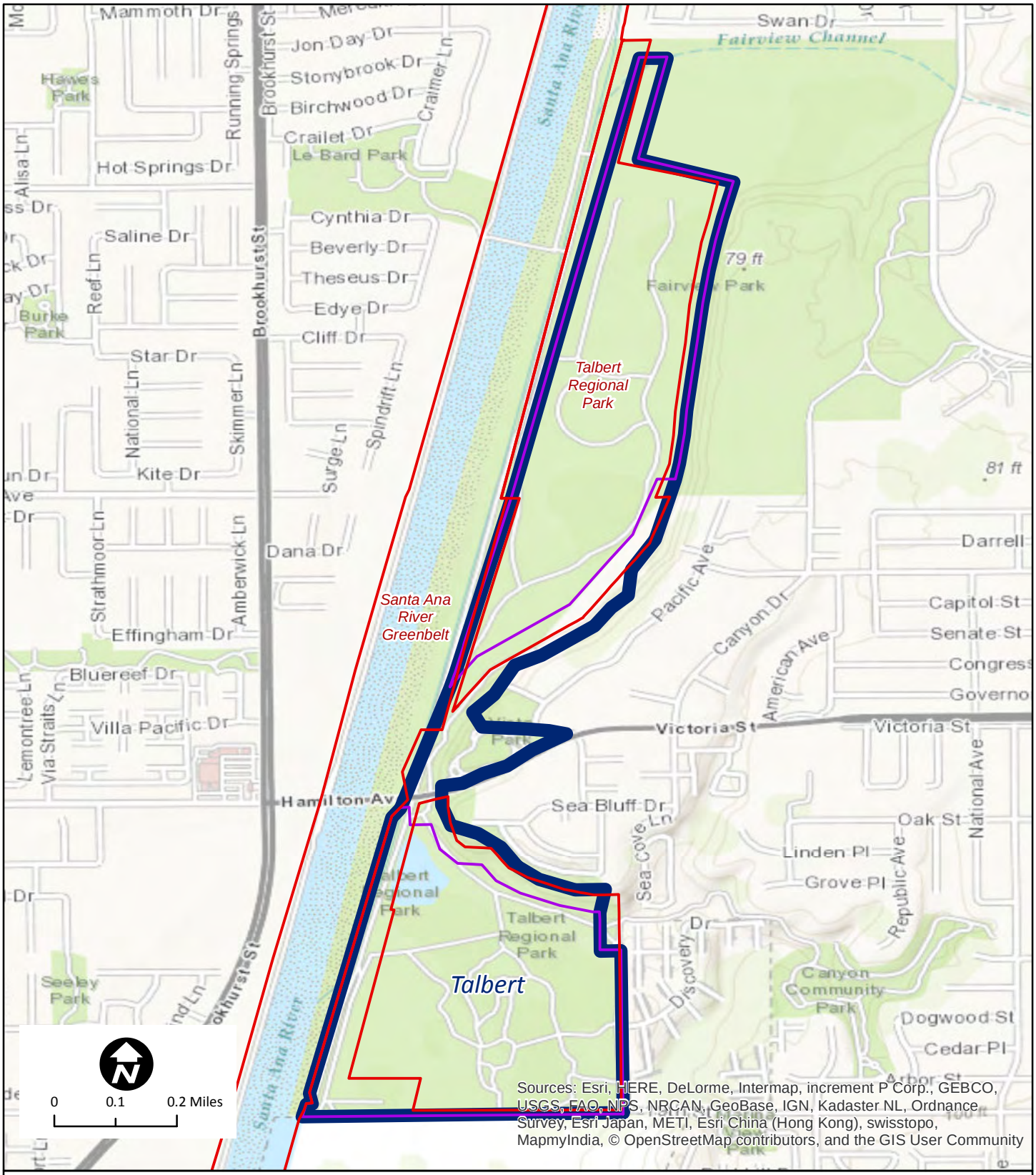
~DRAFT~

Invasive Plant Management Areas and Ownership

Sycamore

Inland San Joaquin Hills

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

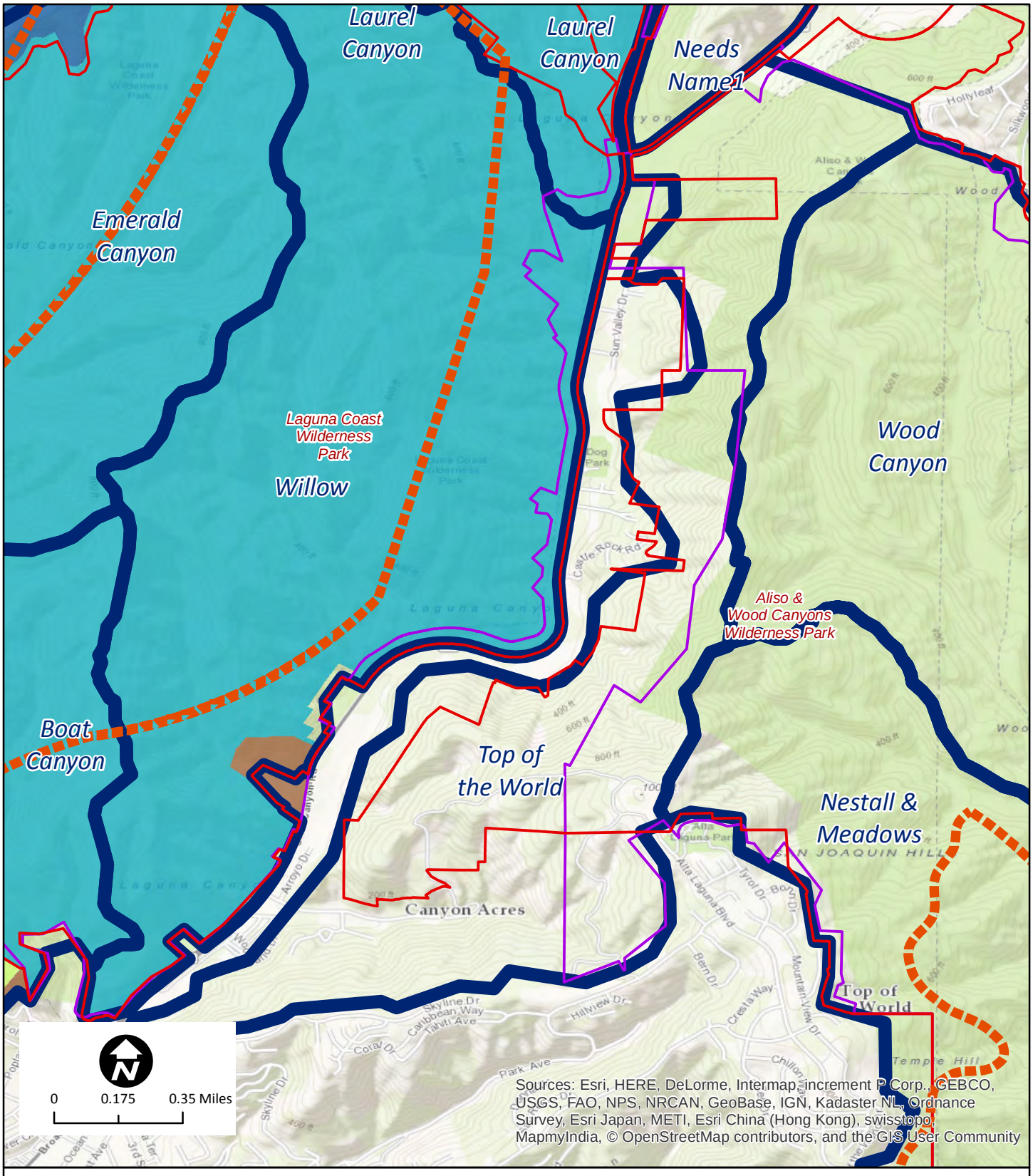
~DRAFT~

Invasive Plant Management Areas and Ownership

Talbert

Coastal Talbert

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

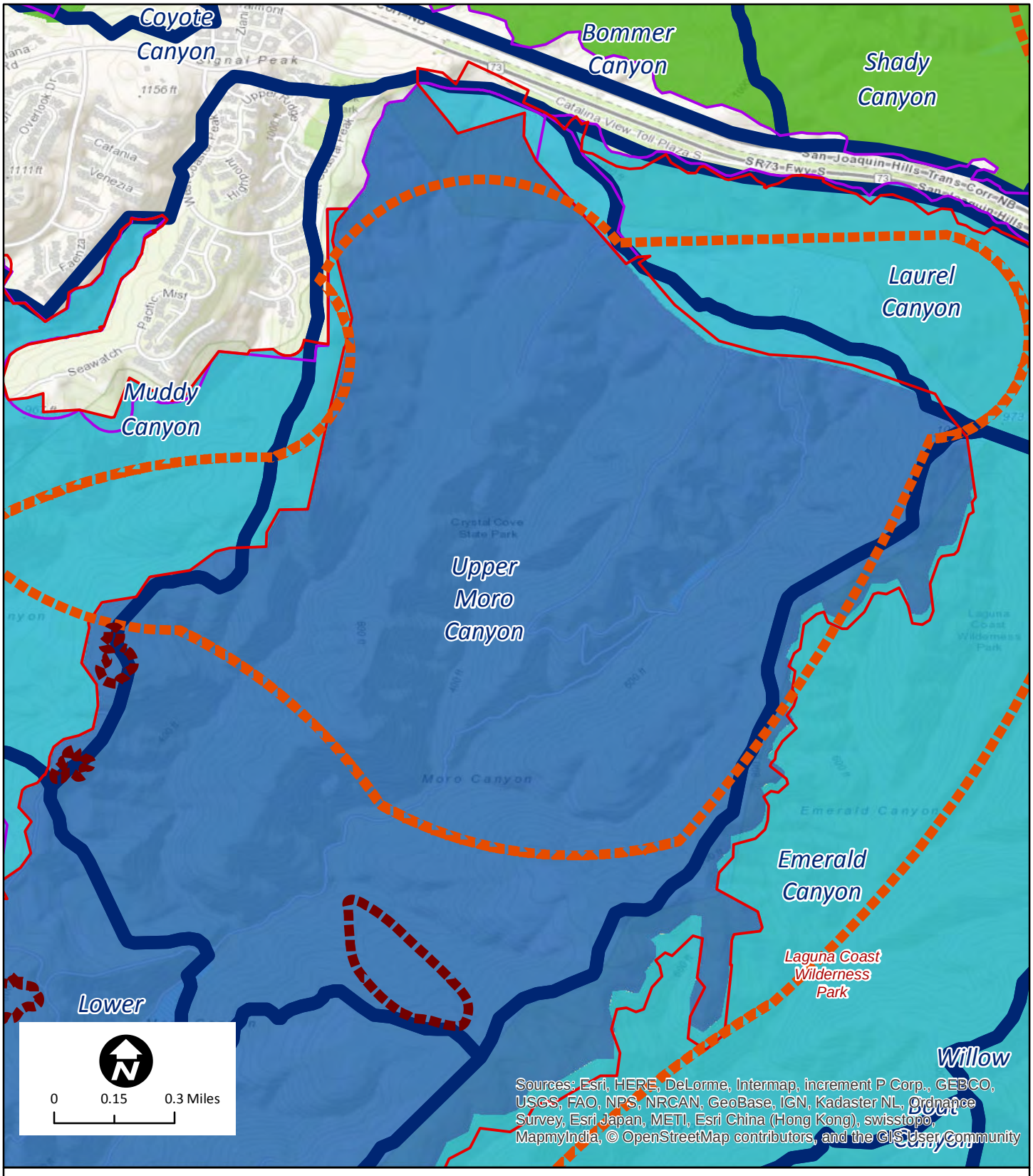
~DRAFT~

Invasive Plant Management Areas and Ownership

Top of the World

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

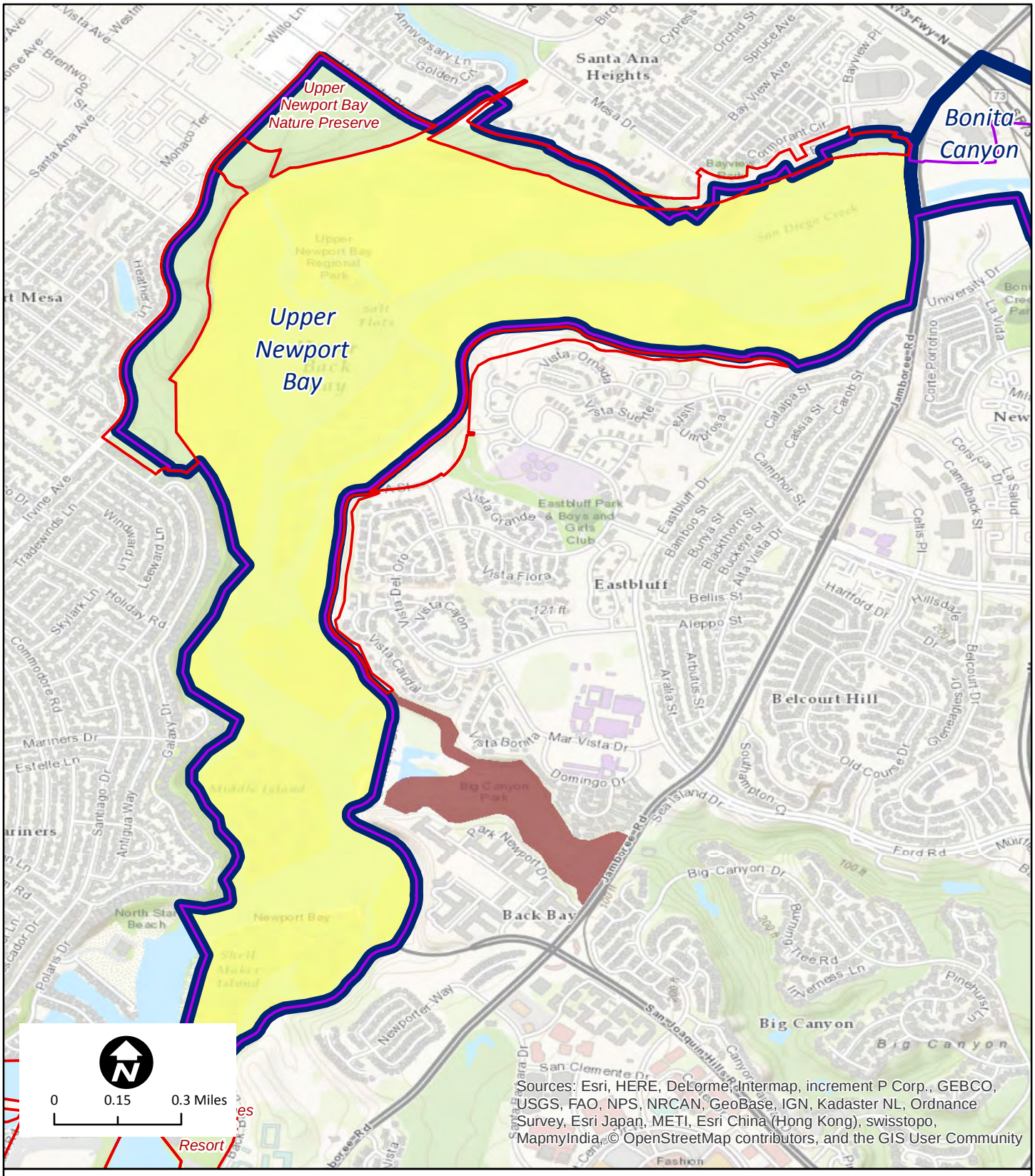
~DRAFT~

Invasive Plant Management Areas and Ownership

Upper Moro Canyon

Coastal San Joaquin Hills

Managed by: State Parks



High Value Areas
- Core Area
- Investment Area
- Invasive Plant Management Units
- OC Parks Boundary
- NCCP Reserve Boundary

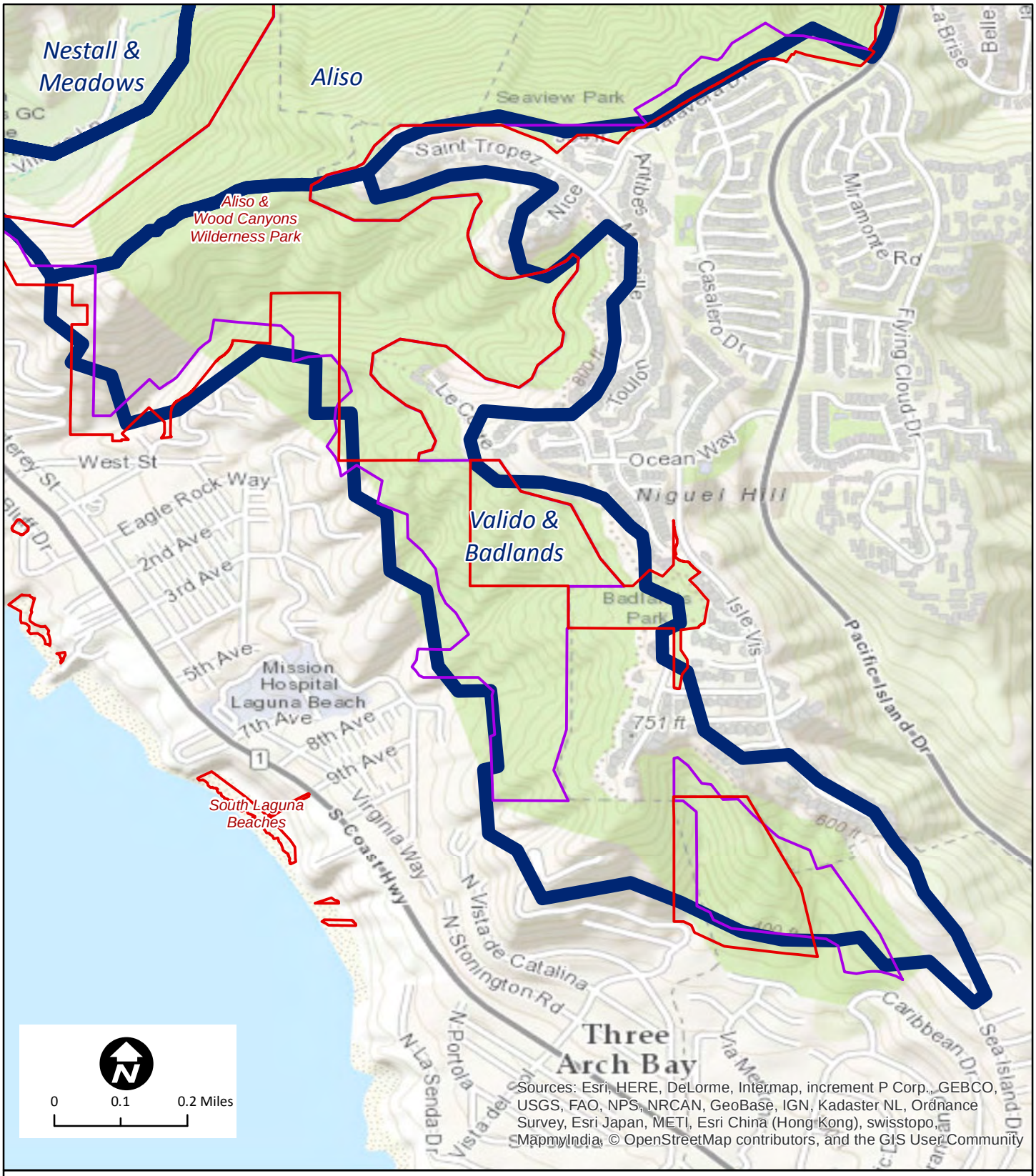
- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

~DRAFT~

Invasive Plant Management Areas and Ownership

Upper Newport Bay

Upper Newport Bay/Bonita Canyon
Managed by: 90/10: DFW/OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

- OC Parks Boundary
- NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

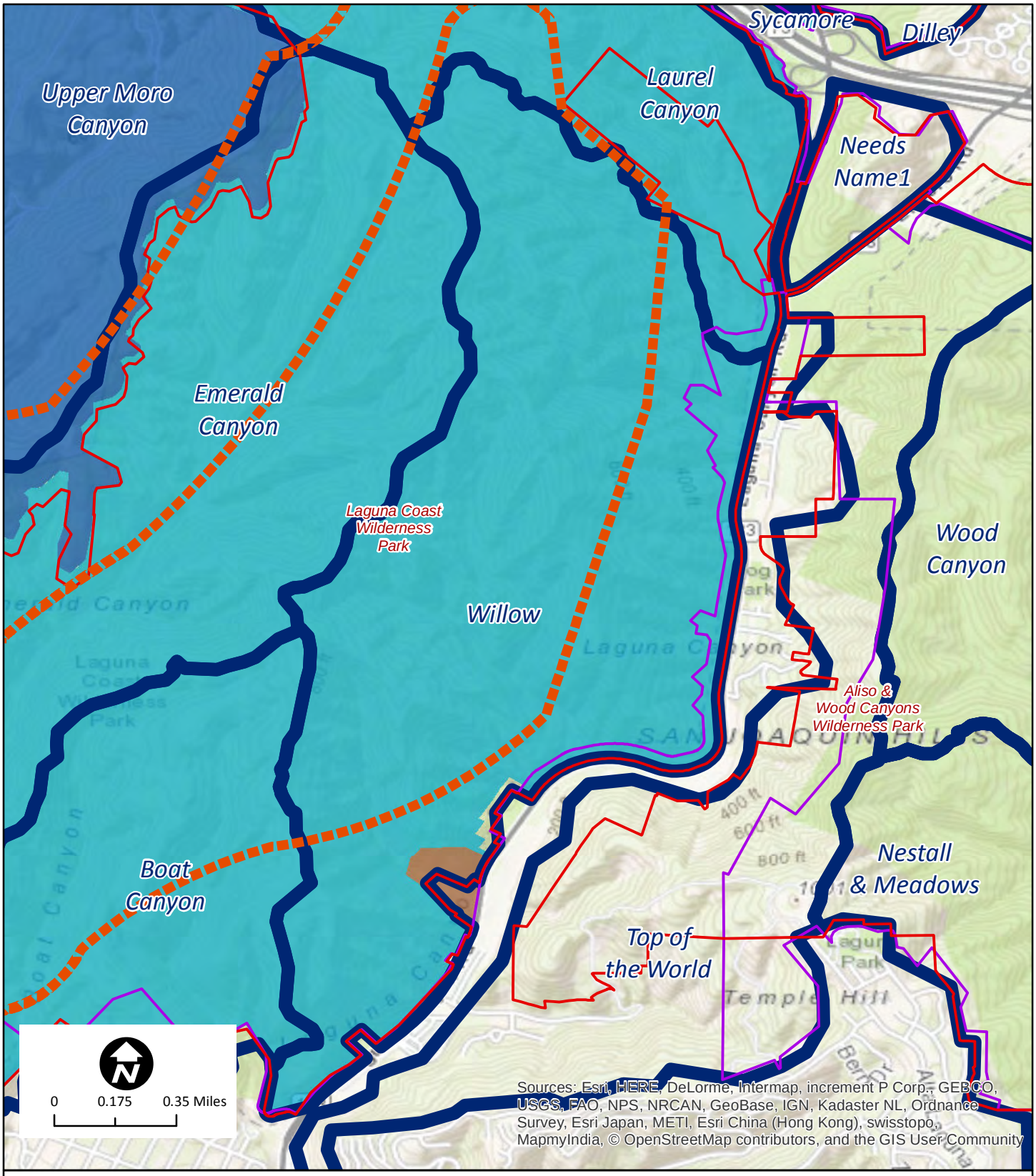
~DRAFT~

Invasive Plant Management Areas and Ownership

Valido & Badlands

Aliso-Wood Canyon Regional Park

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

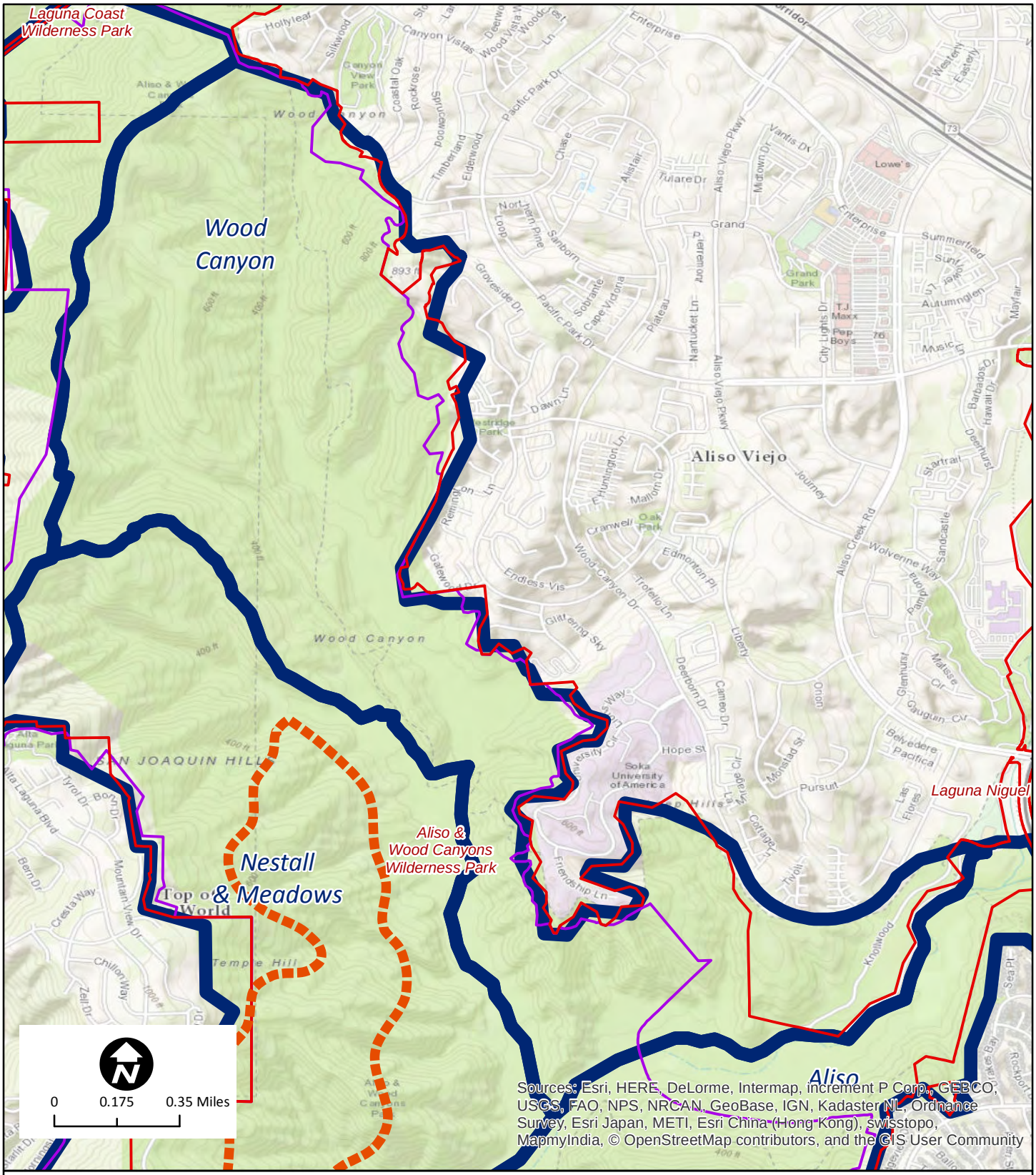
~DRAFT~

Invasive Plant Management Areas and Ownership

Willow

Coastal San Joaquin Hills

Managed by: OC Parks



High Value Areas
- Core Area
- Investment Area

Invasive Plant Management Units

OC Parks Boundary

NCCP Reserve Boundary

- California Dept. of Fish + Wildlife
- City of Irvine
- Irvine Water District
- Laguna Beach
- Laguna Beach Water District
- Newport Beach
- OC Parks
- Other
- OC Waste
- State of California
- The Irvine Company

~DRAFT~

Invasive Plant Management Areas and Ownership

Wood Canyon

Aliso-Wood Canyon Regional Park

Managed by: OC Parks