

# **Nature Reserve of Orange County**

**County of Orange  
Central/Coastal NCCP/HCP**

## **2017 ANNUAL REPORT**



**Natural Communities Coalition**

**13402 Old Myford Road**

**Irvine, CA 92602**

[www.occonservation.org](http://www.occonservation.org)

# NATURE RESERVE OF ORANGE COUNTY ANNUAL REPORT 2017

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**Acknowledgements**

*The Natural Communities Coalition appreciates and thanks the reserve landowners and land managers whose hard work and collaboration makes a significant contribution to the health of the Reserve and this Annual Report.*

**Cover Photo**

Spring wildflower display following the Laguna Ridge Fire on June 26, 2016, in Laguna Coast Wilderness Park. Unburned coastal sage scrub in the background is 24 years old.  
Photo taken in May 2017

# **Nature Reserve of Orange County**

## **Annual Report 2017**

**Sections: 1.0 – 7.0**

Natural Communities  
Coalition

## **BACKGROUND**

*The Implementation Agreement for the County of Orange NCCP/HCP Central and Coastal Subregion specifies that an Annual Report be prepared each year to describe activities of the non-profit management corporation and of landowners and land managers within the reserve system. The annual report contains a progress report for the preceding year and a work plan for the following year. This report is being submitted to the US Fish and Wildlife Service and California Department of Fish and Wildlife to fulfill that requirement for the years 2017/2018. Guidelines provided by the Wildlife Agencies were used in the preparation of this report.*

## **INTRODUCTION**

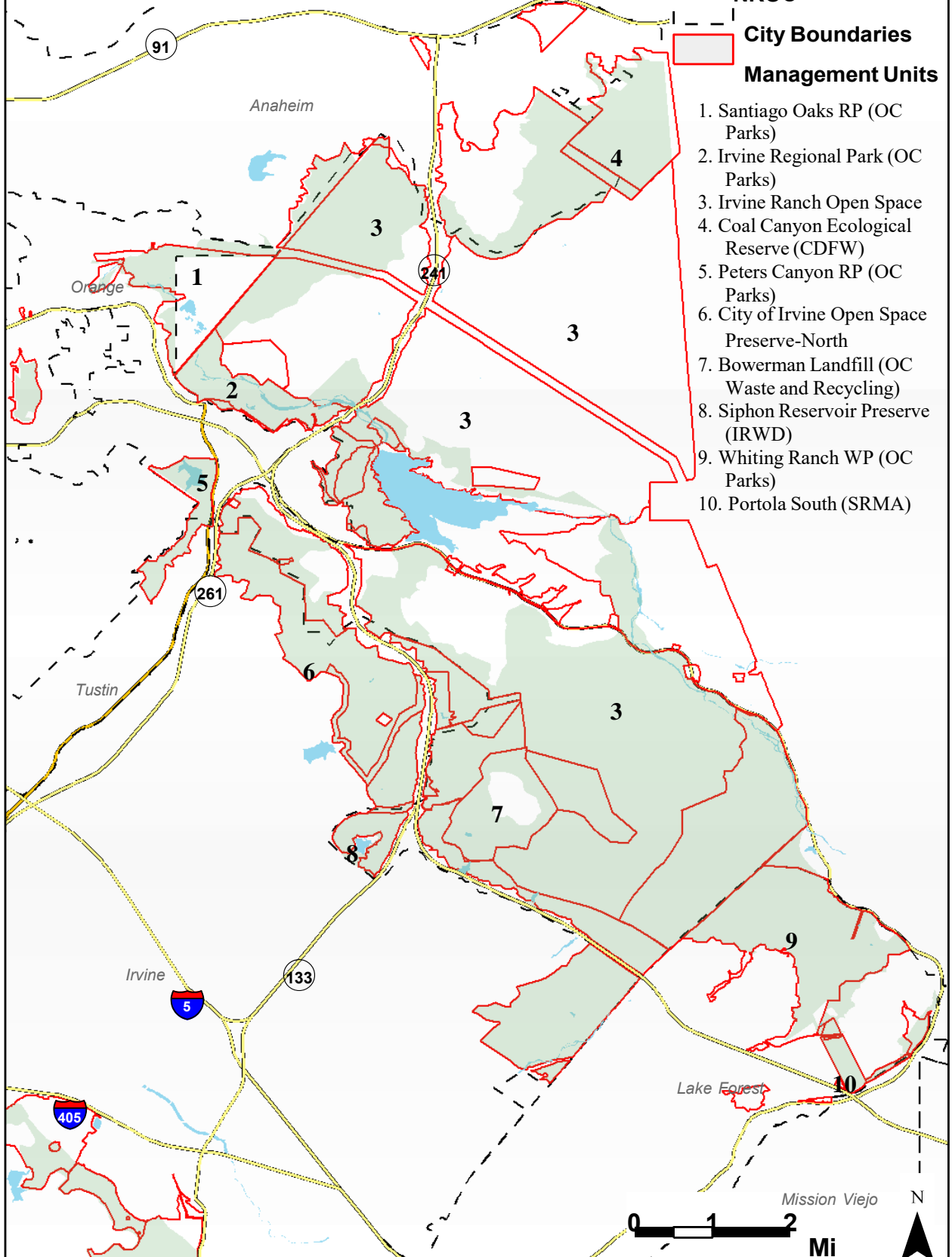
The Natural Communities Coalition is the 501(c)(3) non-profit corporation that was formed to manage the Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) for the Central and Coastal Subregion of Orange County. The mission is “*Coordinate with landowners, managers and other partners to ensure the persistence of the Reserve’s natural communities, including the full spectrum of native plant and animal species, through protection, study and restoration of native habitats and natural processes*”. Thirty-nine sensitive species are protected, including nine plant and 30 animal species. The primary vegetation type in the Reserve is coastal sage scrub, coexisting in an intricate mosaic of oak woodland, native grassland, chaparral, Tecate cypress and riparian communities.

NCC helps coordinate science and land management activities of reserve landowners and managers in the nearly 38,000-acre reserve system. Additionally, it conducts biological research and monitoring, and implements habitat restoration and enhancement programs in coordination with landowners and managers. The overall biological goal of the Reserve program is to conserve healthy, functioning ecosystems at a landscape level. This is accomplished through adaptive management, a flexible approach that is open to change based on new scientific information.

## **RESERVE MAPS**

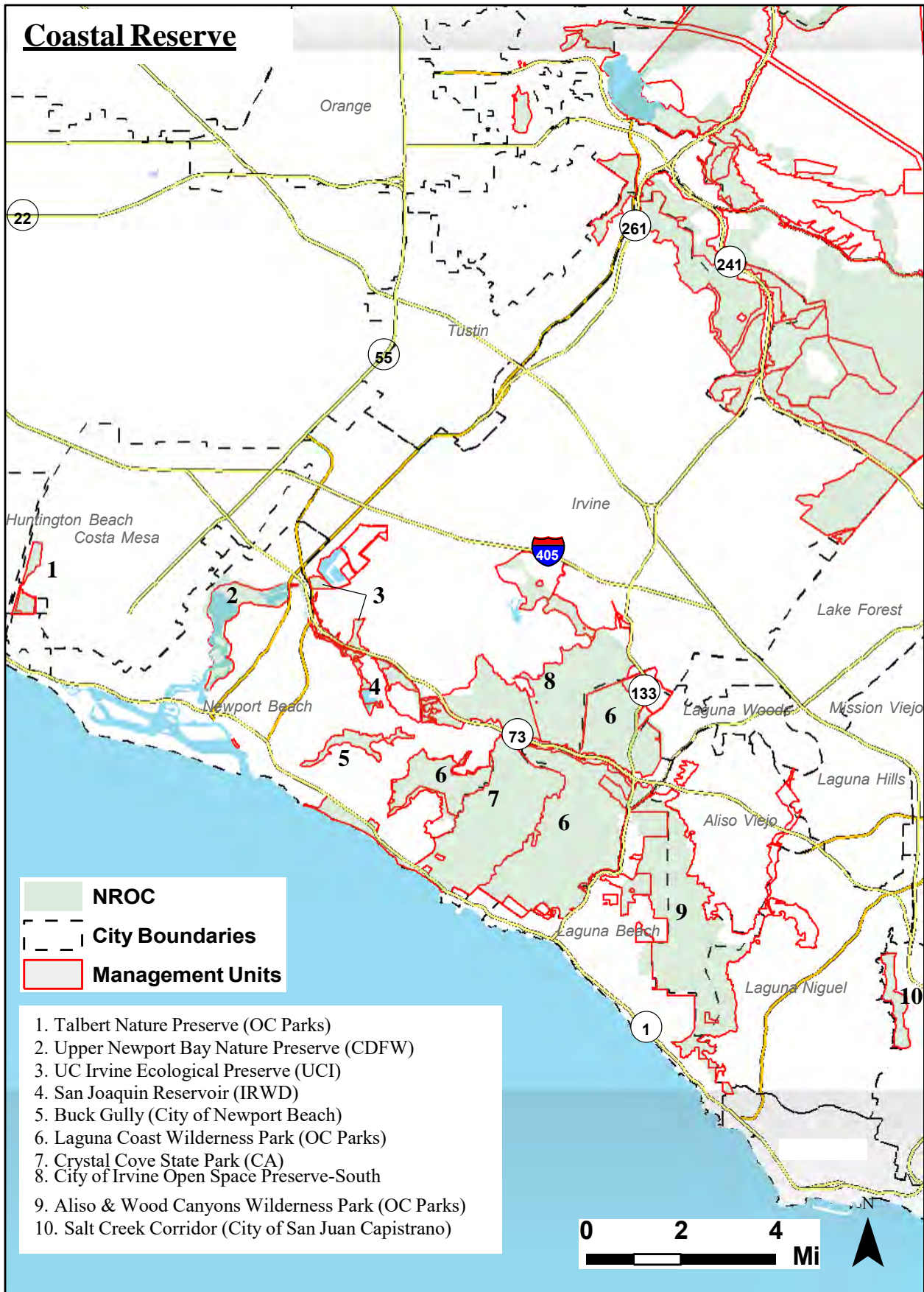
Two maps of the Reserve system, Central and Coastal, and associated non-Reserve open space have been included in this annual report for easy reference.

# Central Reserve



- Legend**
- NROC
  - City Boundaries
  - Management Units**
  - 1. Santiago Oaks RP (OC Parks)
  - 2. Irvine Regional Park (OC Parks)
  - 3. Irvine Ranch Open Space
  - 4. Coal Canyon Ecological Reserve (CDFW)
  - 5. Peters Canyon RP (OC Parks)
  - 6. City of Irvine Open Space Preserve-North
  - 7. Bowerman Landfill (OC Waste and Recycling)
  - 8. Siphon Reservoir Preserve (IRWD)
  - 9. Whiting Ranch WP (OC Parks)
  - 10. Portola South (SRMA)

# Coastal Reserve



## 1.0 NCC ORGANIZATIONAL GOVERNANCE AND ANNUAL REPORT OVERVIEW

### 1.1 Board of Directors Milestones in 2017

#### March

- Board of Directors unanimously approved the NROC 2016 Annual Report and 2017 Work Plan for submission to the Wildlife Agencies.
- The tax returns for the October 1, 2015 through September 30, 2016, fiscal year were presented to and approved by the board.
- The Board of Directors voted to approve the following individuals to serve a two-year term as Public representatives to the NCC Board of Directors:

Name	NCC Board Position
Michael Recupero	Public At-Large Director: Business
Jerry A. King	Public At-Large Alternate: Business
Thomas Eastman	Public At-Large Director: Environment
Elisabeth Brown, PhD	Public At-Large Alternate: Environment
Mark Denny	Public At-Large Director: Recreation
Hallie Jones	Public At-Large Alternate: Recreation

- NCC relocated its business office to Irvine Ranch Historic Park (13042 Old Myford Road, Irvine, CA 92602) after more than a decade located in Irvine Ranch Water District Headquarters.
- NCC Board and staff will be assisting the Wildlife Agencies in updating current records and improving future habitat impacts accounting procedures.

#### June

- NCC Board of Directors approved the inclusion into the Reserve of Portola South—a 101 acre property formerly owned by Southern California Edison. The property is owned and managed by Southwest Resource Management Association (SRMA). The NCC Directors also approved to expand Board membership to include SRMA as an *Ex Officio* member.

#### September

- Board of Directors approved the 2017-18, fiscal year budget.
- NCC Board of Directors approved a Minor Amendment (MA 17-01) associated with the Orchard Hills Development which added an additional 1.48 acres to the Reserve.
- The Board of Directors for NCC and Orange County Parks Foundation approved a Memorandum of Agreement to improve efficiencies of their overlapping missions.



## **December**

- NCC Board of Directors approved a partnership with StreetLight Data, Inc., to explore the application of mobility data to better understand public use and recreation within the Reserve and its relation to natural resource protection.
- NCC Board of Directors approved a resolution to increase the In-Lieu Mitigation Fee from \$65,000 per acre to \$80,316.78 per acre for impacts to occupied coastal sage scrub outside of the Reserve. The resolution also requires the In-Lieu Mitigation Fee be reviewed annually and adjusted as necessary based on the Consumer Price Index released by the U.S. Department of Labor, Bureau of Labor Statistics.
- NCC Board of Directors approved the September 30, 2017, audited financials as presented by Windes, Inc.

## **2.0 NCC SCIENTIFIC PROGRAM STATUS AND WORK PLAN 2017-18**

### **2.1 Introduction**

The primary responsibility of NCC is to facilitate implementation of an effective management program that maintains the long term net habitat value of the coastal sage scrub habitat mosaic within the Central-Coastal Subregion. Through its biological monitoring and research program, NCC gathers key information on the status and trends of the biological resources and operation of natural systems found within the Reserve. Knowledge gained from these activities informs development of the Reserve's science-based management program implemented by the signatories of the NCCP/HCP, with support from NCC, in an adaptive framework.

Habitat restoration and enhancement is critical to maintaining and enhancing the long-term viability and function of the habitat within the Reserve, and serves a key role in the Reserve's management program. As defined by the NCCP/HCP, any activity designed to enhance existing biological functions, or restore biological functions that were present historically but no longer are present within the Reserve is treated as a restoration or enhancement activity. Traditionally, the focus of NCC's habitat restoration program has been on the restoration of the conditions that support the target species and habitat, however, the program has the flexibility to be expanded to include the enhancement or restoration of the full range of habitats included within the Reserve, as well as, the monitoring and associated adaptive management of ongoing operation and maintenance activities, public access and recreation uses, and fire management programs.

The Work Plan Table (Section 2.2) and accompanying Project Descriptions (Section 2.3) provide updates on the progress and accomplishments of twenty-eight projects sponsored by NCC during the 2017 calendar year. Six of these projects are complete and two have been postponed. All others are ongoing or new projects scheduled to be implemented in 2018. Project Descriptions were written to facilitate development of a project database that allows for the standardization of tracking project status, cost, matching contributions, landowner involvement, and accomplishments. In addition, the information provided in the summary table allows projects to be directly linked to project reports, GIS data, and contracts, as well as assigns projects to different program classes and areas, and by resource.

The total approved Work Program budget for FY 2017-18 is \$1,004,000. Consistent with the State's NCCP Program and NCC Strategic Plan, the budget for FY 2017-18 includes funding for multi-year science and land management initiatives developed to support a broad-based ecosystem approach to the protection and long-term management of biological diversity present within the Reserve. Multi-year initiatives are organized across the six focus areas of wildland fire, recreation, habitat restoration, invasive species, wildlife management, and biological monitoring.

Designed to address the critical issues and threats facing the Reserve identified through the Science Panel Workshop in 2013, multi-year initiatives build upon the existing knowledge-base of land managers, scientists, and resource professionals. Following discussions with members of the NCC Board, Technical Advisory Committee, key partners and stakeholders, the importance of identified multi-year initiatives was ultimately recognized and seconded by participants of the Science Integration Meeting hosted by NCC in early 2016.

Multi-year initiatives supported by the present-year budget include a number of resource management and monitoring activities in direct support of the mission of the Reserve. These include: a partnership among OC Parks, The Nature Conservancy, Irvine Ranch Conservancy, UC Riverside, UC Santa Cruz, and the California Department of Fish and Wildlife to develop informed management strategies to address invasive beetles threatening oak and riparian woodlands; partnership with UC Irvine on development of strategies for monitoring changes in the coastal sage scrub habitat mosaic and creation of dashboard metrics of relevance to partners, the public, and elected officials concerning the health of the Reserve; work with UC Los Angeles on the continued development of management strategies to improve breeding opportunities for the western spadefoot; and partner-supported, repeat, region-wide surveys for the Cactus Wren.

The budget continues to support empowerment of the Core Management Team, made-up of resource professionals from Irvine Ranch Conservancy, OC Parks, and State Parks, as they direct implementation of a coordinated, unified approach to the management of invasive plants first described and adopted by the Back Country Council in 2013 and most recently advanced by the California Invasive Plant Council under contract with NCC. The budget allows for the continued identification and prioritization of habitat restoration needs and opportunities across the Reserve as NCC contractors update the Habitat Restoration and Enhancement Plan for the Reserve scheduled to be completed in the fall of 2018. With respect to recreation management, the budget allows NCC staff to continue to engage national leaders in the field of recreation ecology from Utah State University and Oregon State University to work with OC Parks, State Parks, and other partners on development of a long-term recreation management plan for the Reserve, providing the much needed balance between human-use and resource protection within the Reserve.

Lastly, following approval of the Wildland Fire Management Plan, the new budget affords NCC staff the opportunity to implement key elements of the plan over the next couple of years. Such elements include limiting fire spread and rates of ignitions along the wildland-urban interface and roadsides, implementing the Fuel Management Standards, and other fire management activities associated with natural resource protection. Considering that some of these elements fall outside of the Reserve, progress will require partner and contractor-based training, and establishment of new partnerships with other agencies, such as Caltrans, through implementation of priority initiatives identified by the COAST working group and the county-wide Community Wildfire Protection Plan.

In summary, the concentrated effort to develop multi-year initiatives of relevance to the long-term management needs of the Reserve has been more than five years in the making. From meeting minutes to communications with the Board, workshop reports to programmatic elements memorialized in the NROC Annual Report, all relevant information shared during this process is now archived on the NCC Website. Multi-year initiatives supported by the budget reach further than previously funded activities as they create a partner-based collaborative supporting science-based decision making and novel communication processes. Through implementation of the initiatives identified in the new fiscal budget, a foundation is set in place providing stability in terms of the direction of the science program and partners with access to a diverse and talented team of natural resource management professionals and scientists working on focus areas of highest priority to the Reserve.

2.2 2017-2018 NCC Work Plan Table

	Project Name	Project Status†	Project Progression*	Fund**	Matching Funds Secured	2016-17	2017-18	Orange County Parks	Orange County Waste and Recycling	City of Irvine	Crystal Cove State Park	CA Dept. of Fish and Wildlife	City of Newport Beach	University of California, Irvine	Irvine Ranch Water District	Transportation Corridor Agencies	The Irvine Company	Metropolitan Water District
1	Rare Plant Monitoring & Mgmt	O		R		\$90,000	--	X	X	X	X	X	X	X	X	X	X	X
2	Cactus Scrub UCI Rest/Measure M	O		R	Y	--	--							X				
3	Cactus Salvage/Lake Forest	C		R		--	--	X			X							
4	IRC Cactus Wren Link/USDA	C		R	Y	--	--			X								
5	Invasive Plant Program Mgmt	O		R		\$30,000	\$45,000	X		X	X	X	X	X				
6	Invasive Plant Control	O		R		\$85,000	\$155,000	X		X	X	X	X	X				
7	Cowbird Trapping	O		C		\$70,000	\$40,000	X		X	X				X			
8	Mountain Lion Project	O		E		\$10,000	\$10,000	X	X	X		X			X	X	X	
9	NCC Database Mgmt	O		E		--	--	X	X	X	X	X	X	X	X	X	X	X
10	OC RESTORE	O		R/E	Y	--	\$20,000	X	X	X	X	X	X	X	X	X	X	X
11	Weed Prioritization/EDRR	O		R		\$60,000	--	X	X	X	X	X	X	X	X	X	X	X
12	Target Bird Monitoring	O		E	Y	\$30,000	\$175,000	X	X	X	X	X	X	X	X	X	X	X
13	Wildlife Mgmt Scoping/BioBlitz	C		R	Y	\$20,000	--	X	X	X	X	X	X	X	X	X	X	X
14	Adaptive Recreation Mgmt	C		R	Y	--	--	X		X	X	X	X	X		X	X	
15	HREP Update	O		R		\$100,000	\$100,000	X	X	X	X	X	X	X	X	X	X	X
16	Cactus Salvage Portola/Orchard Hills	O		R		\$160,000	\$110,000	X		X	X						X	
17	Land Manager Training	C		R		\$15,000	--	X	X	X	X	X	X	X	X	X	X	X
18	Western Spadefoot Mgmt	O		R		--	--	X	X	X	X	X	X	X	X	X	X	X
19	Aerial Weed Survey/Central	C		R	Y	\$60,000	--	X	X	X		X			X	X	X	

	Project Name	Project Statust	Project Progression*	Fund**	Matching Funds Secured	2016-17	2017-18	Orange County Parks	Orange County Waste and Recycling	City of Irvine	Crystal Cove State Park	CA Dept. of Fish and Wildlife	City of Newport Beach	University of California, Irvine	Irvine Ranch Water District	Transportation Corridor Agencies	The Irvine Company	Metropolitan Water District
20	Reserve Photo Archive	P		E		\$25,000	--	X	X	X	X	X	X	X	X	X	X	X
21	BMPs/Trail Maintenance	P		R		--	--	X		X	X	X	X	X		X	X	
22	Rec Mgmt & Human Valuation	O		R		\$175,000	\$175,000	X		X	X	X	X	X		X	X	
23	Bio Monitoring & Communication	O		E	Y	\$200,000	--	X	X	X	X	X	X	X	X	X	X	X
24	SHB Mgmt & Monitoring	O		R	Y	\$55,000	\$55,000	X	X	X	X	X	X	X	X	X	X	X
25	Fuel Mod Field Tour	N		R		--	\$15,000	X		X	X	X	X	X			X	
26	NDVI Fuels Map	N		E		--	\$25,000	X	X	X	X	X	X	X	X	X	X	X
27	UCI EP Fuel Mod	N		R		--	\$24,000							X				
28	Canyon Fires Rare Plant Survey	N		R		--	\$55,000	X				X						
					Endowment:	\$225,000	\$220,000											
					Restoration:	\$890,000	\$744,000											
					Cowbird:	\$70,000	\$40,000											
					<b>Total:</b>	<b>\$1,185,000</b>	<b>\$1,004,000</b>											

\* Green = Project is on or ahead of schedule; Yellow = Project requires additional attention by NCC staff and/or contractors; Red = Project requires substantial attention by NCC staff and/or contractors, project is in jeopardy of not progressing; White = Project is approved, but not initiated

\*\* R = Restoration & Acquisition Fund; E = Endowment Fund; C = Cowbird Fund

† C = Complete; O = Ongoing; N = New; P = Postponed

## 2.3 Project Descriptions

### List of Acronyms

AIS = Aerial Information Systems  
BMPs = Best Management Practices  
CCSP = Crystal Cove State Park  
CDFW = California Department of Fish and Wildlife  
CEB = Center for Environmental Biology  
CNB = City of Newport Beach  
CNPS = California Native Plant Society  
COAST = County of Orange Area Safety Taskforce  
COI = City of Irvine  
EEMP = Environmental Enhancement Management Program  
HCP = Habitat Conservation Plan  
HREP = Habitat Restoration and Enhancement Plan  
IRC = Irvine Ranch Conservancy  
IRWD = Irvine Ranch Water District  
LAG = Local Assistance Grant  
LCF = Laguna Canyon Foundation  
LCWP = Laguna Coast Wilderness Park  
MOU = Memorandum of Understanding  
MWD = Metropolitan Water District  
NCC = Natural Communities Coalition  
NCCP = Natural Community Conservation Plan  
NROC = Nature Reserve of Orange County  
OCFA = Orange County Fire Authority  
OCIM = Orange County Invasive Management  
OCP = Orange County Parks  
OCWR = Orange County Waste and Recycling  
SDMMP = San Diego Management and Monitoring Program  
TAC = Technical Advisory Committee  
TCA = Transportation Corridor Agencies  
TIC = The Irvine Company  
TNC = The Nature Conservancy  
UCI = University of California, Irvine  
UCLA = University of California, Los Angeles  
UCR = University of California, Riverside  
UNB = Upper Newport Bay  
USDA = US Department of Agriculture  
USFWS = US Fish and Wildlife Service  
USGS = US Geological Survey  
VegCAMP = Vegetation Classification and Mapping Program  
WCS = Wildlands Conservation Science

## Reporting Template for NCCP-related Science and Land Management Projects

Project ID	NCC assigned unique project identification number (allows project-specific information to be linked to project reports and data)
Project Title	Abbreviated project title limited to 100 characters
Contractor(s)/Researcher	Contractors or researchers associated with the project
Time Period	Years project has been active
Total Project Cost	Total project cost in dollars and/or staff hours
Amount Budgeted	Dollars and/or hours spent or budgeted by calendar year
Fund	Endowment, Restoration, or Cowbird Funds (NCC-specific category)
Matching Contribution(s)	Agency (Dollar Amount)
Landowner Involvement	Landowners whose land is accessed for purposes of conducting the project
Project Status	Project may be Complete, Ongoing, or New
Project Progression	Project is on or ahead of schedule (Green), Project requires additional attention by staff and/or contractors (Yellow), Project requires substantial attention by staff and/or contractors, project is in jeopardy of not progressing (Red), Project is approved, but not initiated (White)
Program Class	Identify program class from the following categories: Monitoring/Research, Land Management, Planning, Education/Training, Database Management
Program Area	Identify program area from the following categories: Wildland Fire, Weed Control, Habitat Restoration, Recreation, Sensitive Biological Resources, Invasive Wildlife Control
Resource	Natural resource benefiting from project implementation
Project Purpose	Brief description limited to 50 words
Available Report(s)	Project reports associated with the project (project description linked to associated reports in online library through the unique project ID)
Available GIS Product(s)	GIS data associated with the project (project description linked to associated GIS files in online library through the unique project ID)
Overview	Project background limited to 1000 words (static between years)
Progress	Progress made to date (includes a description of past-year activities as well as activities to be achieved in the new calendar year)
Key Milestones Schedule	Project milestones (with due dates identified): Date milestone achieved
Key Findings	Updated each year as applicable
Notes	Updated each year as applicable

## 1. Rare Plant Monitoring & Mgmt

Project ID	XXXX-XX
Project Title	Rare Plant Monitoring & Mgmt
Contractor(s)/Researcher	UC Irvine
Time Period	2013-2018
Total Project Cost	\$150,000
Amount Budgeted	\$90,000 (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	Requires additional attention by NCC staff and/or contractors
Program Class	Monitoring/Research
Program Area	Sensitive Biological Resources
Resource	Rare Plants
Project Purpose	Inventory, map, and monitor the distribution of rare plants, describe stressors and threats to individual species, and identify and implement management measures
Available Report(s)	--
Available GIS Product(s)	--

### *Overview*

NCC has agreed to partner with UC Irvine's Center for Environmental Biology (CEB) to create and support a multi-year post-doctoral research position at the University for the purpose of addressing the development and implementation of the inventory and analysis phase of NCC's Rare Plant Monitoring and Management Program. Through the position, the researcher would work on issues related to vegetation change and dynamics in the Reserve with emphasis on the compilation and analysis of rare plant abundance, distribution, and dynamics. The long-term goal of this project is to produce decision tools (such as a distribution model) that guide cost-efficient, standardized monitoring by technical stakeholders to understand the state of rare biological diversity in the Reserve, along with conservation, restoration, and mitigation activities of land managers.

### *Progress*

As of January 2014, a post-doctoral scholar was hired by the University to work on the project for a 12 to 24-month period. NCC staff, working with the University developed a tentative project scope and deliverables for inclusion in a future agreement with the University. In February 2014, a data arrangement between the University and NCC was agreed to by representatives from both institutions and development of an aggregate rare plant geodatabase for the Subregion was initiated.

In February 2015, a multi-year scope of work was developed by UCI and provided to NCC for review and comment. Working with the Director of Sponsored Projects, from the UCI Office of Research, an agreement between the University and NCC for the first phase of the project was



completed in June 2015. Through discussions between the University and NCC, the project became a vehicle to operationalize a Master Agreement between NCC and UCI, covering all relevant future science-based collaborations between the two organizations.

In 2016, an updated Research Specific Agreement was developed by CEB and provided to the Technical Advisory Committee for review and comment. The document describes the updated activities and deliverables associated with year-two of the collaborative project to be undertaken in 2017. Strategic areas of effort addressed by the project include: database development; database application; monitoring, planning, reporting; and data needs and threat assessment.

In 2017, CEB reorganized staff responsibilities in support of the project and made recommendations for modifications to the previously agreed upon task list and accompanying deliverables, recommending a shift from a finite project schedule to a longer-term monitoring approach. Conversations between CEB and NCC staff on this topic are expected to continue through 2018.

With regards to deliverables and action items completed in 2017, CEB staff coordinated technician training and data assessment with recent field surveys conducted by Fred Roberts at Crystal Cove State Park. As part of this effort, data collected at CCSP in 2016 and 2017 was used to assess data gaps and quality of information contained in the larger regional database, with the intention of the new data being integrated into the larger database in 2018. In December, 2017, CEB hosted a meeting to get feedback from stakeholders concerning work completed to date by the Center on database management and distributional modeling. At the meeting, Hailey Laskey, a graduate student in the University's Masters in Conservation and Restoration Science program, shared visualization aids and logic constructs developed from the now compiled database to assist with decision-making and species prioritization. During the meeting, stakeholders provided input with regards to the process underlying the distributional modeling (through environmental correlates and niche documentation) and degree visualizations could assist in the decision-making process surrounding prioritization, monitoring, and management.

Additional field training and data assessment is planned for 2018 working with regional experts conducting surveys in areas impacted by recent fires in the inland portion of the Subregion. Field teams from CEB are planning to expand data collection efforts at inland sites, linking rare plant surveys with existing, long-term vegetation monitoring sites. Lastly, a prioritization meeting with members of the Technical Advisory Committee and stakeholders is planned for early 2018 to discuss and identify the highest priority rare plant species and future survey areas with the purpose of guiding near-term monitoring, management and science activities tied to rare plants.

### *Key Milestones*

1. Data Entry and Compilation (Due: 30 June 2016): *Completed on schedule*
2. Data Collection Guidelines (Due: 30 June 2016): *Completed on schedule*
3. Database Interoperability (Due: 30 June 2017): *In progress*
4. Database Refinement (Due: 31 December 2017): *In progress*
5. Preliminary Alliance Relationships (Due: 31 December 2017): *In progress*

6. Distributional Modeling and Prioritization of Management Activities (Due: 31 December 2017): *Postponed until March, 2018*
7. Initial Field Surveys (Due: 31 March 2017): *Coordinated with Fred Roberts in 2017 at Crystal Cove State Park*
8. Annual Progress Report and Downscaled Database Refinement (Due: 31 December 2017): *Postponed until March, 2018*
9. Development of Derived Monitoring Schemes (Due: 31 December 2017): *Postponed until March, 2018*
10. Development of a Reporting and Synthesizing Activities Assessment (Due: 31 December 2017): *Postponed until March, 2018*
11. Viability Analysis and Scenario Development (Due: 31 December 2018)
12. Development of Plans to Anticipate Evolving Data Use (Due: 31 December 2018)

### *Key Findings*

Key findings are not available at this time, as project is still in progress. Initial findings are due to be made available in March 2018, following delivery of the first annual progress report for the project.

### *Notes*

A total of \$121,000 in NCC funds is temporarily restricted for the development of a rare plant management and monitoring plan and initial implementation of identified management strategies. The \$60,000 in funding allocated by the NCC Board in 2013 was rolled forward to the FY 2015-16, in anticipation of an agreement getting being executed in spring of 2016. The earmarked funding was to complete the first phase of program development. In September 2016, the NCC Board approved an additional \$90,000 in funding to support advancement of the program through the end of 2017.

## **2. Cactus Scrub UCI Rest/Measure M**

Project ID	XXXX-XX
Project Title	Cactus Scrub UCI Rest/Measure M
Contractor(s)/Researcher	Land IQ; Nakae & Associates
Time Period	2011-2018
Total Project Cost	\$368,900
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	OCTA (\$359,400)
Landowner Involvement	UCI
Project Status	Ongoing
Project Progression	On schedule
Program Class	Land Management
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Restoration of 8.5 acres of coastal cactus scrub at UC Irvine Ecological Preserve

Available Report(s)	<i>2017 Performance Monitoring Report Year 5 – Measure M Cactus Scrub Restoration for the University of California Irvine Ecological Preserve. Prepared for Natural Communities Coalition. Prepared by Land IQ. Jun., 2017.</i>
Available GIS Product(s)	--

### Overview

The Measure M Cactus Scrub Restoration Project is funded under the Orange County Transportation Authority (OCTA) Measure M environmental mitigation program. This project involves the restoration of approximately 8.5 acres of highly disturbed and non-native grassland habitat to coastal cactus scrub within the University of California Irvine (UCI) Ecological Preserve. The \$359,000 Measure M grant awarded to NCC runs through 2018.

### Progress

The project is considered to be progressing on schedule and nearing completion. The 8.5 acres of cactus scrub restoration was initiated in late 2011 with seeding occurring in late 2012. The Measure M restoration combined with the EEMP cactus scrub restoration totals 12.5 acres of cactus scrub restoration at the UCI Ecological Preserve less than six years old. The Measure M site has performed well over the last 72+ months and is regularly visited by the two target bird species, Cactus Wren and California Gnatcatcher.

Prior to seeding, the site showed some natural recruitment from the soil seed bank, including, California sagebrush (*Artemisia californica*), doveweed (*Croton setigerus*), fascicled tarplant (*Deinandra fasciculata*), twiggy wreath plant (*Stephanomeria virgata*), and needlegrass (*Nassella* sp.).

In 2015, site maintenance consisted of primarily of hand-pulling non-native grasses and cutting localized patches of short-podded mustard and black mustard. Re-sprouting of fennel in the weed control area was cut and sprayed. In 2015, four gnatcatcher pairs and one cactus wren pair were observed within or in the vicinity of the UCI Measure M site.

In 2016, remedial actions, which included planting, watering, and weeding activities, were performed across an approximately one-acre area of the restoration site. Planting of approximately 300 rose pots of both sagebrush and bush sunflower occurred in January. Watering occurred at the time of planting and follow-up weeding and watering was performed later in the year. Remedial actions were recommended by Land IQ, as the one-acre area within the larger restoration site had a continual persistence of mustard following seeding and maintenance over the last 4 to 5 years.

In 2017, performance monitoring was conducting in April with quantitative evaluation of cactus growth and survivorship, plant cover, species diversity, and photo documentation. Results of the data in 2017 show survivorship of the planted cactus material and blue elderberry in the restoration to be at least 95 percent after the fifth year of establishment. Absolute cover for the restoration site was calculated to be 98.7 percent.

Exotic vegetation cover was 70.7 percent, mainly from annual grass cover, at 56.7 percent. Bare ground and plant litter comprised 10.3 percent.

In 2017, two Cactus Wren territories and six California Gnatcatcher territories, including at least four pairs of gnatcatchers, were recorded within the UCI Preserve. Casual observations made during vegetation monitoring conducted in 2017 show both species used the restoration site for foraging.

The Measure M restoration site is developing within reasonable expectations for native plant growth, cover and species distribution especially after considering the historic drought conditions from 2011 through 2016. With above normal rainfall in late 2016 through early 2017, native vegetation cover increased substantially in 2017 along with non-native annual grasses, largely *Bromus madritensis* and *Festuca myuros*. The site is expected to continue develop without the need for further maintenance. Qualitative monitoring of the Measure M funded restoration project is scheduled to occur in 2018.

### *Key Milestones*

1. FINAL Habitat Restoration Plan (Due: 31 December 2010): *Finalized on 2 December 2010*
2. Initial Field Surveys (Due: 30 November 2011): *Site surveys completed in spring and fall of 2011*
3. Site Preparation (Due: 30 November 2011): *Site preparation completed in October 2011*
4. Phase I: Site Installation (Due: 31 December 2011): *Cactus material and container plants installed in November 2011*
5. Phase II: Site Installation (Due: 31 December 2012): *Seed application completed in October 2012*
6. First Annual Site Maintenance (Due: 31 December 2012): *Completed on schedule*
7. Annual Progress Report (Due: 31 December 2012): *Completed on 28 September 2012*
8. Second Annual Site Maintenance (Due: 31 December 2012): *Completed on schedule*
9. Year 1 – Annual Performance Monitoring Report (Due: 31 December 2013): *Completed on 30 November 2013*
10. Third Annual Site Maintenance (Due: 31 December 2014): *Completed by September 2014*
11. Fourth Annual Site Maintenance (Due: 31 December 2015): *Completed by May 2015*
12. Year 2 – Annual Performance Monitoring Report (Due: 31 December 2014): *Completed in October 2014*
13. Year 3 – Annual Performance Monitoring Report (Due: 31 December 2015): *Completed in December 2015*
14. Year 4 – Annual Performance Monitoring Report (Due: 31 December 2016): *Completed in September 2016*
15. FINAL Performance Monitoring Report (Due: 30 June 2017): *Completed in June 2017*
16. Performance Standards Achieved (Due: 30 June 2017): *Site achieved performance standards for total native plant cover, native functional groups, and overall survivorship of the planted cactus material in April 2017*

17. Performance Monitoring Memo Addressing Native and Non-Native Vegetation Cover  
(Due: 30 June 2018):

*Key Findings*

Although the project is still considered to be in progress, quantitative monitoring took place in spring of 2017 allowing for evaluation of the restoration site and assessment of the functions and values of the cactus restoration five full-years after installation.

Overall, survivorship of the planted cactus and container species (blue elderberry) was greater than 95%. Changes in cactus height were greatest for cacti planted as individual pads, which increased in average height from 37 cm to 59 cm between 2015 and 2017. Planted segments averaged a height of 63 cm and planted clumps averaged a height of 79 cm in 2017. The mean number of total cladodes for planted pads over the restoration areas was 47. As the installed pad material consisted of a single pad in 2011, the change in numbers demonstrates exceptional growth.

Native shrub cover was 53% and native herbaceous cover was 30% achieving the performance standard of an average of 75% native plant cover. Thirty-nine native shrub, herbaceous, and cactus species were detected in 2017, up from 24 noted in 2013. Flowering and seed production of native species was observed across the restoration site including the planted elderberry.

The increase in absolute cover of non-native vegetation between 2015 (17%) and 2017 (71%) was attributed to the large volume precipitation that fell as early winter rains in late 2016. Non-native annual grass cover is expected to decrease without additional maintenance, while native shrub and cactus cover continues to increase in subsequent years as drier conditions again prevail for the region.

The Measure M restoration site has achieved the objectives of the project based on the monitoring results. The cactus scrub restoration is developing within reasonable expectations for native plant growth, cover and species distribution, especially considering the historic five-year drought conditions experienced during plant establishment from 2011 through 2016. The site is being used by the California Gnatcatcher and Cactus Wren for foraging, and at least once for nesting in the past three years. The restoration site not only supports establishment of native species from original planted and seeded material but demonstrates recruitment of local native species. Flowering and seed production of native species and the presence of juvenile plants that have germinated in the current growing season demonstrate the vegetation is capable of contributing native cover to the site, which is an indication of establishment and sustainability of the cactus scrub community.

While the restoration site at this time does not yet compare to mature cactus scrub in terms of cactus cover, it still provides potential habitat for sensitive avian species. As the restoration site continues to develop, changes over time in the growth and cover of cactus and native shrubs will provide high quality habitat for the Cactus Wren and California Gnatcatcher over 8.5 acres within the UCI Preserve.

## Notes

In 2014, the project restoration ecologist, Margot Griswold (of Land IQ), requested an additional year of site maintenance to be implemented by Nakae at an additional cost of \$34,400. Continuing site maintenance during the initial establishment of the target native seeded species (beyond the two-years afforded by the current contract with OCTA) was considered important as the aggressive exotic species still present on the site compete with the slower growing native shrub and perennial grasses for light, water, and nutrients during the establishment period. Although the cactus scrub restoration was developing within an expected range for plant, cover and species distribution at the time of the request, the drought conditions persistent within the region beginning in 2011 (and lasting into to the winter of 2016/17), exacerbated the competitive effect of exotic species.

In May of 2017, the OCTA Environmental Oversight Committee, which includes representatives of the California Department of Wildlife and the U.S. Fish and Wildlife Service, participated on a tour of the Measure M site. Sign-off by the Wildlife Agencies on the mitigation funded by OCTA is expected to occur before 30 June 2019.

### 3. Cactus Salvage/Lake Forest

Project ID	XXXX-XX
Project Title	Cactus Salvage/Lake Forest
Contractor(s)/Researcher	Land IQ; Nakae & Associates
Time Period	2011-2017
Total Project Cost	\$353,200
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, CCSP
Project Status	Complete
Project Progression	On schedule
Program Class	Land Management
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Restoration of 7.0 acres of cactus scrub at Crystal Cove State Park, Whiting Ranch Wilderness Park, and Laguna Canyon Wilderness Park
Available Report(s)	<i>2017 Performance Monitoring Report Year 5 – City of Lake Forest Cactus Salvage, Relocation, and Cactus Scrub Restoration Project. Prepared for Natural Communities Coalition. Prepared by Land IQ. Nov., 2017.</i>
Available GIS Product(s)	--

#### Overview

The Lake Forest project involves cactus and topsoil salvage from the City of Lake Forest Sports Park and Recreation Center site near Glass Creek, at the intersection of Portola Parkway and El Toro Road.

Cactus salvaged from the site was transported to three locations within the NCCP-Reserve to actively restore a total of seven acres of disturbed and non-native grassland habitats to coastal cactus scrub at Whiting Ranch Wilderness Park (four acres), Crystal Cove State Park (two acres), and Laguna Coast Wilderness Park (one acre). Topsoil was delivered and spread at the Whiting Ranch restoration sites. Additionally, as part of the project, 14,700 cactus pads and 700 non-rooted 'segments' were salvaged and transported to land managers at 14 sites in Orange County.

### *Progress*

The City of Lake Forest cactus scrub restoration is considered to be complete. Performance monitoring was conducted in March and April of 2017 at all three restoration sites for the fifth year following site preparation and spreading of 3,250 cubic yards of topsoil at Whiting Ranch in December, 2011, completion of site preparation and installation of cactus at all three sites by the end of January, 2012, and seeding of Crystal Cove and Laguna Coast sites in the fall 2012.

Targeted herbicide treatment was conducted at all three sites in 2012. Hand-weeding of the three sites occurred in 2012, 2013, and 2014. Through 2015, survival of planted cactus material was estimated to be 90 to 95 percent across all sites after three years of establishment. Site maintenance of the restoration site in 2015 consisted of weeding activities in April 2015. Weeding consisted primarily of hand-pulling of non-native grasses and mustard species. Few exotic species were observed during monitoring visits. No weeding occurred at the Crystal Cove, Laguna Coast, or Whiting Ranch restoration sites in 2016 or 2017.

Performance monitoring in 2017, consisted of quantitative plant cover, species abundance, shrub/tree height, qualitative evaluation of cactus growth and survivorship, and photo documentation. Survivorship of the planted cactus material was visually assessed and estimated and a species list was generated for each of the restoration sites and enhancement areas.

At the end of five years, all three sites are developing within reasonable expectations for plant growth, cover and species distribution. Monitoring results from 2017 show native plant cover exceeded the performance standard at all three sites. Crystal Cove and Whiting Ranch have met the targets for native functional groups. Laguna Coast has meet the target for cover of native herbaceous species. The planted cactus material has tripled in cover after five years and exhibits new growth, flowering, and fruiting at all three sites. Flowering, seed production, and the presence of juvenile plants of native species that germinated in the current growing season shows the vegetation is capable of reseeding the sites, which is an indication of a trend toward establishment and sustainability of the cactus scrub community.

### *Key Milestones*

1. Initial Field Surveys (Due: 30 November 2011): *Site surveys completed in spring and fall of 2011*
2. FINAL Habitat Restoration Plan (Due: 31 December 2011): *Finalized on 28 February 2012*
3. Site Preparation (Due: 31 December 2011): *Site preparation completed by January 2012*

4. Phase I: Site Installation (Due: 31 December 2011): *Cactus material and topsoil installed by January 2012*
5. Deliver of Cactus Material (Due: 31 December 2011): *Cactus material delivered to 14 project partners by 31 December 2012*
6. Phase II: Site Installation (Due: 31 December 2012): *Seed application completed by 7 December 2012*
7. First Annual Site Maintenance (Due: 31 December 2012): *Completed on schedule*
8. Annual Progress Report (Due: 31 December 2012): *Completed on 17 September 2012*
9. Second Annual Site Maintenance (Due: 31 December 2012): *Completed on schedule*
10. Year 1 – Annual Performance Monitoring Report (Due: 31 December 2013): *Completed on 30 November 2013*
11. Third Annual Site Maintenance (Due: 31 December 2014): *Completed on schedule*
12. Year 2 – Annual Performance Monitoring Report (Due: 31 December 2014): *Completed in November 2014*
13. Third Annual Site Maintenance (Due: 31 December 2015): *Completed on schedule*
14. Year 3 – Annual Performance Monitoring Report (Due: 31 December 2015): *Completed in December 2015*
15. Year 4 – Annual Performance Monitoring Report (Due: 31 December 2016): *Completed in November 2016*
16. FINAL Performance Monitoring Report (Due: 30 June 2017): *Completed in November 2017*
17. Performance Standards Achieved (Due: 30 June 2017): *As of April 2017 all three restoration sites met their performance standard for growth and survivorship of transplanted cactus, and native plant cover; Crystal Cove and Whiting Ranch met their targets for native functional groups, Laguna Coast met the standard for native herbaceous cover; Crystal Cove met the standard for cover of exotic plant species*

### *Key Findings*

All three of the restoration sites are developing within an expected range of growth and are on track towards the development of cactus scrub habitat providing habitat for the Cactus Wren and California Gnatcatcher.

In 2017, survivorship of planted cactus material at all three sites was estimated to be 90 to 95 percent after five years of establishment. Planted cactus material exhibited new growth and was observed to be in flower and fruiting in all three restoration sites. Flowering and seed production of native species was also observed at all three sites, which is an indication of a trend toward establishment and sustainability of the cactus scrub community.

At the Crystal Cove restoration site, total combined absolute cover of native vegetation was calculated to be 115 percent in the spring of 2017, up from 59 percent in 2015. Absolute cover of cactus species was 15 percent, up from 7 percent in 2015. Total combined exotic cover was 5 percent, consistent with numbers from 2015. Bare ground and plant litter cover equaled 11 percent, down from 44 percent in 2015. Mean height of the clumps of *Opuntia littoralis* and *Cylindropuntia prolifera* were 119 cm and 153 cm, respectively.



At the Laguna Coast Wilderness Park site, total absolute cover of native vegetation was 95 percent in 2017, up from 48 percent in 2015. Cactus cover was 17 percent of total native cover, up from 5 percent in 2015. Total exotic vegetation cover was 44 percent (up from cover values of 14 percent in 2015) and made up largely of *Schismus barbatus*, the Mediterranean annual grass, and *Bromus madritensis*. Bare ground and plant litter made up 10 percent. Mean height of the clumps of *Opuntia littoralis* and *Cylindropuntia prolifera* were 142 cm and 207 cm, respectively.

At the Whiting Ranch restoration site, native vegetation was calculated to be 122 percent, more than double from cover value measure in 2015 (60 percent). Total cactus cover was 17 percent of total native cover. Total exotic vegetation cover was 38 percent in 2017, down from 2015 (49 percent) and largely made-up by Mediterranean annual grass. Cover of bare ground and plant litter comprised 7 percent of the restoration site and was down from 2015 (18 percent). Mean height of clumps of *Opuntia littoralis* and *Cylindropuntia prolifera* were 130 cm and 150 cm, respectively.

At Crystal Cove State Park, a qualitative assessment of the two acres of coastal sage scrub enhancement areas adjacent to the existing cactus scrub restoration sites was performed in 2017. A total of 31 native plant species and 9 non-native herbaceous species were noted through the enhancement areas. Estimated combined cover of native vegetation was 45 to 50 percent, up from 20 to 25 percent in 2015. Exotic vegetation was an estimated combined 50 to 55 percent, up from 35 to 40 percent in 2015. Dominant native shrubs across the two acres include, California sagebrush, coyote brush, and coastal goldenbush. Wire lettuce and Menzie’s fiddleneck were the dominate native herbaceous species.

*Notes*

Development of a two-acre habitat enhancement project at Crystal Cove State Park complementing the existing two-acre cactus scrub restoration at Crystal Cove was initiated in 2013. The project was considered to be complete in 2016. Continued monitoring of the site in 2017 was made possible by Land IQ’s willingness to fold monitoring of the two-acre area into their work plan for monitoring the neighboring Cactus Salvage/Lake Forest restoration site.

**4. IRC Cactus Wren Link/USDA**

Project ID	XXXX-XX
Project Title	IRC Cactus Wren Link/USDA
Contractor(s)/Researcher	Irvine Ranch Conservancy (IRC)
Time Period	2012-2017
Total Project Cost	\$24,300
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	USDA (\$8,100)
Landowner Involvement	COI
Project Status	Complete
Project Progression	On schedule
Program Class	Land Management
Program Area	Habitat Restoration

Resource	Coastal Sage Scrub
Project Purpose	Restoration of 2.3 acres of coastal cactus scrub to complement existing cactus scrub linkage restoration projects in North Laguna Canyon
Available Report(s)	--
Available GIS Product(s)	--

### Overview

Social choice experiments implemented in 2012 as part of the US Department of Agriculture (USDA) Grant with UC Berkeley provided for restoration of a two-acre cactus scrub habitat at a site in the City of Irvine Open Space South. The restoration project complements ongoing efforts by NCC and IRC to restore a Cactus Wren habitat linkage in North Laguna Canyon. Specifically, the project extends the northern-most linkage sites chosen to connect patches of cactus in a line-of-site arrangement in an effort to enhance movement opportunities for the Cactus Wren through the Canyon.

### Progress

The project is considered to be complete from the perspective of NCC. The specific restoration area was defined in spring of 2012 and site preparation was completed in the fall of 2012. Initial planting of cactus material and seeding of the site was completed by the close of 2013. In 2014, twelve large (two-meter tall) salvaged cholla were planted at the site to complement existing cactus plantings. Maintenance of the site, specifically, spot spraying of exotic annual grasses with low-dose herbicide occurred in both 2013 and 2014. Weeding activity, continued every 6 to 8 weeks in 2015 and then, as needed, in 2016 and 2017. An additional seeding event of native forb species occurred across 1.4-acres of the site in November, 2015.

At the close of 2017, the project was considered to be 90% complete as reported by the Irvine Ranch Conservancy. Site maintenance is expected to continue through the spring in 2018, involving mostly weed removal performed through monthly stewardship activities. By the close of 2018, following full project completion, the project is to be uploaded to OC RESTORE or the equivalent County-sponsored database of Subregion-specific active and historic habitat restoration projects.

### Key Milestones

1. FINAL Habitat Restoration Plan (Due: 31 December 2012): *Plan finalized in November 2012*
2. Initial Field Surveys (Due: 31 December 2012): *Site surveys completed in September and November 2012*
3. Site Preparation (Due: 1 March 2013): *Site preparation completed by January 2013*
4. Phase I: Site Installation (Due: 1 March 2013): *Cactus material installed in February 2013*
5. Phase II: Site Installation (Due: 31 December 2013): *Initial seed application completed by December 2013*
6. First Annual Site Maintenance (Due: 31 December 2013): *Completed on schedule*

7. Phase III: Site Installation (Due: 31 December 2014): *Completed in November 2015*
8. Second Annual Site Maintenance (Due: 31 December 2014): *Completed on schedule*
9. Third Annual Site Maintenance (Due: 31 December 2015): *Completed on schedule*
10. Fourth Annual Site Maintenance (Due: 31 December 2016): *Completed on schedule*
11. FINAL Performance Monitoring Report (Due: 31 December 2016): *Final project report has been postponed until a future time uncertain*

### Key Findings

The restoration site totals 2.3 acres in size and includes 0.7 acres of active coastal sage scrub restoration, 1.4 acres of native grass and forb restoration, and 0.2 acres of passive restoration following weed removal in existing grasslands. Monitoring results from 2017 reported over 50% native cover for the restoration site. Additionally, for the first time since project initiation in 2012, in 2017, Cactus Wrens were observed utilizing the restoration site, nesting in the transplanted cholla, and foraging under available shrub cover.

### Notes

A total of \$7,800 was required to allow the Irvine Ranch Conservancy to perform additional seeding and maintenance of the site through 2017. In-kind support is being provided for the project as part of IRC's volunteer stewardship program run through the City of Irvine Open Space.

## 5. Invasive Plant Program Mgmt

Project ID	XXXX-XX
Project Title	Invasive Plant Program Mgmt
Contractor(s)/Researcher	Harmsworth Associates; IRC; Hamilton Biological; Calflora
Time Period	2004-2018
Total Project Cost	\$518,000
Amount Budgeted	\$30,000 (2016-17); \$45,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, COI, CCSP, CNB, UCI
Project Status	Ongoing
Project Progression	On schedule
Program Class	Land Management
Program Area	Weed Control
Resource	Coastal Sage Scrub
Project Purpose	Management (i.e., mapping, coordination, and reporting) of NCC and partner-sponsored weed control activities on NCCP-enrolled lands
Available Report(s)	<i>Five-year Invasive Plant Management Plan for the Coastal Portion of the County of Orange Central &amp; Coastal Subregion NCCP/HCP. Prepared by California Invasive Plant Council. Jan., 2017.</i>  <i>2017 Early Detection/Rapid Response Survey Report Coastal Orange County NCCP Reserve. Prepared by Hamilton Biological. Dec., 2017.</i>

	<i>Calflora Weed Manager (<a href="http://www.calflora.org">www.calflora.org</a>)</i>
Available GIS Product(s)	--

### *Overview*

Implementation of NCC’s invasive plant control program requires multi-agency coordination and collaboration. Through the program, artichoke thistle and other invasive plant species have been controlled across thousands of acres of the NCCP-Reserve. Since the formal program was initiated in the year 2000, close to \$3.5M in funds have been spent on implementation of the program, resulting in the spot application of herbicide to thousands of individual plants and reducing the distribution of target invasive species (principally artichoke thistle) from thousands to hundreds of acres within the Coastal Reserve. With the formal program having been largely successful at accomplishing its principal goal of reducing the cover of artichoke thistle, NCC, together with partnering organizations, are redefining the goals of the program focusing on additional priority species and the creation of a new firewall to prevent the presence and establishment of problematic emergent species within the Reserve.

With the creation of the Core Management Team (CMT) in 2016, consisting of representatives from State Parks, OC Parks, and the Irvine Ranch Conservancy, coupled with advanced planning conducted under the guidance of the California Invasive Plant Council (Cal-IPC) since 2014, NCC is better positioned to facilitate Subregion-wide planning and implementation of the invasive plant program over the course of the next decade. To this end, NCC has contracted with the Cal-IPC to develop a coordinated, unified approach to prioritizing invasive plant control efforts across the NCCP-Reserve. The draft plan describes an overarching conceptual framework proposed for managing invasive plants in the Reserve, a five-year work plan for the Coastal Reserve, a five-year work plan for the Central Reserve (and adjoining conservation lands), and Early Detection/Rapid Response (EDRR) Structure. The overarching framework provides a foundation for transparent decision-making and assessment, and helps ensure coordination between land managers as they execute specific elements of the plan falling within their purview.

### *Progress*

The project is considered to be on schedule, albeit at the early stage in its evolution as it begins to execute the next generation of planning. The formal control program described in the Reserve’s Habitat Restoration and Enhancement Plan concluded in 2015, and in 2016, under the guidance of Cal-IPC and in collaboration with the Core Management Team, NCC facilitated creation of a new overarching five-year management plan for the coastal portion of the Subregion. Development of a similar overarching five-year management plan for the inland portion of the Subregion was initiated in 2017 and continues to develop in early 2018.

In support of advancing the initial planning efforts, Harmsworth conducted field surveys and prepared detail maps of the distribution of priority invasive plant populations for Irvine Regional Park, Peter’s Canyon, El Modena Open Space, and Upper Newport Bay Nature Preserve in 2015, and Santiago Oaks and Talbert Park in 2016.

Revisions to mapping efforts completed by Harmsworth between 2011 and 2015 were reviewed and amended as needed in 2016. To complement field surveys and existing spatial data on the distribution of invasive plants, aerial weed surveys were completed in 2014, 2016, and 2017, covering approximately 48,000 acres of conserved open space. Analysis of available spatial data was conducted by Cal-IPC in 2016 and 2017, in support of the over-arching planning work.

In 2016, Harmsworth was again tasked with managing NCC-sponsored control efforts in Laguna Coast Wilderness Park, UC Irvine, and El Toro, and assisting the County in managing County-sponsored control efforts within the Reserve at the additional NCCP-enrolled County Parks, specifically, Aliso & Wood Canyons Wilderness Park, Upper Newport Bay Nature Preserve, Talbert Regional Park, Santiago Oaks Wilderness Park, Irvine Regional Park, Peter's Canyon Regional Park, and Whiting Ranch Wilderness Park. Within these parks, all mapped veldt grass, garland chrysanthemum, and Sahara mustard, and areas with at least 10% cover of artichoke thistle were targeted for treatment in 2016. In 2016, as in 2014 and 2015, NCC reached an agreement with the Irvine Ranch Conservancy (IRC) to actively manage and coordinate NCC-sponsored weed control activities on the lands under their management, specifically, City of Irvine, City of Newport Beach, and Irvine Ranch Open Space.

In early 2017, Cal-IPC finalized a comprehensive five-year plan for the coastal portion of the County of Orange Central-Coastal Subregion NCCP/HCP. 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 plan. Together these provide detailed guidance and recommendations for land managers on the weed management priorities in specified management units. An over-arching five-year plan for the central (or inland) portion of the Subregion is in development and scheduled to be finalized at the close of spring 2018.

In 2017, members of the CMT began use of Calflora's Weed Manager to archive and report control and mapping activities across the lands under their management. Activities reported included the early detection surveys implemented by Hamilton Biological within the coastal portion of the Subregion and the associated control activities, funded by NCC, targeting discovered populations of emergent invasive species implemented by Henry DiRocco. By the close of 2017, each organization affiliated with the CMT had created their own group to organize activities under their management in one central place for purposes of reporting and sharing observations, treatment history and other program features with members, prior to making information associated with new records available to all Calflora users.

In 2018, members of the CMT will expand their individual organization's use of Calflora's Weed Manager, enlisting more staff and volunteers to use the phone-based application to record new observations and control work tied to new discoveries and ongoing management of known populations. Also in 2018, Hamilton Biological is expected to conduct, for the first-time ever, comprehensive early detection surveys for priority emergent species across much of the trail system covering the inland portion of the Subregion, surveying trails on both NCCP-Reserve and Conservation Easement Lands alike.

In 2018, Henry DiRocco, working through Sage Environmental Group, will continue to manage treatment of populations of emergent plant species discovered in 2017 in the coastal portion of the Subregion, while also making his crew available to treat newly discovered populations in the inland portion of the Subregion following the surveys to be performed by Hamilton Biological.

#### *Key Milestones*

1. Develop Field Schedule in Communication with CMT (Due: 1 March 2017): *Field schedule for fiscal-year field activities completed on schedule.*
2. Manage Invasive Plant Control Implementation (Due: 30 June 2017): *Management of invasive plant control activities funded by NCC completed by NCC staff in 2017*
3. Enter into an Agreement with Calflora (Due: 1 March 2017): *Agreement reached with Calflora in 2017*
4. Enter into a Contract with Biological Consultant to Conduct Surveys for Emergent Invasive Plants (Due: 1 March 2017): *Hamilton Biological was hired in March 2017*
5. Enter into a Contract with Invasive Plant Management Specialist to Work with OC Parks in 2017 and 2018 (Due: 1 March 2017): *Planned hiring of two natural resource managers in early 2018 by the County has made the need for a contracted specialist irrelevant*
6. Enter into an Agreement with IRC to Oversee and Implement Invasive Plant Control Activities for 2017 on Lands within their Responsibility (Due: 1 March 2017): *Additional funding in support of oversight responsibilities were deemed unnecessary in 2017*
7. Complete and Submit FINAL Report (Due: 31 December 2017): *FINAL report associated with Early Detection Surveys completed by Hamilton Biological in December 2017*

#### *Key Findings*

By the close of 2017, a total of three groups were formed under Calflora's Weed Manager (<http://www.calflora.org/entry/weed-mgr.html>) and populated with members for the Irvine Ranch Conservancy, California State Parks, and OC Parks. A total of 32 members were added under the Irvine Ranch Conservancy group and 1,345 records posted online and made publicly available through Calflora. Twenty members were listed under the California State Parks group with 169 records made publicly available. Thirteen members were listed under the group for OC Parks. At the close of 2017, Cal-IPC was actively uploading to Calflora baseline datasets (for the coast and inland portions of the Subregion) of known populations of invasive plants collected from partner datasets and as a result of the aerial surveys conducted in 2011, 2014, 2016, and 2017. Information on the number of acres of gross and infested areas, number of plants, cover value, and location and source accompany each record, when available.

An illustrated plant list of the priority one (to be eradicated Reserve-wide) and two (eradicate in certain watersheds) invasive plant species was posted by the Irvine Ranch Conservancy and is now available through Calflora ([http://www.calflora.org/app/ipl?list\\_id=px927](http://www.calflora.org/app/ipl?list_id=px927)). Conversations between Irvine Ranch Conservancy, Cal-IPC, and members of ONE TAM, the lands collaborative from Marin County, have advanced discussions among members of the CMT about reporting options and metrics used to communicate ongoing activities tied to invasive plant management.

In the spring and summer of 2017, Hamilton Biological conducted botanical surveys to detect and confirm new and existing populations of emergent invasive species within the coastal portion of the Subregion. The surveys, funded by NCC, and designed largely by the Core Management Team (Jutta Burger, Jennifer Naegele, and Lana Nguyen), were a first for the region. Performed across the entirety of the South Coast Wilderness (~18,000 acres), fieldwork resulted in approximately 200 miles of trails being surveyed on foot. A total of forty-four priority emergent weed species were detected accounting for close to 1,700 new records. All information associated with the finds were uploaded to Calflora's Weed Manager for sharing with the respective land manager and communication to the rapid response contractor under contract with NCC, Henry DiRocco.

### Notes

The initial estimated cost for managing NCC and County-sponsored weed control activities in 2017 was \$135,000, which was an increase from what was budgeted for management in the prior three years. One reason for the increased cost, is the program in 2017 was to include additional survey work for emergent invasive plant populations, funding support for use of Calflora's Weed Manager, and increased oversight responsibilities by IRC, and the third-party oversight contractor working with OC Parks. Ultimately, in 2017, both the increased oversight responsibilities by IRC and the third-party oversight contractor were deemed not necessary or impractical reducing the total expenditure for the year from the estimated amount to \$30,000.

## 6. Invasive Plant Control

Project ID	XXXX-XX
Project Title	Invasive Plant Control
Contractor(s)/Researcher	Nakae & Associates; Henry DiRocco; Laguna Canyon Foundation
Time Period	2000-2018
Total Project Cost	\$2,927,200
Amount Budgeted	\$85,000 (2016-17); \$155,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, COI, CCSP, CNB, UCI
Project Status	Ongoing
Project Progression	On schedule
Program Class	Land Management
Program Area	Weed Control
Resource	Coastal Sage Scrub
Project Purpose	Implementation of top weed control priorities identified in the NROC Habitat Restoration & Enhancement Plan and new five-year invasive plant management plans for the County of Orange NCCP/HCP Central & Coastal Subregion
Available Report(s)	<i>Calflora Weed Manager (www.calflora.org)</i>
Available GIS Product(s)	--

## *Overview*

Implementation of NCC's invasive plant control program has resulted in the control of artichoke thistle and other invasive plant species across thousands of acres of the Reserve. Since the formal program was initiated in the year 2000, approximately \$3.5M in funds have been spent on implementation of the program, resulting in the spot application of herbicide to thousands of individual plants and reducing the distribution of target invasive species (principally artichoke thistle) from thousands to hundreds of acres within the Coastal Reserve. With the program having been largely successful at accomplishing its principal goal of reducing the cover of artichoke thistle, NCC is actively working with partnering organizations to redefine the goals of the program focusing on the long-term sustainability of the control efforts.

## *Progress*

The project is considered to be progressing on schedule. In 2017, the level of NCC-funded weed control activities implemented across the Reserve was similar to the prior two years. The principal weed control contractor, Nakae & Associates (Nakae), controlled artichoke thistle, veldt grass, and other targeted invasive species in Laguna Coast Wilderness Park (LCWP), Crystal Cove State Park (CCSP), UC Irvine Ecological Preserve, and the City of Newport Beach's Buck Gully.

New to the program, in 2017, NCC hired an emergent invasive plant control contractor, Henry DiRocco, to treat new discoveries of high-priority species found during early detection surveys completed along trails and roads by Hamilton Biological in the same year. The effort is the first expression of the rapid response component of the now formalized Early Detection - Rapid Response Program for the NCCP-Reserve in the coastal portion of the Subregion. Ensuring a rapid response is available following early detections of emergent invasive plant species provides the greatest likelihood of successful containment of otherwise problematic invasive plant populations.

During the active field season of 2017, Hamilton Biological shared locality and other descriptive information tied to new discoveries to land managers and Henry DiRocco almost on a daily basis using Calflora's Weed Manager. Following communications with the appropriate land managers, upon arrival at a newly discovered population, Henry DiRocco would confirm identification of the previously observed plants and perform a wider survey of the immediate surroundings to ensure complete coverage for any outlying plants. Treatment of the discovered plants occurred either through hand-pulling, mechanical removal, and/or herbicide treatment, when allowed. Site information and treatment history was uploaded to Calflora by Henry for recording purposes.

In late 2017, NCC signed an agreement with Laguna Canyon Foundation (LCF), partnering with the City of Laguna Beach, to survey, remove, and monitor Canary Island St. John's Wort present within Laguna Canyon. The partnership with LCF extends control efforts for the species outside of the NCCP-Reserve and across neighboring City and private properties otherwise harboring hundreds of individual plants already controlled by NCC, working with OC Parks, in Laguna Coast Wilderness Park.



In 2018, Nakae, working under the management of NCC, will again be tasked with controlling the population of veldt grass present at LCWP and CCSP. Similar to 2017, in 2018, Nakae will also work closely with State Parks to treat populations of priority invasive plants mapped during the 2014 aerial surveys located along the coastal terrace of Crystal Cove State Park. New to 2018, Nakae will work with staff from the University of California, Irvine (UCI), to again perform a rigorous sweep of invasive plants at the UCI Ecological Preserve. Nakae will also return to Buck Gully in 2018, to control perennial invasive plants under the guidance of the Irvine Ranch Conservancy.

In 2018, NCC will again contract with Henry DiRocco (now working under Sage Environmental Group), to again revisit and treat populations of high-priority emergent invasive plant species discovered in 2017 during the early detection field surveys. Henry DiRocco will also be on-call to treat any populations of high-priority species requiring immediate treatment following their discovery within the inland portion of the Subregion to be surveyed by Hamilton Biological in the spring of 2018.

In addition to continuing the agreement with LCF to continue a collaborative approach to treating St. John's Wort, NCC is prepared, in 2018, to enter into a second agreement with LCF to manage treatment of sahara mustard across select areas of Laguna Coast Wilderness Park. Management of sahara mustard has been ongoing in the area for three years (beginning in 2015) under the guidance of OC Parks in partnership with LCF. The work has been successful and is looking to be expanded to cover additional populations distributed across nearby roadways of Boat, Water Tank, Laguna Bowl, and Big Bend.

#### *Key Milestones*

1. Coordinate with CMT on Field Schedule (Due: 1 March 2017): *Completed on time*
2. Enter into a Contract with Nakae & Associates (Due: 1 March 2017): *Completed on schedule*
3. Enter into a Contract with Emergent Invasive Plant Control Contractor (Due: 1 March 2017): *Completed on schedule*
4. Implement Invasive Plant Control Activities (Due: 31 December 2017): *Invasive plant control activities completed by Nakae by the end of June 2017; DiRocco's control activities were completed by the end of May 2017*

#### *Key Findings*

In April and May 2017, Nakae treated approximately 24 populations of veldt grass in Laguna Coast Wilderness Park and Crystal Cove State Park, cutting off flowering stalks and spraying the leaf blades. Population densities were generally low, with average cover values of about 10% across a cumulative total area of approximately 40 acres. At Crystal Cove State Park, populations of artichoke thistle were again treated in 2017. Sweet fennel, tree tobacco, black mustard, London rocket, ice plant, purple false broom, and artichoke thistle were treated by spot spraying and hand-weeding throughout the Ecological Preserve at UCI.

Discovered populations of significance treated by Henry DiRocco in 2017 at Laguna Coast Wilderness Park include sahara mustard (*Brassica tournefortii*), devil's thorn (*Emex spinosa*), stinknet (*Oncosiphon piluliferum*), tamarisk (*Tamarix ramosissimas*), and crown daisy (*Glebionis coronaria*). Populations of milk thistle (*Silybum marianum*) and purple veldt grass (*Ehrharta calycina*) were treated at Crystal Cove State Park, and giant reed (*Arundo donax*) and bull thistle (*Cirsium vulgare*) was treated at Upper Newport Bay Nature Preserve.

Walking surveys covering a search area of approximately 335 acres by Laguna Canyon Foundation in fall 2017 yielded eight clusters of St. John's Wort, totaling about 4.0 acres across the survey area. Scattered individuals were also noted throughout the survey area. Approximately, 80% of the mapped population appeared to be located on privately-owned parcels. A plan and timeline for treatment of the mapped populations is to be completed in early 2018.

### Notes

Over the last five years, the total workload for NCC spray contractors has been reduced as the County and Irvine Ranch Conservancy continue to expand their control efforts in areas of the Reserve traditionally treated by NCC. New maps of invasive plant populations prepared by Harmsworth and Associates in 2015 and 2016 for Irvine Regional Park, Peter's Canyon, El Modena Open Space, Upper Newport Bay Nature Preserve, Santiago Oaks Regional Park, and Talbert Regional Park have provided OC Parks with increased opportunity to direct their spray contractors to treat priority areas within the NCCP-Reserve.

## 7. Cowbird Trapping

Project ID	XXXX-XX
Project Title	Cowbird Trapping
Contractor(s)/Researcher	Leatherman Bioconsulting, Inc.
Time Period	1999-2018
Total Project Cost	\$641,500
Amount Budgeted	\$70,000 (2016-17); \$40,000 (2017-18)
Fund	Cowbird
Matching Contribution(s)	--
Landowner Involvement	OCP, COI, TIC
Project Status	Ongoing
Project Progression	On schedule
Program Class	Land Management
Program Area	Invasive Wildlife Control
Resource	Least Bell's Vireo
Project Purpose	Reduce incidence of cowbird nest parasitism for sensitive bird species, specifically California Gnatcatcher and Least Bell's Vireo
Available Report(s)	<i>2017 San Joaquin Hills Transportation Corridor Brown-Headed Cowbird Trapping Program Report. Prepared by Leatherman Bioconsulting, Inc. Prepared for Natural Communities Coalition. Oct., 2017.</i>
Available GIS Product(s)	--

## *Overview*

Per an agreement between the Transportation Corridor Agencies (TCA), USWFS, CDFW, and NCC, the responsibility of implementing the San Joaquin Hills Transportation Corridor Brown-headed Cowbird Trapping Program was transferred from TCA to NCC in 1999. As part of this agreement, TCA also provided an endowment to NCC to cover the costs of implementing the program. The trapping duration, and number and location of traps employed each year as part of the program is determined through a combination of evaluating prior year trapping success as well as the annual performance of the endowment. Additional funds, independent of the original program endowment, from the County of Orange have provided for the deployment of one to two traps a year during this time period.

## *Progress*

The project is considered to be progressing on schedule. Since 1993, the number of traps operated through the program has ranged from a low of 7 in 2004 and 2005 to a high of 24 in 1994. Since 2006, the number of traps in operation has ranged from 10 to 12. Beginning in 2008, traps were operated during the period extending from 15 March through 15 July. Approximately 4,890 brown-headed cowbirds have been captured and removed from the local population over the last 20+ years of implementing the program. Over the same time period, tens of thousands of non-target birds have been captured in the traps as by-catch from implementing the program. The annual mortality rate for these non-target species over this same time period is between one and two percent. No threatened or endangered species are reported to have been captured. Formal measures evaluating effectiveness of cowbird trapping on target bird nesting success are not available.

In 2016, NCC staff completed an analysis of available trapping and capture data for the San Joaquin Hills Brown-headed Cowbird Trapping Program. Results are reported below under “Key Findings”. The purpose of the analysis was to provide fodder for discussion with the Wildlife Agencies (and prospective third-party contractors) regarding next steps for moving forward with a programmatic review consistent with the NCC Strategic Plan.

In September, 2016, funding was approved by the NCC Board to review the program and make recommendations for improving the program for the San Joaquin Hills. Additional data considered for analysis as part of the review included data collected from TCA's Eastern Transportation Corridor Brown-headed Cowbird Trapping Program and programmatic information from MCB Camp Pendleton. One issue with the current program, identified by NCC Board members, is the program, as currently structured, does not allow for any definitive conclusions to be drawn about the success of the program with regards to improving the nesting success of the Least Bell's Vireo and California Gnatcatcher.

In 2017, in accordance with the 2016-18 Strategic Plan for the Natural Communities Coalition, staff reviewed and identified potential changes in the management program for the Brown-headed Cowbird. In addition to reviewing program logistics and capture history for both the San Joaquin Hills and the Eastern Transportation Corridor, in 2017 staff was in communication with the U.S.

Fish and Wildlife Service, California Department of Fish and Wildlife, researchers, contractors, and partnering organizations who are familiar with cowbird trapping efforts both locally and across the region. To learn more, at the recommendation of Dr. Barbara Kus of the U.S. Geological Survey, staff attended the American Ornithological Society Meeting held at Michigan State University, in East Lansing, Michigan from 31 July through 5 August 2017.

Dr. Kus is a research scientist and regional expert on the Least Bell's Vireo and Southwestern Willow Flycatcher, the focal species for the greater trapping program in southern California. At the meeting a one-day symposium, entitled, "Forty-five Years of Brown-headed Cowbird Control: What have we learned?", was organized and led by Mary Whitfield, of the Southern Sierra Research Station, and Dr. Kus. The symposium addressed the history of cowbird trapping across much of the western United States from Texas to Michigan, Arizona to California.

At the symposium, Cowbird control to reduce brood parasitism was recognized as a key component of management to protect a number of endangered and threatened species, including the Black-capped Vireo in Texas, Kirtland's Warbler in Michigan, Golden-cheeked Warbler, Least Bell's Vireo in California, and Southwestern Willow Flycatcher. Participants shared case studies and discussed how to use cowbird control effectively to achieve conservation goals and document responses of hosts to cowbird control. Much was learned by staff at the meeting, including the significance of past trapping efforts as well as the limitations of exclusively relying on trapping as a management tool to promote the continual recovery of listed host species.

Within the County of Orange Central and Coastal Subregion NCCP/HCP, both the Least Bell's Vireo and California Gnatcatcher are the focal species of conservation concern continuing to drive implementation of the cowbird control program. The Least Bell's Vireo is a federally endangered species, listed in 1986, and conditionally covered by the County of Orange Central and Coastal Subregion NCCP/HCP. The California Gnatcatcher is federally listed and the flagship species for the NCCP Program in southern California.

Although the vireo has shown substantial recovery since listing, experts recognize the need for long-term management of Least Bell's Vireo in southern California will exist beyond a potential future de-listing of the species. Much of the recovery over the last 20 years is attributed to annual trapping of cowbirds at breeding sites which eliminated or reduced parasitism and significantly increased seasonal productivity of nesting pairs of vireos. The need to continue trapping efforts beyond delisting is recognized. Also recognized is that conditions are changing and current parameters guiding deployment of traps together with new threats need to be reconsidered and addressed in order to support the continued recovery of the vireo. For example, beyond nest parasitism by cowbirds, obstacles identified limiting population growth of the vireo include present-day and future degradation of riparian habitats.

In the near future, invasive beetles may challenge recovery of the vireo throughout the South Coast Ecoregion. Increased flexibility is recognized as needed to better manage for the vireo over both the short and long-term. Additionally, of interest, the story of the Brown-headed Cowbird is changing. New information collected over the next decade, may change our understanding of this species across its range and our collective approach to its management.

In order to address both the short and long-term needs of both the Least Bell's Vireo and California Gnatcatcher within the Subregion, reorganization of the program is being recommended for consideration in 2018. If successful, the reorganization instituted by NCC may become a model for other organizations and agencies to consider in time and help to change the long-term outlook for management of the species in southern California.

### *Key Milestones*

1. Coordination on Trapping Schedule and Placement (Due: 1 March 2017): *Completed on schedule*
2. Implementation of Trapping Program (Due: 15 July 2017): *Completed on schedule*
3. FINAL Annual Trapping Program Project Report (Due: 31 December 2017): *FINAL Report completed in October 2017*
4. Initial Trapping Program Review Report Provided to Executive Committee (Due: 30 September 2017): *Report provided in October, 2017*

### *Key Findings*

Key findings are not available at this time, as the greater project is still ongoing. Information presented below, comes from a preliminary analysis of available capture and trapping data completed in 2016. Additional findings are expected to be available following the formal review of the program scheduled to conclude in 2018. It is important to note, the effectiveness of removing cowbirds on the reproductive success of the program's target bird species, that is, the Least Bell's Vireo and California Gnatcatcher, is unknown, as formal measures for evaluating the effectiveness of cowbird trapping on target bird nesting success have not been developed.

### *Results of analysis completed in 2016:*

Per-trap-day numbers of cowbirds captured and removed have ranged from a low of 0.04 cowbirds (in 2014 and 2016) to a high of 0.21 (in 2002). Over the last six years the per-trap-day numbers have consistently been below 0.10. In the prior 18 years, the per-trap-day numbers were below 0.10 only three times, suggesting a real decline in trapping efficacy or cowbird numbers over the last five years relative to the proceeding eighteen.

The total number of species captured by year is closely related to the number of traps deployed. Although trapping efficiency is believed to be improved by adjusting the trapping period and location, the number of cowbirds captured per trap day through time is decreasing. It is important to note, the first spike in cowbirds captured occurred in 2002, the same year the number of traps were reduced significantly (from 20 to 8) and the trapping period was most constricted (23 May to 15 July). Otherwise, the number of days of the trapping period and general timing of the trapping effort has been more or less constant since 1999.

Interestingly, the number of non-target birds captured per trap day is also decreasing through time. The similar decrease in non-target birds suggests a change in behavior (such as a learned behavior to avoid the traps by individual birds) or similar decline in local population status.

A change of behavior is reasonable, as unlike the cowbirds, non-target birds are not sacrificed upon capture but released. One question to ask is whether, other regional, repeated measures (like the Christmas Bird Count) show similar local declines which would suggest greater forces are in play.

The number of females captured per trap day appears to increase in the early years of the program, and then begin a downward trajectory after reaching a high-point in 2002. The number of male and female cowbirds captured per trap day appears to be closely aligned.

The overall decrease in the number of cowbirds captured per trap day over the 24-year period suggests cowbirds may be avoiding traps more frequently than in the past, or the number of cowbirds available to be trapped has decreased. If the local population size of cowbirds has dropped, the decline could be due to trapping efforts (that is the removal of 4,854 cowbirds over the 24-year history of the program), the loss of range lands and pasture used as foraging grounds by the species with the removal of cattle from the Subregion, or changes in the behaviors of parasitized host populations.

*Notes*

Similar to 2017, the program in 2018 will include operation and maintenance of Brown-headed Cowbird traps in open space areas in the vicinity of the San Joaquin Hills Transportation Corridor, including lands located within the Reserve. It is expected that a total of 11 cowbird traps will be operated from March 15 to July 15 in 2018. Trap locations may be the same as in 2018. However, as in previous years, the contractor will be actively evaluating alternative location for trap placement to maximize the number of cowbirds captured, the protection of target species status species, and the safety of the daily trap monitors. A total of \$40,000 has been budgeted to cover the costs of implementing the program in 2018.

**8. Mountain Lion Project**

Project ID	XXXX-XX
Project Title	Mountain Lion Project
Contractor(s)/Researcher	UC Davis (Vickers)
Time Period	2011-2018
Total Project Cost	\$95,000
Amount Budgeted	\$10,000 (2016-17); \$10,000 (2017-18)
Fund	Endowment
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, TIC, CDFW, IRWD, TCA, TIC
Project Status	Ongoing
Project Progression	On schedule
Program Class	Monitoring/Research
Program Area	Sensitive Biological Resources
Resource	Mammalian Carnivores
Project Purpose	Inform land management strategies around: (1) landscape connectivity and conservation; (2) health and disease; and (3) minimizing conflicts between cougars and people.

Available Report(s)	<i>UC Davis - Southern California Cougar Project 2016 Annual Report. Prepared by UC Davis Wildlife Health Center. Jan., 2017.</i>
Available GIS Product(s)	--

### Overview

The ongoing study of the mountain lion (*Puma concolor*) in southern California is headed by Dr. Walter Boyce and Dr. Winston Vickers of the Wildlife Health Center at UC Davis. Dr. Vickers is the field lead for the project. The project is currently in its third phase which began on January 25, 2013, and is a follow-up to the first two phases of the study which ran from late 2000 to mid-2012. This mountain lion or cougar research focuses on: (1) landscape connectivity and wildland conservation, including road crossings and the effects of fire; (2) genetics, health, and disease, especially focused on diseases transmitted between cougars and other species, exposure to rodenticides, and genetic assessment of the population; (3) minimizing conflicts between cougars and people; (4) and predation on bighorn sheep and interactions with deer in the Peninsular Mountain Ranges. The study area encompasses Orange, Riverside, and San Diego Counties. Cougars have been captured, sampled, and GPS-collared over a wide portion of these counties from the northern Santa Ana Mountains in Orange County to southern San Diego County. Cougars from the study have utilized lands as far north as the Highway 91 and 241 Toll Road junction in the northern Santa Ana Mountains in Orange County, and as far south as the Parque Nacional Constitución de 1857 located approximately 50 miles south of the border in Mexico. The area used by study cougars has also extended from the Pacific Ocean in the west to the Santa Rosa Mountains to the east. The project is important for NCC as the cougar is a top predator and serves a role as an ecological regulator. Cougars help to control deer populations as well as to regulate other carnivores, which has important consequences to the composition and structure of natural communities within the reserve system.

### Progress

To address the goals of the third phase of the study, the researchers continued field efforts to complete capturing, sampling, and GPS collaring of cougars under a Scientific Collecting Permit from the California Department of Fish and Wildlife. The portions of the study area where the focus of field capture work was primarily directed in 2013 and 2014 were the Santa Ana Mountain Range in Orange and Riverside Counties, Western San Diego County, and the Palomar Mountains in San Diego and Riverside Counties. In addition, researchers conducted extensive camera monitoring of wildlife corridors and crossings in the Santa Ana Mountains during the 2012-2013 field season. Included in this list of areas, are all of the major wildlife crossings along the studied sections of the 241 Toll Road in Orange County. Cameras are monitored on a monthly basis and all photos recorded in a database for analysis and reporting purposes. The Irvine Ranch Conservancy and Orange County Parks also contribute photos of cougars that are recorded on their lands, and collaborate with the researchers to identify individual animals in those photos if they have previously been captured by the study team. Camera monitoring continued in 2014 as did additional trapping efforts directed at keeping between two to four lions collared in the northwestern Santa Ana Mountains.

In 2015, the focus of the program was on assessment of mountain lion habitat use and connectivity in northern San Diego and southern Riverside and Orange Counties, with special focus on the prioritization of lands in north San Diego County associated with the Pechanga Corridor considered critical to maintaining connectivity between the Palomar and Santa Ana Mountains populations of lions.

In 2016, the team, led by Winston Vickers, engaged in an extensive genetic analysis involving all of the lions sampled to date across San Diego, Riverside and Orange Counties (around 150 animals). The genetic work allows for construction of extensive pedigrees/family trees to help define how animal movement has occurred over the time of the study and before. The work is a collaborative effort largely funded by SANDAG and The Nature Conservancy.

In 2017, a Population Viability Analysis was advanced by collaborator, John Benson, providing perspective on the long-term viability of lions within southern California, given the current constraints on movement and threat presented by state-issued depredation permits. Kathy Zeller published papers on landscape resistance and connectivity using telemetry and genetic data from collared lions in 2017. Kyle Gustafson also published a paper in 2017 on genetic diversity of tracked lions, measuring the impact of one migrant who successfully crossed I-15 and sired offspring with female lions in the Santa Ana Mountains. Lastly, in 2017, a Local Assistance Grant was awarded to Dr. Vickers and his partners to evaluate opportunities for enhancing connectivity across I-15. The grant period begins in 2018 and will run for two years.

#### *Key Milestones*

To date, no key milestones for the project have been jointly-identified by NCC and the project researchers.

#### *Key Findings*

The mortality data collected during the study suggests that cougars throughout southern California face significant, and likely increasing, threats secondary to habitat loss and fragmentation, continued expansion of the human population, roads, and development. Some sources of mortality for cougars may be mitigated through education, investment in proper road crossings and fencing, habitat conservation, prevention of habitat fragmentation, and proper domestic animal husbandry. The research team is actively pursuing a number of these mitigation measures in collaboration with partnering organizations throughout the study area. As an example of the mitigation measures being implemented, in 2014 and 2015, in consultation with the project principal investigators, TCA installed exclusion fencing along the sides of several miles of the SR241 Toll Road specifically to limit mountain lion access to sections of the road where lions and other wildlife had been struck at a high incidence by vehicles when attempting to cross.

Genetic and corridor analyses completed in 2016 highlight the importance of male lions as genetic dispersers, with home ranges averaging approximately 145 square miles in size. The isolating nature of urban development and creation of major state highways has isolated extant populations of mountain lions.



In the Santa Monica Mountains, the population of lions is relatively small, and bounded by U.S. Route 101, limiting the likelihood of continued persistence of the population beyond the next 50 years. Similarly, although connectivity still exists within the Santa Ana Mountains, Interstate 15 has effectively isolated the population from lions in San Diego County and Western Riverside County. Genetic analyses of 146 lions in the region showed 7 lions crossed I-15 over the last 15 years. Four males crossed west to east, and three males from east to west. Only a single migrant produced offspring and contributed to gene flow across the I-15 barrier. The emigration of this individual lion introduced new alleles into the Santa Ana population, decreasing inbreeding measures in the local population, at least temporarily.

Least Cost Path analysis highlights the importance of the San Luis Rey River, Santa Margarita River, Temecula Creek, and Pechanga Creek to maintaining or enhancing connectivity and ensuring adequate gene flow and long-term persistence of the Santa Ana population of lions.

Publications in peer-reviewed scientific literature resulting from the work include the following:

*Gustafson KD, Vickers TW, Boyce WM, Ernest HB. A single migrant enhances genetic diversity of an inbred puma population. Royal Society Open Science (2017) 4:170115.*

<http://dx.doi.org/10.1098/rsos.170115>

*Zeller KA, Vickers TW, Ernest, HB, Boyce WM. Multi-level, multi-scale resource selection functions and resistance surfaces for conservation planning: Pumas as a case study. PLoS ONE (2017) 12(6): e0179570. <https://doi.org/10.1371/journal.pone.0179570>*

*Zeller KA, McGarigal K, Cushman SA, Beier P, Vickers TW, Boyce WM. 2017. Sensitivity of resource selection and connectivity models to landscape definition. Landscape Ecol (2017) 32:835.*

<https://doi.org/10.1007/s10980-017-0489-8>

#### Notes

The project is a collaborative effort with many partners assisting in funding and logistics. NCC was a minor financial contributor to the project in 2011 (\$25,000), 2012 (\$10,000), 2013 (\$10,000), 2014 (\$10,000), 2015 (\$10,000), 2016 (\$10,000), and 2017 (\$10,000). In 2018, NCC will again make another contribution (\$10,000) to UC Davis in support of the project. Over the years, NCC funding has allowed the principal investigators to expand analyses, spend extra time on capture or camera work, and replace equipment not otherwise covered by other funding.

#### 9. NCC Database Mgmt

Project ID	XXXX-XX
Project Title	NCC Database Mgmt
Contractor(s)/Researcher	UC Irvine; OC Parks
Time Period	2014-2018
Total Project Cost	--
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Endowment
Matching Contribution(s)	--

Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNP, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Database Management
Program Area	Multiple
Resource	Multiple
Project Purpose	Develop a coordinated approach to the long-term management of ecological data within the NCCP Reserve that focuses on system integration, interoperability, and user efficiency
Available Report(s)	<i>Nature Reserve of Orange County - NROC Geodatabase Design. Produced for Orange County Community Resources, Orange County Parks. Produced by VESTRA Resources, Inc. Jan., 2014.</i>
Available GIS Product(s)	--

### Overview

For NCC to effectively use science to inform adaptive resource management, the integration of data collection, processing, analysis, storage, retrieval and sharing is paramount among participants in the NCCP/HCP. While every partner in the NCCP/HCP operates independent systems for storage and access to data relevant to the Reserve, the integration of these tools and long-term coordination and management of the collaborative process is critical to NCC's mission to coordinate effective management of the natural resources present within the NCCP-Reserve.

### Progress

NCC staff has been discussing with UCI/Center for Environmental Biology (CEB) concerning the steps needed to effectively integrate data management and use efforts among the partners in the NCCP/HCP. Specifically, a 'Design-Build' process has been proposed that includes needs assessment, specific database interoperability, early-adoption by user partners, use analysis, emerging versus historical data challenges, and mutual appreciation of current partner efforts. Development of this process was influenced, in part, by several key discussions, including: a discussion between Irvine Ranch Conservancy, NCC, and UCI/CEB (in August 2013); more focused treatment by the NCC Technical Advisory Committee (August 2013) and Board of Directors (September 2013); and a discussion between OC Parks, IRC, NCC, and UCI/CEB (October 2013).

Although a database interoperability project has yet to be initiated with CEB, in an effort to further the mission of increasing data integration across the Reserve, NCC, in partnership with OC Parks, made significant progress in terms of organizing the available NCCP-related data housed by the County. In 2014, working with the County's hired consultant, VESTRA Resources, a leader in design and management of GIS/IT systems, NCC participated in design of a GeoDatabase schema for storing existing NCC data. As designed, the schema is intended to allow for options to meet NCC's longer term goal to provide an automated web-based solution that will allow investigators to search through existing data and provide new information in a structure that will efficiently integrate into the NCC data storage schema.

In the future, NCC, together with the County and UCI, is considering development of a viewing and delivery solution utilizing this new data structure.

In support of this vision, NCC met with UCI Libraries and CEB in November, 2015, and then followed up with a meeting amongst NCC, UCI Libraries and the GIS Manager for OC Parks, in February, 2016. Specifically, the meetings evolved around the concept of sharing NCCP data currently housed with OC Parks with the UCI Libraries. The Office of the President of the University of California recently sponsored creation of a data sharing service for the UC System, called DASH. UCI Libraries are pursuing development of this service in order to support the description, publishing, and preservation of ecological data (citing it with a permanent identifier), assigning of relevant geolocation to data, and increased search and browse capabilities. The recent push by the University of California to increase visibility and accessibility to ecological data creates a unique opportunity to potentially pair the two systems, UCI Libraries and OC Parks, to improve the distribution and use of ecological data collected by signatories to the NCCP and supporting partners over the last twenty years.

In 2016 a couple of pilot projects were advanced to support implementation of data sharing within the Reserve. In June, NCC submitted to UCI Libraries reports and available data collected as part of the vegetation classification and mapping project completed in 2015. The submission included the full geo-database and three reports, one for each phase of the project to be archived and made available to a wider audience. Following receipt, the dataset was reviewed, reformatted and added to OC Data Portal (and dash UCI) by UCI Libraries in November. The second project advanced in 2016 involves archiving of the NCC collection of 15,000 digital images of natural landscapes and resources of central and coastal Orange County. Archiving involves the donation of the collection to the UCI Libraries Special Collections and Archives Division for purposes of preserving the collection in perpetuity and increasing visibility of the collection with partners, researchers, and the public.

In 2017, NCC continued discussions with UCI Libraries, OC Parks, CEB, as well as invested time in further development of the online library of project reports hosted on the NCC-website. Initially, the web-based library of reports is to cover the last five years of funded work, and then subsequently, be advanced to cover the full 20+-year history of the organization, which includes upwards of an estimated 200 annual projects.

In 2017, NCC staff worked with CEB Voth Fellow, Samuel Bedgood, to facilitate data transfer from NCC to UCI DASH. In July, reports, Excel data files, and GIS files associated with the 2008 and 2013 Vegetation Change study led by UCI and then UC Berkeley were transferred. Photos and tabular data collected by AECOM in 2012 as part of the vegetation classification that occurred in Orange County in support of the larger vegetation mapping project were transferred in August. Also, in August, the report and data tables, and GIS files tied to the 2014 Aerial Invasive Plant Survey (which occurred across the coastal portion of the Subregion) were transferred to UCI. In October, report and data files tied to the 2010 Tecate Cypress Management Plan were provided to UCI for transfer into DASH.

Also in support of advancing data management, through an approved agreement with NCC, the Center for Environmental Biology is under contract to compile, curate, and disseminate common data used by partners of NCC, and signatories of the NCCP/HCP for effective decision-making. Data includes trail maps, soil types, land-use history descriptors, weather overlays, fire histories, ecological syntheses, climate and development future scenarios, and measurement locations. Data is to be consolidated to a common location to be accessed by NCC approved organizations and individuals so as to enhance data sharing and the effective use of information for adaptive management. The data is expected to take the format of GIS layers, and be available on-line. Additionally, the Center's recent involvement with development of the Reserve's long-term vegetation monitoring program, uniquely positions them play a leadership role in the long-term management and distribution of ecological data tied to rare plants, oak woodlands, grasslands, chaparral, and coastal sage scrub.

### *Key Milestones*

Milestones have not been identified, as aspects of the project are still evolving.

### *Key Findings*

The County, as the signatory responsible for hosting and managing the spatial data (GIS) associated with implementation of the NCCP/HCP, is to receive and archive all reports, data, and meta-data, and share spatial data and models generated by NCC-funded projects. Successful execution of this obligation involves: development and management of online platforms to share spatial data (and models) among land managers for viewing and download; creation of an inventory of available GIS data relevant to natural resource management; and a designated "librarian" to receive and file spatial data received from NCC contractors.

Because of the high level of complexity of the data in general and the variation of data collected and methodologies used across all the studies, NCC, in the designed schema employed by the County's contractor in 2014 and 2015, chose to organize ecological data archived with the County into a two-tiered hierarchy. At the highest level, the information is collected into a set of point feature classes organized into taxonomical types (amphibian, bird, fish, habitat, invertebrate, mammal, rare plant, reptile, and vegetation). The second, or detailed, level is organized based on NCC projects. At the detailed level, users will find the geospatial data collected by the project as well as the project documents, tables, and any other information specific to that project.

### *Notes*

During the 2014 budgeting process, a total of \$85,000.00 was made available for the improved long-term management of ecological data within the NCCP Reserve. Subsequently, following a refocusing of priorities by both NCC and CEB, the amount allocated towards database developed for FY 2014-15 (and subsequently rolled-over to 2015-16 and then 2016-17) was reduced to \$25,000. Although still intact at the close of FY 2016-17, the \$25,000 budgeted in previous years was not rolled over to the next fiscal year (2017-18). Going forward, work associated with the project, at least in the near-term, is expected to be performed by staff and/or through partner contributions.

## 10. OC RESTORE

Project ID	XXXX-XX
Project Title	OC RESTORE
Contractor(s)/Researcher	Sara Jo Dickens; GreenInfo Network
Time Period	2014-2018
Total Project Cost	\$87,500
Amount Budgeted	-- (2016-17); \$20,000 (2017-18)
Fund	Restoration/Enhancement (1:1)
Matching Contribution(s)	USDA (\$XXXX)
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Database Management
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Create an on-line tool for tracking and informing the development of habitat restoration projects within the NCCP-Reserve
Available Report(s)	<i>OC RESTORE Restoration and Conservation Web Tool Beta Test. Final report submitted to the Irvine Ranch Conservancy and Nature Reserve of Orange County. Alex Brotman and Chase LeCroy (UCSB Bren School). Sept., 2014.</i>  <i>OC RESTORE Projects Manager User Guide. Prepared by Robert Graham, GreenInfo Network. Nov., 2013.</i>
Available GIS Product(s)	--

### Overview

In 2010, Dr. Katharine Suding at UC Berkeley (UCB), Dr. Stephen Swallow at the University of Connecticut, and the Natural Communities Coalition (NCC) were awarded a three-year grant from the U.S. Department of Agriculture that focuses on restoring native communities invaded by exotic plants. The project funded by the grant was designed to lead to an increased understanding of the threshold dynamics of invasion and restoration so that management actions can be developed and selected with an understanding of ecological and economic constraints and trade-offs. Under the grant, NCC was responsible for the stakeholder engagement and facilitating development of the decision-making component. This involves engaging stakeholders in combining ecologically based invasion management and economic valuation components with decision support tools and centralized information exchange. One component of this was development of a web-based decision tool for determining and tracking restoration management actions. Although the USDA Grant formally ended at the close of 2013, NCC has continued to invest in development and refinement of web-based, habitat restoration decision support tool for land managers.

## *Progress*

GreenInfo Network was brought into the project in 2012 to assist UC Berkeley in developing the online-based decision making tool. A beta-version of the tool was first unveiled to project partners and land managers in October of 2012. The meeting was held in a workshop format that was co-hosted by NCC and UCB. The focus of the workshop was on introducing the web-based habitat restoration database and decision tool being produced from the collaborative efforts of UC Berkeley, NCC, land managers, and Wildlife Agencies. The beta-version of the tool unveiled at the workshop was designed based on land manager needs and interests as determined by their participation in previous workshops and applied research conducted by UC Berkeley. A second workshop in which an advanced version of the web-tool was unveiled was hosted in 2013. The tool was formerly rolled-out in late 2013, with the distribution of a draft manual and the distribution of passwords to project partners for purposes of accessing the tool.

In 2014, NCC, in partnership with Irvine Ranch Conservancy, formed an advisory team to review the beta version of the online tool, OC RESTORE. The team consisted of staff from IRC, NCC, Sara Jo Dickens (as a hired NCC project management consultant), and two interns from the Bren School of Environmental Management at UC Santa Barbara. The advisory team hosted a third workshop highlighting design changes recommended by the group following an intensive three-month testing schedule. Throughout 2014, GreenInfo participated in the project planning work as well as continued to make minor revisions to the program code in an effort to fix or bypass detected errors in computer program code.

In 2015, both GreenInfo Network and Sara Jo Dickens (operating as Ecology Bridge) entered into contracts with NCC to continue to build, upgrade, and improve the OC RESTORE web database and map based on stakeholder input. In December, 2015, Sara Jo Dickens made a presentation to the NCC Board of Directors on the progress made enhancing OC RESTORE and stakeholder use of the tool since NCC took ownership of the tool's development in January, 2014. The majority of tasks tied to completion of Phase II of the tool's evolution were complete as of December 2015. These tasks include, revision of the database structure, creation of new functions to meet stakeholder requests, development of batch upload templates for faster data upload, increasing the number of geospatial data layers, and providing users with a means of downloading the geospatial layers directly as a package.

In 2016, NCC staff discussed project advancement with the Executive Committee and Sara Jo Dickens. Although much interest in the potential of the online tool was expressed by members of the Board at the December (2015) meeting, a remaining hurdle involves securing true partner buy-in to use the tool prior to NCC investing an additional \$25,000 or more in tool development to address unresolved programming issues and recommended changes. An identified next step involved meeting informally with key partners and the Wildlife Agencies to discuss whether continued investment was worth the cost to the organization.

In October 2017, NCC staff, together with Emily Perkins, of the San Diego Management Monitoring Program (SDMMP) and Sara Jo Dickens, met with the Wildlife Agencies to discuss the future of OC RESTORE and likely return on the investment of additional staff time and funding.

Based on information shared during the meeting, it was recognized OC RESTORE may be best positioned to be advanced as a shared online resource utilized by organizations in both San Diego County and Orange County. To further explore this opportunity, NCC staff is planning to consult with SDMMMP in 2018 to better understand their organization's perspective on the value of the tool and opportunities to partner on its development. If after the evaluation a partnership is found to be desirable by both parties, a thorough description of costs and benefits, and envisioned workflow, tied to additional investment in the tool will need to be highlighted and shared.

### *Key Milestones*

1. OCIM Web-tool Workshop I (Due: 31 December 2012): *Workshop held 25 October 2012*
2. OCIM Web-tool Workshop II (Due: 31 December 2013): *Workshop held on 13 November 2013*
3. Launch OCIM Web-tool (Due: 31 December 2013): *OC RESTORE web-tool launched on 14 December 2013*
4. Form interagency advisory team to review functionality of OC RESTORE (30 June 2014): *Completed on schedule*
5. OC RESTORE Workshop III (Due: 15 September 2014): *Completed on schedule*
6. Submission of a FINAL assessment report from advisory team (Due: 15 September 2014): *Report completed on 12 September 2014*
7. Complete recommended updates of database structure, map, and reports (Due: 30 June 2015): *Completion of the majority of tasks outlined as part of Phase II are complete; remaining tasks are expected to be complete by 30 June 2016*
8. Presentation to NCC Board of Directors (Due: 31 December 2015): *Completed on 17 December 2015*
9. Meeting with Wildlife Agencies to discuss future of OC RESTORE (Due: 30 September 2017): *Meeting occurred on 21 December 2017*

### *Key Findings*

In 2013, workshop participants provided the following feedback with the purpose of informing additional design of the tool. Highlights from the feedback provided during the workshop included a clear desire by land managers to be able to use the tool to: (1) assess proposed restoration sites; (2) search their respective management areas for sites to be prioritized for restoration; (3) search the restoration database for historical restoration data; (4) track restoration activities; and (5) assist them in meeting their reporting obligations.

Following the 2014 workshop and beta testing of the tool, it became clear, NCC and NCC partners will require continued support of use OC RESTORE until users are comfortable with tool functions and all agreed upon upgrades are incorporated. It is the ultimate goal of NCC to have partners regularly report management actions via the web-tool to produce a long-term database and enhance data sharing.

In 2016, Calflora Weed Manager became the preferred method by land managers for tracking and reporting on invasive plant management within the Subregion, removing the need for OC RESTORE to support tracking of weed infestations and treatments over time.

Going forward, consistent with the original vision for the project, OC RESTORE will principally serve as an online database (and information source) for historic, ongoing, and planned restoration projects.

As a result of the meeting with the Wildlife Agencies in 2017, it was recognized OC RESTORE is well-positioned to become an informative planning and coordination tool. Potential exists for the online tool to become a vehicle for sharing and viewing the location of identified habitat restoration opportunities, as well as, historic and present-day invasive plant survey results and treatment history, fire history, historic and present-day occurrence of California Gnatcatcher and Cactus Wren, location of authorized (and unauthorized) trails, rare plants, and data layers associated with the updated vegetation map. Additionally, partners may value the ability of OC RESTORE to serve as an archival and reporting tool, providing greater transparency with regards to historic and present-day land management activities. NCC staff may utilize the tool to help identify novel, field-based, natural resource management training opportunities for land managers.

Regardless of the long-term potential value of the tool, to be truly effective, the quality of the restoration data in the database needs to be improved. Based on review of the database in 2016 and 2017, NCC staff noted, although the tool has the capacity to capture much information about historic and ongoing restoration projects, the data currently in the database for 100+ historical projects is relatively sparse in nature, lowering the value of any one individual project record. Investment by partnering organizations in improving the quality of the data housed in the database is needed for OC RESTORE to better reflect its potential value.

#### Notes

NCC is solely responsible for managing the online tool as of January 2014. To meet this need, NCC entered into agreements in both 2014 and 2015 with GreenInfo Network and Sara Jo Dickens to assist in design and user support related to development and refinement of OC RESTORE, respectively. Funding support (\$20,000) for design of the tool was rolled forward from 2016 to 2017, and then again to 2018.

#### 11. Weed Prioritization/EDRR

Project ID	XXXX-XX
Project Title	Weed Prioritization/EDRR
Contractor(s)/Researcher	California Invasive Plant Council
Time Period	2014-2018
Total Project Cost	\$140,000
Amount Budgeted	\$60,000 (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Planning
Program Area	Invasive Weed Control
Resource	Coastal Sage Scrub



Project Purpose	Develop a coordinated, unified approach to prioritizing invasive weed control efforts across the NCCP-Reserve
Available Report(s)	<i>Five-year Invasive Plant Management Plan for the Coastal Portion of the County of Orange Central &amp; Coastal Subregion NCCP/HCP. Prepared by California Invasive Plant Council. Jan., 2017.</i>
Available GIS Product(s)	--

### Overview

In 2014, California Invasive Plant Council (Cal-IPC) was brought in under contract with NCC to perform a needs assessment for the development of a coordinated, unified approach to prioritizing invasive weed control efforts across the NCCP-Reserve. Informed by the planning and coordination activities of the Back Country Council, as well as ongoing weed surveillance work, the assessment is to focus on evaluating the need for early detection and rapid response (EDRR) strategies for emergent invasive weed species, coordinated control of established target invasive species, and the restoration of fully degraded habitat areas. Cal-IPC is engaged in strategic prioritization and EDRR with entities across California, and is expected to bring this expertise to advise NCC planning. This will support NCC's capacity to steward its lands into the future and to lead regional collaboration for landscape-level management. In addition, NCC's work will provide an excellent example from which other organizations and agencies across California can benefit from lessons learned.

### Progress

As of early 2015, Cal-IPC had completed the planning phase of the project, determining the next steps in developing expert recommendations for: (1) strategic prioritization for invasive plant management; and (2) early detection/rapid response protocol for new invasive plant populations. During the six-month planning phase Cal-IPC reviewed materials to become familiar with the current status of NCC's invasive plant management and EDRR, including annual reports, management plans, the studies by UC Berkeley, datasets, maps, and recent survey results. A two-person team from the organization traveled to Orange County for a 2-day visit in November 2014, visiting both the inland and coastal areas of the NCCP-Reserve, and meeting with NCC staff and key project partners (OC Parks, IRC, and State Parks), with the goal of advancing planning for the full project. Following the visit to Orange County, Cal-IPC conducted follow-up calls with additional stakeholders not interviewed in person. Cal-IPC prepared and presented a work plan and budget for analyzing information and developing recommendations for invasive plant management and EDRR in February, 2015.

Following entry into an 18-month agreement with NCC, in early 2015, to implement the work plan identified, Cal-IPC advanced the identified initiatives working collaboratively with NCC and members of the Core Management Team (consisting of representatives from IRC, OC Parks, and State Parks). Work culminated in development of a draft Five-year Invasive Plant Management Plan for the Coastal Reserve and participation in the Science Integration Meeting hosted by NCC on 25 February 2016.

The draft plan (finalized in January 2017) describes an overarching conceptual framework proposed for managing invasive plants in the Reserve, a five-year work plan for the Coastal Reserve, and EDRR structure. The overarching framework provides a foundation for transparent decision-making and assessment, and helps ensure coordination between land managers as they execute specific elements of the plan falling within their purview.

In late 2016, NCC staff, working with Cal-IPC and the CMT, developed a new scope of work supporting advancement of the over-arching planning efforts for the Subregion. The scope included: (1) preparation of a 5-year Invasive Plant Management Plan for the inland portion of the Subregion; and (2) assessment of progress made in invasive plant management in the inland portion of the Subregion between 2011 and 2016. Development of the new plan area-specific plan was to build upon the invasive plant management framework and EDRR recommendations developed for the Coastal Reserve in 2016.

In support of the planning effort, Cal-IPC, in 2017, synthesized existing information and reviewed available tools to inform recommendations for reaching consensus among stakeholders on a coordinated action plan for the inland portion of the Subregion. Over the course of the year, working with members of the CMT, Cal-IPC advanced development of the draft five-year work plan, established land management responsibilities for each mapped area organized by subwatershed, reviewed and discussed reporting options, and uploaded baseline datasets to Calflora Weed Manager.

In support of the EDRR component of the program, Cal-IPC, again working with the CMT, identified priority emergent species and prepared routes and maps to guide early detection surveys to be completed across 170 miles of trails in spring 2018. Cal-IPC also began analyzing available spatial data on invasive plants collected during 2011 and 2016 aerial flights. Analyses are being conducted to note changes in cover values over the five-year period and test the efficacy of helicopter surveys as a means for measuring the effectiveness of management activities over time. A fully-developed draft plan is expected to be made available by Cal-IPC for review and execution by NCC and the CMT by early spring 2018.

### *Key Milestones*

1. Site visits and stakeholder meeting (Due: 15 November 2014): *Completed in November 2014*
2. Prepare and present a work plan and budget (Due: 15 January 2015): *Work plan and budget completed in February, 2015*
3. Prepare and Present a DRAFT Five-Year Management Plant for Coastal Reserve (Due: 15 January 2015): *Completed on schedule*
4. Participate in the Science Integration Meeting (Due: 31 March 2016): *Completed in February 2016*
5. Prepare and Submit Final Five-year Management for Coastal Reserve (Due: 30 September 2016): *Completed in January 2017*
6. Collect GIS Data and Conduct Spatial Analysis (Due: 30 June 2017): *Data collected and initial analyses completed in 2017*

7. Compare Results of 2011 and 2016 Helicopter Surveys (Due: 30 June 2017): *Analysis is ongoing, additional information was provided to Cal-IPC from Wildlands Conservation Science after flying additional acreage in 2017*
8. Draft Work Plan and EDRR Plan (30 September 2017): *Draft work plan is still in development; early detection survey routes were identified in September and shared with CMT in December for approval*
9. Prepare and Submit Final Five-year Management Plan for Central Reserve (Due: 31 December 2017): *Delivery of the plan postponed until 31 March 2018*

### *Key Findings*

Initial concerns and priorities identified varied by organization interviewed. However, several key points emerged as universally agreed-upon needs: (1) Work plan – A strategic work plan for invasive plant management, designed (and revisited) in a collaborative and transparent way, which clearly lays out priority actions and responsibilities and formalizes coordination between the region’s land management entities. Interviewees want a plan that dovetails with restoration work, has specific guidelines for each organization’s involvement, and has a consistent system for reporting on progress annually; and (2) EDRR program – A structured EDRR program for invasive plants, including a simple system for sharing information on new detections with the region’s network of land management entities and a clear protocol for how to implement response to new detections. Interviewees want an EDRR workflow with a clear streamlined structure to enable effective response from land managers who already have a lot on their plates.

Through discussions (advanced in 2015) with the core management team (Jutta Burger from Irvine Ranch Conservancy, Jennifer Naegele from Orange County Parks, and Lana Nguyen from Crystal Cove State Park), as well as examination of documents from the Backcountry Council, Harmsworth & Associates, and others, Cal-IPC developed an approach that focuses on maintaining the ecological integrity of core areas while pushing back invasive plants found in other areas of the reserve. Main recommendations and areas of work include the following:

- Create a single list of invasive plant species from the various lists developed by various entities over time, and prioritize plants for control and surveillance;
- Create a GIS layer that delineates management units within the reserve, and includes neighboring lands;
- Identify key management opportunities, design specifications for field work, set annual and long-term goals, and set needed investment levels;
- Support “early detection and rapid response” (EDRR) work so that new invasive plant species get addressed promptly;
- Structure a clear oversight system for each management site and the overall program;
- Develop clear metrics and a dashboard for tracking (and presenting) progress over time.

In February 2017, a Memorandum of Agreement (MOA) was written and submitted to partnering organizations for signatures. The purpose of the MOA is to establish the role and responsibilities of all parties during the first full year of implementation (2017) of the “Five-year Invasive Plant Management Plan for the Coastal Portion of the County of Orange Central & Coastal Subregion NCCP/HCP”. Over the course of the year, agreements were reached with those in leadership (in writing or verbally) positions in California State Parks, Irvine Ranch Conservancy, and OC Parks to implement key tenets of the Plan over the course of the next five years.

Specifically, the following listed initiatives and commitments identified in the Plan were executed in 2017 and continue to be pursued in 2018:

- Prepare and implement annually a management plan based on the criteria in the Plan, focused on specific species and populations of invasive plants prioritized for eradication or containment within individual management units;
- Prepare and implement annually an early detection and rapid response plan, actively scouting for new detections of emergent invasive plants, vetting observations to determine which species and locations are actionable, and implementing timely control measures aimed at eradication;
- Facilitate and participate in annual trainings in support of successful surveillance and treatment tied to implementation of the early detection and rapid response program;
- Adopt common data protocol using the online Calflora Weed Manager annually as a purposeful, shared tool and database for mapping and tracking invasive plant populations and treatment efforts within and between years;
- Share treatment progress through preparation and dissemination of a simple annual report documenting progress made toward stated goals;
- Participate in an annual meeting of NCC, IRC, OC Parks, and State Parks each winter to evaluate compiled results from the previous mapping and treatment season to assess the impact of investments and adjust approaches as necessary;
- Contribute financial resources and/or staff support to implementation of a region-wide invasive plant survey every five years to check progress in achieving over-arching programmatic goals; and
- Collaborate with regional partners through active participation in the Santa Ana River/Orange County Weed Management Area

#### *Notes*

The work plan approved in 2015, to be advanced in 2016 and 2017, and completed in 2018, has two main tasks: (1) generate a five-year invasive plant management work plan for the NCCP-Reserve (developing individual plans for the Central and Coastal Reserve); and (2) recommend an effective EDRR structure for new invasive plant observations.

## 12. Target Bird Monitoring

Project ID	XXXX-XX
Project Title	Target Bird Monitoring
Contractor(s)/Researcher	USGS; SDMMMP; Leatherman BioConsulting, Inc.
Time Period	2014-2018
Total Project Cost	\$370,000
Amount Budgeted	\$30,000 (2016-17); \$175,000 (2017-18)
Fund	Endowment
Matching Contribution(s)	TNC (\$85,000)
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Monitoring/Research
Program Area	Sensitive Biological Resources
Resource	Target Bird Species – California Gnatcatcher and Cactus Wren
Project Purpose	Develop a comprehensive monitoring program for both the California Gnatcatcher and Cactus Wren
Available Report(s)	<i>Natural Communities Coalition California Gnatcatcher Study 2016. Prepared for Natural Communities Coalition. Prepared by Leatherman Bioconsulting, Inc. Nov., 2016.</i>
Available GIS Product(s)	--

### Overview

In support of development and implementation of NCC's long-term Target Bird Species monitoring program, NCC has launched a collaborative planning project with the US Geological Survey (USGS), San Diego Management Monitoring Program (SDMMMP), The Nature Conservancy (TNC), and Colorado State University (CSU), focused on identifying goals, strategies, and objectives, in support of the long-term management and assessment of the NCCP Program in supporting conservation of the two target species. In the development of the plans, emphasis is to be placed on the identification of robust, but cost-efficient, monitoring strategies that are well-coordinated with other southern California NCCPs.

### Progress

In 2014, under the leadership of the US Fish and Wildlife Service (USFWS), several planning sessions were completed in support of the development of a long-term coordinated monitoring program for the California Gnatcatcher designed to determine status and trend of the species in habitat occupancy over time. The process of developing a regional monitoring program involved a team of biologists from USGS, USFWS, SDMMMP, NCC, TNC, and CSU evaluating previous survey efforts to select the most efficient and cost effective survey method and to determine the sampling design. Data were reviewed from the Western Riverside County Multiple Species Habitat Conservation Program, Nature Reserve of Orange County, and from USFWS surveys in San Diego County. To support study design, SDMMMP developed a habitat suitability model for purposes of defining a sampling framework for the monitoring project.

In July, 2015, the USFWS, USGS, and SDMMMP hosted a workshop to advance planning and coordinate sampling effort, timing, and site selection among all of the participating agencies in preparation for the anticipated 2016 field season. Protocols for standardizing the field surveys were shared and discussed among meeting participants. In December, 2015, partnering with The Nature Conservancy, NCC developed a RFP to solicit proposals from qualified contractors for completion of surveys in the Central and Coastal Subregion in 2016. Following review of submitted proposals, NCC entered into a contract with Leatherman BioConsulting, Inc. to complete the surveys in January, 2016.

In 2016, Leatherman BioConsulting, Inc. surveyed 180 spatially balanced and randomly selected plots on three separate occasions from March to the middle of April to determine occupancy by the California Gnatcatcher. Beginning in May, each plot was surveyed for vegetation, describing the structure, density, and composition of the site. A catalog of over 700 photographs, consisting of four photos of each plot, was also created and submitted to allow for comparison with the conditions of the plots during future studies. Occupancy and vegetation data, along with the catalog of photos was submitted to the USGS for analysis of regional estimates of California Gnatcatcher occupancy following the close of the field season in June.

Analysis of local and regional estimates of occupancy were performed by the USGS in 2017. In September, results were presented by Dr. Barbara Kus (USGS) to stakeholders at the California Gnatcatcher Regional Monitoring Workshop hosted by the USFWS in Carlsbad. At the workshop, in addition to discussing the results of the surveys, revisions to the underlying habitat suitability model were presented by Dr. Kris Preston (SDMMMP), and lessons learned discussed by all in attendance. Following the presentations and ensuing discussions, regional surveys for the California Gnatcatcher were tentatively scheduled to be repeated in 2020 and 2024.

Following successful execution of the coordinated, regional survey for the California Gnatcatcher, NCC agreed to partner with The Nature Conservancy in 2017 to survey all mapped habitat across the Coastal and Central Subregion for the presence of Cactus Wren in 2018. The 2018 field season will mark more than five years since NCC last funded work to monitor presence, reproduction, dispersal, or survival of the Cactus Wren. Planned field surveys are to include surveys in areas recently burned in the Canyon 2 Fire (October, 2017) providing the first assessment of the impact of the fire on Cactus Wren. New information collected across the Subregion would build on previous work allowing for assessment of change in the population and creation of a new baseline from which to guide future management actions, including the siting of cactus scrub restoration within the Subregion and translocation directed towards bolstering of isolated populations in the Coastal Reserve.

Baseline occupancy surveys of Cactus Wren across the Subregion in 2018 is identified as the first phase of new work directed in support of the management of the Cactus Wren over the next five years. The second phase is envisioned to involve a sustained investment in translocation of first-year Cactus Wren from an isolated, but productive, population in the Central Reserve to two or more locations in the Coastal Reserve. Activities would overlap the occupancy monitoring to be completed in 2018 and continue through 2022. More intensive monitoring of both the potential donor population and a control would begin in 2018. The third phase of the work involves

monitoring, via the re-sighting of translocated birds, the population of Cactus Wren at the receiver sites in the Coastal Reserve over the course of several years, overlapping and then continuing beyond the translocation events.

### *Key Milestones*

1. California Gnatcatcher Survey Team Training (Due: 31 January 2016): *Completed in early March 2016*
2. Plot Assessments (Due: 15 February 2016): *Completed by mid-March 2016*
3. California Gnatcatcher Surveys (Due 30 April 2016): *Three rounds of surveys were completed between 15 March and 30 April*
4. Vegetation Survey (Due 31 May 2016): *Vegetation surveys were completed 2 May through 9 June*
5. Data Compilation and Submission (Due: 30 September 2016): *Data submission was completed in August 2016*
6. California Gnatcatcher Report Preparation and Submission (Due: 30 September 2016): *Final project report describing the results of the field surveys was completed in November 2016*
7. California Gnatcatcher Regional Data Analysis and Report Preparation (Due: 30 June 2017): *Preliminary analysis completed and results presented in September, 2017; final report postponed until 30 September, 2018*
8. California Gnatcatcher Analysis of Subregion Data and Report Preparation (Due: 30 September 2017): *Preliminary analysis completed and results presented in September, 2017; final report postponed until 30 September, 2018*
9. Cactus Wren Survey Team Training (Due: 31 March 2018)
10. Cactus Wren and Cactus Scrub Surveys (Due: 30 June 2018)
11. Cactus Wren Report Preparation and Submission (Due: 30 September 2018)

### *Key Findings*

Although key findings are not available at this time, as the project is still in progress, preliminary results from the 2016 field surveys are presented below. Analysis of the collected California Gnatcatcher data and a formal report from the USGS is expected to be completed by the end of summer of 2018.

California Gnatcatcher was detected at a total of 53 (of the 180) plots during the three rounds of focused surveys. Highest occupancy rates were observed in the Coastal Reserve, where 31 of 80 plots were found to be occupied. In the Central Reserve and across conservation easement lands 22 of 100 plots were found to be occupied. The difference in observed rates of occupancy are attributed to the presence of mature coastal sage scrub habitat along the coast, versus the more open structure and smaller shrubs present throughout the inland sites, much of which still appears to be recovering from the wildland fires of 2007.

Comparison of observed rates of occupancy between surveys conducted in 2011 and 2016 show little difference in observations for the Coastal Reserve with 34% of surveyed areas occupied in 2011 and 39% in 2016.

Larger differences in observed rates were notes between 2011 and 2016 for the Central Reserve (13% and 25%, respectively) possibly reflecting the increased recovery of the area over the last five-years following the 2007 fires.

The likelihood a California Gnatcatcher was detected when present at a survey site within the County of Orange Central and Coastal Subregion was 69%, or very similar to the estimated detectability for the greater region which extends from Ventura to the Mexico-U.S. border. Occupancy within the Subregion was estimated to be 30%, or 54 of the 180 surveyed sites, which is very close to the actual number of sites where Gnatcatcher was observed to be present (53) during the surveys. Occupancy within the Subregion was substantially higher than the regional estimate (23%) or estimate for San Diego County (20%).

In Orange County California Gnatcatcher presence was closely associated with the presence of increasing cover of California sagebrush, California buckwheat, sunflower, and bare ground, but not higher elevation along the coast or inland.

Interestingly, unlike San Diego County, fire history did not affect occupancy estimates within the Subregion. This observation is consistent with what has been noted for the coastal portion of the Subregion, as surveys conducted in the late 1990s showed the California Gnatcatcher approaching pre-fire densities within the footprint of the 1993 Laguna Fire. Additionally, comparisons in the location of gnatcatcher detections between 2011 and 2016 indicate additional recovery has occurred in Crystal Cove over the five-year period. The suspected increase in gnatcatcher numbers at Crystal Cove was confirmed by park-specific field surveys conducted in 2017 following the above average rain-year of 2016-17.

The more recent fires in the foothills of the Santa Ana Mountains in 2006 and 2007, impacted higher elevation sites. A number of California Gnatcatcher locations were spared, as they are most abundant on the edges at lower elevation sites. The absence of fire along the coast for more than 20 years together with the general spatial separation of the inland populations from the more recent fires may explain the absence of a clear fire-effect in the analyzed data.

### *Notes*

After twenty years of serving as the flagship species for the NCCP Program in southern California, the first regional California Gnatcatcher survey was completed in 2016. The goals of the survey were to improve estimation of the current spatial distribution of the California Gnatcatchers across conserved and military lands from Ventura County to the US-Mexico border, and provide a base-line of long-term monitoring data for future repeat surveys expected to occur in 2020 and 2024. Analysis of regional data is expected to be completed by the US Geological Survey by the end of the summer season, 2018.

### **13. Wildlife Mgmt Scoping**

Project ID	XXXX-XX
Project Title	Wildlife Mgmt Scope/BioBlitz
Contractor(s)/Researcher	UCLA; USGS
Time Period	2014-2017



Total Project Cost	\$61,000
Amount Budgeted	\$20,000 (2016-17); -- (2017-2018)
Fund	Restoration
Matching Contribution(s)	USGS (\$15,000+ estimated); UCLA (\$1,000 estimated)
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Complete
Project Progression	On schedule
Program Class	Planning
Program Area	Sensitive Biological Resources
Resource	Reptiles & Amphibians
Project Purpose	Develop a management and monitoring program for purposes of assessing and improving the effectiveness of the reserve system in preserving native species diversity and the structure and functioning of ecological systems
Available Report(s)	--
Available GIS Product(s)	--

### *Overview*

In support of development of a long-term wildlife management program for the NCCP-Reserve, NCC launched a collaborative planning project with UC Los Angeles (UCLA) and the US Geological Survey (USGS) in 2014. The project brings together a team of area experts to produce a planning document identifying and prioritizing projects addressing the most prominent wildlife management and monitoring objectives as they pertain to amphibians, reptiles, and invertebrates present within the County of Orange Central and Coastal NCCP/HCP Subregion. When completed, the planning document is to include supporting action plans and timelines, tactics, a milestone chart, and multi-year budget for ranking priority initiatives to be funded by NCC and partnering organizations over the next several years.

As envisioned, the planning effort is to result in review of “Identified” and “Special Interest” amphibian and reptile species described by the NCCP for special consideration and management intervention. Review is to include evaluation of whether other species known to inhabit the NCCP-Reserve or neighboring conservation lands should be considered based on known risk factors and/or forecasted future trends in status. Management initiatives proposed through the process are to support the long-term viability of amphibian and reptile species inhabiting the NCCP-Reserve considered to be in jeopardy and at greatest risk of decline. Monitoring strategies are to establish a reliable baseline and future measures of amphibian, reptile, and invertebrate occurrence, species diversity, and trophic complexity within the NCCP-Reserve for purposes of assessing the long-term performance of the NCCP in preserving native species diversity and the structure and functioning of ecological systems.

### *Progress*

In 2014, under the leadership of Brad Shaffer (UCLA), an advisory team was formed and several meetings occurred to discuss priority species and management and monitoring opportunities. Included on the leadership team was Robert Fisher (USGS).

Robert has an extensive history with the County of Orange Central and Coastal NCCP/HCP both as a scientific advisor and principal investigator of biodiversity inventorying and monitoring efforts conducted within the NCCP-Reserve and surrounding region between 1995 and 2002.

In 2015, meetings of the advisory group were continued and ideas concerning priorities for implementation advanced. Findings by the group culminated in a presentation by UCLA to the NCC Board in March. An agreement between NCC and UCLA focused on using next generation genomics to guide long-term management of the western spadefoot was finalized in January, 2016. In February, 2016, both UCLA and the USGS participated in the Science Integration Meeting hosted by NCC. Following the Science Integration Meeting, and in support of defining novel pathways for continuing monitoring of sensitive resource within the Subregion, a concept proposal was developed for implementation of an inaugural BioBlitz event. The proposal was provided to the NCC Technical Advisory Committee for review and comment in July, 2016 and approved by the NCC Board in September, 2016.

The sponsored BioBlitz event, termed BioRAP, occurred over the course of five days in April and May of 2017. Partnering with the USGS and UCLA, the NCC-sponsored BioRAP, was implemented across nine sites. The BioRAP followed an established a protocol developed by the USGS for providing an efficient technique for rapidly documenting herpetofauna throughout the region. The survey sites, selected based on accessibility and habitat heterogeneity, included: Black Star Canyon, Limestone Canyon, Bommer Canyon, Serrano Ridge, Crystal Cove State Park, Aliso Canyon, Laurel Canyon, Shady Canyon, Fremont Canyon, and Weir Canyon.

#### *Key Milestones*

1. Presentation to NCC Board of Directors on metrics/measures considered for inclusion in the monitoring program (Due: 19 March 2015): *Completed on schedule*
2. Participation in the Science Integration Meeting (Due: 31 March 2016): *Completed on schedule*
3. Concept proposals/project abstract(s) (Due: 15 May 2015; Postponed to May 2016): *Concept proposal for BioBlitz event completed in July 2016*
4. Final Scoping Report to include a description of each priority strategy, approach, or project with supporting background rationale, goal, objectives, and methods of approach, supporting action plans/timelines, and business plan (Due: 30 June 2015; Postponed to December 2017): *Production of a final scoping report has been postponed for a time uncertain as the lead agencies on the project wait to analyze results of the BioRAP event and results of the ongoing work tied to the western spadefoot*

#### *Key Findings*

Although the over-arching effort to redefine the management and monitoring priorities for amphibians and reptiles is still in progress, the shorter-term planning project and initial field surveys are considered complete. The first BioRAP event was completed in the spring of 2017, western spadefoot conservation genomics initiative was launched in early 2016, and initial discussions around the direction of future monitoring and management initiatives drew to a close following participation by UCLA and USGS in the Science Integration Meeting.

Designed to provide an inexpensive overview of ecosystem health, using a course-grained survey of the many taxa within the amphibian and reptile community protected by the NCCP/HCP Reserve, the BioRAP was centered on the inventory of the amphibian and reptile diversity still present in the NCCP Reserve (and adjoining conservation lands). The first site to be sampled in the event was surveyed on 22 April 2017. The last to be sampled was surveyed five-weeks later on 27 May. A total of 41 individuals participated in the surveys, including 7 individuals from the USGS, 4 individuals from UCLA, and 30 experienced professionals and volunteers from the North American Field Herping Association, Southwestern Field Herping Associates, Wildlands Conservancy, Irvine Ranch Conservancy, and Natural Communities Coalition.

The series of rapid inventories were designed to constitute a low investment, high reward, rapid assessment of the performance of regional conservation strategies. A typical survey had between 8 to 13 participants and lasted about 3 hours. Often two sites were surveyed in the same day, with surveying occurring both in the morning hours and early or later afternoon. Each survey team carried a GPS unit during the surveys allowing survey tracks to be overlain over a 50-meter by 50-meter grid system of the study area to document where surveys were completed but no observations recorded. In total, 3,154 grid cells were surveyed during the BioRAP, totaling 7.9 square kilometers of the Subregion.

A total of 394 unique observations were made across the nine survey events. An estimated 2,504 reptiles and amphibians were recorded. Twenty-three species were observed, including the southern Pacific rattlesnake, red diamond rattlesnake, speckled rattlesnake, striped racer, gopher snake, California kingsnake, ring-neck snake, western blind snake, granite spiny, western fence-lizard, side-blotched lizard, coast horned lizard, Gilbert's skink, alligator lizard, orange throated whiptail, western whiptail, Pacific treefrog, California treefrog, western toad, black-bellied slender salamander, garden slender salamander, coast range newt, and western spadefoot.

When including all life stages, the Pacific treefrog and western toad were the most commonly observed species. Western fence-lizard was present across all survey sites. The gopher snake was the most frequently reported snake. Interestingly, 13 native species were not observed during the BioRAP but are historically known to be present at one of more of the survey sites. The undetected species included the aboreal salamander, Monterey ensatina, western skink, California legless lizard, rosy boa, red coachwhip, nightsnake, mountain kingsnake, long-nosed snake, patch-nosed snake, black-headed snake, two-striped garter snake, and western pond turtle.

The first-ever BioRAP, engaged local professional experts, and together with UCLA afforded the USGS the opportunity to test new methods for documenting and showcasing the reptile and amphibian diversity of the NROC portfolio using a platform created through iNaturalist (<https://www.inaturalist.org/projects/nature-reserve-of-orange-county-2017-herp-biorap>).

In addition to providing occurrence data on species of interest, supporting the long-term assessment of the regional conservation strategy for Central/Coastal OC, the events provided novel opportunities for outreach to the public about the status of biological resources in the reserve, fulfilling another listed goal of the NCC strategic plan.

Notes

Draft criteria for ranking science and land management projects eligible for NCC funding were developed by NCC staff in 2015 following a discussion by the wildlife advisory group on the history of listing species under the NCCP and progress made to date on regional prioritization of conservation initiatives for wildlife, specifically amphibians and reptiles.

Funding was approved in 2015 and 2016, respectively, by the NCC Board, for assessment of the status of the western spadefoot across Central-Coastal Subregion, and implementation of BioBlitz events in the winter and spring months of 2017.

**14. Adaptive Recreation Mgmt**

Project ID	XXXX-XX
Project Title	Adaptive Recreation Mgmt
Contractor(s)/Researcher	USGS; Michael Patten (University of Oklahoma)
Time Period	2015-2017
Total Project Cost	\$175,000
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	CDFW (\$75,000); OC Parks (\$40,000)
Landowner Involvement	OCP, COI, CCSP, CDFW, CONB, UCI, TCA, TIC
Project Status	Complete
Project Progression	On schedule
Program Class	Research/Monitoring
Program Area	Recreation
Resource	Sensitive Biological Resources
Project Purpose	Adaptively manage public access and recreational uses within the NCCP-Reserve by using science to inform development of a trail network and supporting recreation program compatible with the protection and long-term management of biodiversity
Available Report(s)	<p><i>Final Report for California Department of Fish and Wildlife Local Assistance Grant #P1482109 – Assessing Effectiveness of Adaptive Recreation Management Strategies and Evaluation of Core NCCP/HCP Habitat Areas. Prepared by University of Oklahoma. Mar., 2017</i></p> <p><i>Wildlife Response to Wilderness Access Days – Impacts on Abundance and Behavior. Final report submitted to the Irvine Ranch Conservancy and Natural Communities Coalition. Nico Alegria (UCSB Bren School). Sept., 2015.</i></p> <p><i>The Urban Edge: Ecological Light Pollution within the City of Irvine Open Space Preserve. Nathan Burroughs (UCSB Bren School). Sept., 2016</i></p>
Available GIS Product(s)	--

## *Overview*

Consistent with the Habitat Management Program for the County of Orange Central and Coastal Natural Community Conservation Plan (NCCP)/ Habitat Conservation Plan (HCP) the present study addresses the following objectives tied to recreation management: (1) test the utility of specific recreation management guidelines (hypotheses) rooted in analyses conducted under a prior Local Assistance Grant (#P0982014) awarded to the Irvine Ranch Conservancy in 2010; (2) evaluate the current pattern of human use and associated trail systems in relation to core or otherwise sensitive areas for wildlife; and (3) recommend revision and expansion of the human-use and wildlife monitoring system across the NCCP-Reserve.

General methods of approach involve: (1) assessment of temporal changes in activity of seven key mammal species, response to pulses of human activity, and seasonal patterns and associated changes in wildlife sensitivity; (2) analysis of location data collected over the last decade from studies conducted in the NCCP-Reserve to estimate and visualize bobcat space use in relation to landscapes features, including the current trail network; (3) estimation and visualization of the spatial extent of high-value areas for wildlife within the NCCP-Reserve associated with general landscape features; (4) validation of modeling of high-value areas using available multi-taxa animal data; (5) identification of prospective hotspots for recreation management through evaluation of the spatial relationship between known high-use areas of bobcats and high-value (or core) habitat areas and the current trail network within the NCCP-Reserve; and (6) based on the results of the proposed study, development of recommendations for expansion/refinement of the current human-use and wildlife monitoring program.

## *Progress*

The project is now considered to be complete. An initial planning meeting for all project team members was completed in March, 2015, following the beginning of the grant period. The meeting, coordinated by NCC, allowed for coordination among team members on work tasks, discussion of deliverables, timelines, and information transfer among members of the project team. Project team members include Dr. Milan Mitrovich (NCC), Dr. Jutta Burger (IRC), Dr. Michael Patten (University of Oklahoma), Dr. Erin Boydston (US Geological Survey; USGS), Dr. Jeff Tracey (USGS), Will Miller (US Fish and Wildlife Service), and Christine Beck (California Department of Fish and Wildlife). In 2015, analysis of camera-trap data was advanced by both Michael Patten and Nico Alegria (UC Santa Barbara) under the guidance of Jutta Burger (IRC). A project report was finalized by Nico Alegria in September, 2015, highlighting diel shifts in activity in key wildlife species on days with and without human disturbance. Analyses by the USGS have focused on development of maps and GIS models of the spatial complexity of the Coastal and Central Subregions, in support of identification of potential Core Habitat Areas for wildlife.

In 2016, the project team met as a group in both May and October in Irvine to discuss and share results of ongoing analyses and advance the project. Following the first meeting, general schedules were outlined for completing any outstanding analyses and to advance written drafts of findings related to components the first (“Assessment of Recreation Management Strategies”) and second (“Identification of Core Habitat Areas and Management Hotspots”) components of the project.

The focus of the second team meeting centered on identifying: the critical questions needing to be addressed by expanding the human-use monitoring system; management implications of the present work with respect to recreation or (more generally) human-use within the study area.

An interim report was prepared by Dr. Michael Patten and submitted to the California Department of Fish and Wildlife for review and comment in March, 2016. Nathan Burroughs (UC Santa Barbara) under the guidance of Jutta Burger (IRC) and others, described edge disturbance across the study area, characterizing light pollution and other types of habitat degradation occurring along the urban-wildland interface. Nathan's findings were summarized in a report completed in September, 2016.

In 2017, the project team completed the final report for submittal to the California Department of Fish and Wildlife in March. The report was completed on schedule and included the Large Event Report and Anthropogenic Light Report as appendices. An associated report prepared by the USGS discussing analysis of bobcat movement data and multi-taxa indices of high-value areas within the study area is undergoing the now customary internal review by the agency and is expected to be available for distribution in early 2018. Michael Patten (University of Oklahoma), sharing the results of analysis of the camera-trap data, made a presentation entitled "Avoidance Behavior and Diel Shifts by Mammals in Urban Reserves" at the International Urban Wildlife Conference held in San Diego 4 to 7 June, 2017.

#### *Key Milestones*

1. Project Setup and Initial Planning Meeting (Due: 15 March 2015): *Completed on 12 March 2015*
2. Compile and Analyze Camera-trap Data (Due: 15 September 2016): *In progress*
3. Identification of Core Habitat Areas and Recreation Management Hotspots (Due: 15 September 2016): *In progress*
4. Interim Progress Report (Due: 15 March 2016): *Completed on schedule*
5. Second Team Planning Meeting (Due: 15 May 2016): *Completed on 24 May 2016*
6. Third Team Planning Meeting (Due: 15 September 2016): *Completed on 21 October 2016*
7. Recommendation for Expansion of Human-use and Wildlife Monitoring (Due: 31 December 2016): *Completed in 2017*
8. Draft Final Report + GIS Models and Maps (Due: 15 January 2017): *Completed on Schedule*
9. Final Project Report (Due: 15 March 2017): *Completed on 27 March 2017*

## *Key Findings*

Key findings shared and discussed by the project team at planning meetings and in the final report follow.

### *Camera-trap Data Analysis*

- Wildlife avoidance was evident regardless of species, type of human activity, and camera placement. The overall trend is sharply negative: as human activity increases, mammal activity decreases.
- Human presence (within the prior 24 hours) leads to temporal shifts by wildlife in areas already accustomed to human disturbance. Consistent with the findings of earlier research conducted on bobcats and other wildlife, camera-trap data showed evidence of strong behavioral shifts, especially for coyotes and mule deer to more nocturnal activity periods.
- Shifts by both species leads to enhanced predator-prey dynamics as the mule deer activity period becomes more nocturnal allowing for greater overlap with its principal predator, the mountain lion. Similarly, shifts by the coyote to nocturnal conditions, presents greater overlap between predator (coyote) and known prey (gray fox), increasing the vulnerability of gray fox to higher rates of predation.
- In areas generally not accessible to the public, human activity spikes associated with large events lead to temporal shifts by wildlife to more nocturnal activity, prior to returning to pre-event levels within a few days.
- Time-series analysis identified seasonal variability in wildlife activity exists between years, suggesting there are select times of the year when wildlife may be more vulnerable to human-presence (or disturbance) than others.
- Although there is no detectable increase or decrease in mammal captures across the nine years of data, a negative correlation between mammal detection and human presence was identified at the landscape-level.

### *Movement Based Estimation and Visualization of Bobcat Space-use:*

- Modeling efforts of bobcat space use highlight the need by female bobcats for contiguous quality habitat for home range placement. Female bobcats are strongly associated with natural areas, and resource selection models highlight the particular importance of the NCCP/HCP reserve habitat.
- Modeling efforts based on fine-scale selection highlight additional habitat areas outside of the NCCP/HCP Coastal Reserve that may be of real benefit to bobcats and likely other wildlife through the enhancement of functional connectivity.
- Given the limited amount of contiguous open space within the Coastal Reserve and observed sensitivity of wildlife to human-presence, a cautionary approach to expanding human-activity beyond authorized trails and outside of already established sunrise to sunset activity envelopes is suggested.

### Conclusions:

- Marked increase in human-use of wildlands over the last nine years coupled with observed temporal and spatial shifts by wildlife due to human presence highlights the importance of developing an over-arching, adaptive recreation management plan for the NCCP/HCP Reserve. Focal dimensions for recommended future work include: (1) determining current reserve-wide visitor-use levels and spatial and temporal distributions; (2) assessing biophysical resource conditions; (3) understanding visitor perceptions, values, and judgements, as well as their understanding of the genesis for the lands conserved under the NCCP; and (4) providing scientific expertise in park planning and management.
- New information on human-use and values, when complemented by the findings of the present study, is to advance planning tied to threshold management, core area designation, and trail design and use. Next steps involve determining thresholds of acceptability of key indicators of resource and social conditions, and assisting land managers in development of a range of possible management actions when conditions exceed these levels.

### Notes

NCC was awarded a Local Assistance Grant for \$75,000 in support of the project from CDFW in late 2014. In addition to the \$40,000 contribution from OC Parks, project support includes \$23,230 in in-kind services from the Irvine Ranch Conservancy.

### 15. HREP Update

Project ID	XXXX-XX
Project Title	HREP Update
Contractor(s)/Researcher	Land IQ
Time Period	2015-2018
Total Project Cost	\$300,000
Amount Budgeted	\$100,000 (2016-17); \$100,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Planning
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Update the Habitat Restoration Enhancement Plan, identifying and prioritizing habitat restoration opportunities and constraints by management area across the NCCP-Reserve
Available Report(s)	--
Available GIS Product(s)	--



## *Overview*

The project advances the NCC Habitat Restoration and Enhancement Plan (HREP) by funding a team of professional restoration ecologists to assess habitat restoration opportunities and constraints across the NCCP-Reserve working at both the scale of the Reserve as well as individual Management Units. Efforts are to include facilitation of a stakeholder-driven process for identifying and prioritizing the identified restoration opportunities. Updating of the HREP is expected to be a three-year process, with year-one focused on building consensus across the landowners, land managers, and key partners on the landscape-level priorities for restoration within the Reserve System.

## *Progress*

In 2014 and 2015, NCC staff hosted multiple planning sessions with Land IQ (contractor identified to facilitate update of the HREP) to discuss project goals, objectives, and approach. A draft scope of work was developed by Land IQ covering the three-year project. NCC reviewed the scope, highlighting opportunities to integrate the restoration planning initiative with other overlapping science and land management initiatives supported by NCC. Following revision of the original scope of work, and supporting timelines for implementation, NCC entered into an agreement with Land IQ to complete the first year of an envisioned three-year effort in September, 2015. Specifically, the first-year comprises a number of tasks directed at completing a regional conceptual design and management visions to guide the development of park-level habitat restoration planning.

In 2016, Land IQ participated in strategic planning efforts and meetings including the Science Integration Meeting hosted by NCC on 25 February 2016. At the Science Integration Meeting the team identified the types of broad restoration opportunities to be considered for pursuit in the upcoming years. Opportunities were identified based on needs and success measures based on review of the existing Habitat Restoration Enhancement Plan, new datasets, feedback from other NCC planning efforts and practitioner expertise.

In 2016, Land IQ developed a GIS-based model of monthly soil moisture patterns (storage, demand, and deficit) of the Reserve's complex topography and soil, combined with other correlates (e.g., soil texture, past land use), to identify site-specific ecologically appropriate vegetation community restoration targets. Conversations with UC Irvine followed development of the models and centered on the results of the modelling efforts, climate change forecasts and adjustment of restoration targets, and identifying characteristics of sites that are believed to be stable and or increasing in native cover. In 2016, Land IQ also advanced development of Best Management Practices (BMPs) based on lessons learned from active and historic restoration projects and practitioner expertise; initiated analysis of costs tied to successful landscape-scale restoration methodologies; and participated in preliminary discussions with NCC staff about 1 to 2 large projects for immediate pursuit of grant funding.

In 2017, Land IQ finalized a generalized, adaptive management approach for landscape-scale habitat restoration for large projects (~100 acres) that is cost-effective, adapts to site-specific uncertainty of outcome, and primarily relies upon natural rainfall for implementation.

The approach includes adaptive management principles such as monitoring feedback and decision points. The final plan is to include examples of typical habitat restoration planning made possible by using the methods highlighted within the adaptive approach. Implementation specifications for each method identified is to be provided as a reference and address site selection, site preparation and weed management, seed sourcing, plant palettes, seeding rates, seed installation, planting techniques, monitoring methods and post-installation weed management.

Land IQ advanced the modeling of vegetation alliances across the planning area in 2017, including examining changes under climate change scenarios. Model outputs were intended to support identification of ecologically appropriate restoration targets in otherwise, historically disturbed sites. To aid interpretation of the modeling efforts, Land IQ examined the stability of shrub-herbaceous cover within the Reserve over a twenty-year period. Analysis helps to identify the environmental characteristics of stable, increasing, and decreasing vegetation types. Information from completed analyses is to inform the identification of ecologically appropriate habitat restoration targets across the Reserve.

NCC staff and Land IQ began meeting on monthly basis in 2017 to discuss project progression and review project deliverables as they were advanced. Meetings culminated in a working session with partners hosted by NCC in October. The working session provided stakeholders with an overview of the purpose and strategic planning implemented to date on development of the plan, a detailed review of the adaptive management approach, and background on the modeling techniques used to inform development of priority maps for restoration within the planning area. The approach highlighted by the work and project deliverables discussed at the meeting were well received; a second meeting to share examples of priority maps for restoration was requested and planned for the end of January, 2018.

Field assessments to validate and refine the results of reserve-wide analysis of restoration opportunities, needs, targets, and success measures are planned for 2018. Field surveys and conversations with local stakeholders and species and subject matter experts are to inform identification of prospective restoration opportunities by management unit.

In 2018, Land IQ will continue to work with local stakeholders, partnering agencies, and land owners/managers, to make a consensus selection of priority project opportunities to be recommended for further development. Select projects found to be multi-benefit and multi-partner may be advanced for purposes of pursuing outside funding with matching funds provided by NCC. A finalized updated, landscape-level habitat restoration plan is to be submitted to the NCC Board and Wildlife Agencies for approval in the fall.

### *Key Milestones*

1. Strategic Planning Document (Due: 31 March 2016): *Document prepared in June 2016 and shared with the TAC in July*
2. Geospatial Database, Existing Conditions Report and Bibliography (Due: 30 June 2016): *Continually advanced throughout the planning process*
3. Summary Profiles and Conceptual Models (Due: 30 June 2016): *In progress*

4. Regional Habitat Restoration Potential Report and Geodatabase (Due: 30 June 2016): *In progress*
5. Regional HREP Goals and Objectives Workshop (Due: 31 August 2016): *Completed October 2017*
6. NCC Habitat Restoration BMPs (Due: 31 August 2016): *Shared with partners in October 2017*
7. Draft Park-Level HREP Objectives & Priorities (Due: 31 August 2016): *Scheduled to be shared in January 2018*
8. Park-Level HREP Plans, including Work Packages for Management Units (Due: 31 March 2018):
9. Draft HREP Document (Due: 31 March 2018):
10. Final HREP Document (Due: 31 August 2018):

### *Key Findings*

Findings are not available at this time, as the project is still in progress. Key themes being addressed following the first year of implementation of the project include: landscape-scale habitat restoration; sources of uncertainty tied to climate change, fire, and seedbank condition; adaptive management; cost-effect methods; natural rainfall driven restoration; maximize return on investment; integration of planning efforts; measures of success; and stakeholder & resource agency engagement.

### *Notes*

Funding for years two and three of the project (2017, 2018) was approved by the NCC Board in the fall of 2016.

## **16. Cactus Salvage Portola/Orchard Hills**

Project ID	XXXX-XX
Project Title	Cactus Salvage Portola/Orchard Hills
Contractor(s)/Researcher	Land IQ; Nakae; Stice Company
Time Period	2014-2021
Total Project Cost	\$1,170,000
Amount Budgeted	\$160,000 (2016-17); \$110,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, COI, CCSP, TIC
Project Status	Ongoing
Project Progression	On schedule
Program Class	Land Management
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Salvage topsoil and cactus material from development sites for use in the restoration of coastal sage scrub and cactus scrub within the NCCP-Reserve

Available Report(s)	<p><i>2017 Performance Monitoring Report Year 2 – Crystal Cove State Park Cactus Salvage and Cactus Scrub Restoration Project. Prepared by Land IQ. Nov., 2017.</i></p> <p><i>2017 Performance Monitoring Report Year 1 – Whiting Ranch Wilderness Park Cactus Salvage and Restoration Project. Prepared by Land IQ. Nov., 2017.</i></p> <p><i>Restoration of Nesting Habitat for the Coastal Cactus Wren Using Salvaged Cactus on Irvine Ranch Conservancy – Managed NCCP Lands. Prepared by the Irvine Ranch Conservancy. Feb., 2016.</i></p>
Available GIS Product(s)	--

### Overview

Separate opportunities emerged in 2014 and 2015 to work with partnering organizations, specifically the Irvine Ranch Conservancy, OC Parks, State Parks, and the Irvine Company to salvage topsoil and cactus from future development sites located outside of the NCCP-Reserve for use in the restoration of coastal sage scrub and cactus scrub within the NCCP-Reserve. These opportunities involve conducting salvage operations within the geographic areas of Portola Hills, Portola Center, and Orchard Hills. Working together with IRC, TNC, contractors, and the landowners, topsoil and cactus are to be salvaged from the sites for distribution within the Central and Coastal Reserves. Specifically, captured topsoil is being considered for delivery to active restoration areas within the Central Reserve within the County-owned Whiting Ranch Wilderness Park and Irvine Ranch Open Space. In addition to Whiting Ranch and Irvine Ranch Open Space, salvaged cactus is to be considered for delivery to sites within the Coastal Reserve to complement existing cactus scrub restoration fostering recovery of the Cactus Wren population.

### Progress

In 2014, cactus (34 clumps and 1,000 pads) were salvaged from the Portola Hills development site and delivered to the active West Loma and Mule Deer restoration sites managed by the Irvine Ranch Conservancy on behalf of OC Parks, and City of Irvine, respectively. Also, in 2014, cactus from the same salvage site was captured and moved for planting at CCSP, following site preparation activities across 9.7 acres of degraded habitat above Muddy Canyon. The new restoration at CCSP complements 4.0 acres of ongoing, NCC-sponsored, cactus scrub restoration occurring in the State Park.

At Whiting Ranch Wilderness Park, 6.8-acres of planned cactus scrub restoration was postponed until the fall of 2015, as local conditions (i.e., saturated soils) prevented access to the restoration site by heavy equipment for purposes of site preparation. In an effort to save mature cactus present at the Portola Center development site prior to clearing activities, mature cactus clumps were salvaged in February 2015 and planted in a fallow field adjacent to the McFadden Ranch House at Whiting Ranch. The total amount of salvaged cactus clumps planted at the McFadden Ranch House (500) is expected to support approximately 20 acres of new cactus scrub restoration within Whiting Ranch and neighboring areas of the Central Reserve over the next few years.

Expanding upon the salvage activities conducted in 2014, in the fall of 2015, cactus scrub restoration was initiated across 5.7-acres of disturbed non-native grassland habitats at Whiting Ranch. In October and November, work conducted by NCC contractors resulted in a total of 62 clumps of mature cactus being moved from the McFadden Ranch House and 4,290 pads and 372 segments collected and transported from the Orchard Hills development area to support restoration efforts at Whiting Ranch. The establishment maintenance period commenced after the installation was completed and is to continue for approximately five seasons, and will include two irrigation events and weed control for two years prior to seeding. The level of maintenance required for each of the five years will depend on weather conditions and site development.

In the late winter of 2015-16 a fourth salvage project was initiated. Working with IRC, OC Parks, and the Irvine Company, NCC partnered to salvage 4,000 CY of native topsoil and mature cactus plants and pads from the development site owned by the Irvine Company located in North Irvine (Orchard Hills) for purposes of restoring approximately seven acres of coastal sage scrub habitat (at West Loma, Hicks Canyon, and Portola Staging Area) and select breeding sites for the Cactus Wren within the NCCP-Reserve at six sites (Buck Gully, Quail Hill, Mule Deer/North Laguna Canyon, West Loma, Limestone Canyon, Portola Orchard). Through this operation, a total of 118 mature clumps and 600 pads of cactus from Orchard Hills were salvaged and planted. Coordination with, and funding from, The Nature Conservancy (TNC), resulted in additional clumps and pads being transported and planted on easement lands bordering the Reserve at West Loma in both 2014 and 2015.

In 2016, site maintenance at Crystal Cove State Park continued with weed control events in February, March, and June. Open areas were sprayed and the basins, containing the planted cactus were hand weeded. The dominant weeds controlled were non-native grasses and mustard species. Performance monitoring was conducted in spring 2016 and consisted of qualitative evaluation of cactus growth and survivorship, estimated plant cover, species abundance, and photo documentation. The new restoration project at Whiting Ranch was monitored by Land IQ throughout 2016. Maintenance activities included spraying of weed species, largely mustard and annual grasses.

Performance monitoring occurred in the spring 2017 at both at Crystal Cove State Park and Whiting Ranch Wilderness Park. Additionally, at Crystal Cove State Park, mustard and non-native grasses germinating from the existing seed bank were mowed and weeded by hand in March 2017. At Whiting Ranch, non-native grasses and mustard were spot-sprayed and hand-weeded in February, May, and October 2017.

In early 2018, the restoration sites at Crystal Cove State Park and Whiting Ranch are scheduled to be seeded. Seed source for Crystal Cove includes both locally collected seed and seed provided by S&S Seeds, originally collected at Camp Pendleton, Ranch Mission Viejo, and the Irvine Ranch. Following seeding, weed control and site maintenance is scheduled to continue for another two years at Crystal Cove (through 2019) and three years at Whiting Ranch (through 2020).

## Key Milestones

1. Field assessments of Portola Hills and Portola Center salvage sites (Due: 1 July 2014): *Completed on schedule*
2. Initial field surveys of prospective restoration sites at CCSP and Whiting Ranch (Due: 1 July 2014): *Completed on schedule*
3. Secondary field surveys of prospective restoration sites at CCSP and Whiting Ranch (Due: 31 October 2014): *Completed on schedule*
4. FINAL Habitat Restoration Plan for CCSP (Due: 31 October 2014): *Completed in October, 2014*
5. FINAL Habitat Restoration Plan for Whiting Ranch (Due: 31 October 2014): *Completed in October, 2014*
6. Phase I Salvage, transfer, and planting of cactus at West Loma and Mule Deer Sites: (Due: 31 December 2014): *Completed in November 2014*
7. Site Preparation CCSP (Due: 31 December 2009): *Site preparation completed in December 2014*
8. Site Installation CCSP (Due: 31 December 2014): *Cactus material salvaged and installed in December 2014*
9. Field surveys and site flagging at Whiting Ranch (Due: 15 January 2015): *Completed in January, 2015*
10. Cactus salvage at Portola Center and planting-in at the McFadden Ranch House at Whiting Ranch (Due: 15 February 2015): *Completed on schedule*
11. Site preparation Whiting Ranch (Due: 30 September 2015): *Completed on schedule*
12. Field assessments of Orchard Hills salvage site (Due: 1 October 2015): *Completed on schedule*
13. Cactus salvage at Orchard Hills and planting-in at Whiting Ranch and six additional sites within the NCCP-Reserve (Due: 15 December 2015): *Completed in November 2015*
14. Site installation of large campus clumps at Whiting Ranch (Due: 31 December 2015): *Completed by 15 December 2015*
15. Soil salvage site prep West Loma, Hicks Canyon, and Portola Staging Area (Due: 15 December 2015): *Completed by 31 December 2015*
16. Soil salvage capture, delivery, spreading, and erosional control measures (Due: 31 December 2015): *Completed by 31 January 2016*
17. Installation Report Whiting Ranch Wilderness Park (Due: 31 December 2015) *Completed on schedule*
18. Year 1 – Annual Performance Monitoring Report for CCSP (Due: 31 December 2016): *Completed in November 2016*
19. First and Second Annual Site Maintenance CCSP (Due: 31 December 2015 & 2016): *Completed on schedule in both 2015 and 2016*
20. First Annual Site Maintenance Whiting Ranch Wilderness Park (Due: 31 December 2016): *Completed on schedule*
21. Third Annual Site Maintenance CCSP (Due: 31 December 2017): *Completed in March 2017*

22. Year 1 – Annual Performance Monitoring Report for Whiting Ranch Wilderness Park (Due: 31 December 2017): *Completed in November 2017*
23. Year 2 – Annual Performance Monitoring Report for CCSP (Due: 31 December 2017): *Completed in November 2017*
24. Second Annual Site Maintenance Whiting Ranch Wilderness Park (Due: 31 December 2017): *Completed on schedule*
25. Seeding Event for CCSP (Due: 1 February 2018):
26. Seeding Event for Whiting Ranch Wilderness Park (Due: 1 February 2018):
27. Year 2 – Annual Performance Monitoring Report for Whiting Ranch Wilderness Park (Due: 31 December 2018):
28. Year 3 – Annual Performance Monitoring Report for CCSP (Due: 31 December 2018):

### *Key Findings*

Key findings are expected to evolve over time as the project is ongoing. In 2014 and 2015, a total of 22.5 acres of cactus scrub (15.4 acres) and coastal sage scrub (7.1 acres) restoration have been initiated within the NCCP-Reserve through soil and cactus salvage efforts. Additionally, over the same period, in support of the creation of new nesting opportunities for the Cactus Wren, 1,600 pads, 100 segments, and 152 cactus clumps were strategically planted across six sites within the NCCP-Reserve.

In both 2016 and 2017, the restoration project at Crystal Cove State Park was noted as developing within an expected range of growth and is on track towards the development of cactus scrub habitat. Planted cactus material exhibited new growth and flower development, and flowering, seed development, and recruitment of native species was observed. In 2017, Native vegetation was estimated to cover 15 to 20% of the site. Seventy to seventy-five percent of the site was non-vegetated, and 5 to 10% of the site was covered by exotic vegetation.

In 2017, the restoration project at Whiting Ranch Wilderness Park was noted as developing within an expected range of growth and demonstrates a trend towards the establishment of the cactus scrub community. Native cover was estimated to be approximately 5 to 10% of the site. Estimated cover of cactus species was approximately 10 to 15% of total native cover. Seventy-five to eighty percent of the site was non-vegetated, and 5 to 10% of the site was covered by exotic vegetation.

Even at this early stage of establishment, bird activity was observed within and near the restoration area at Whiting Ranch in November 2016 when a pair of Cactus Wren (possibly a family group) was observed utilizing the upper central edge of the restoration site.

### *Notes*

In 2014, \$500,000 was approved for the salvage and restoration projects related to development of the Portola Hills and Portola Center sites. The allocated funding was to cover to cost associated with the salvage and initial establishment of cactus and topsoil. Additional funding was recognized as being required to cover the long-term maintenance costs of the restoration resulting from the salvage efforts. A minimum of 20-acres of cactus scrub restoration is expected to be implemented through the multi-year initiative.

In 2015, an additional \$400,000 was approved by the Board to support soil and cactus salvage within the Reserve. The recently identified opportunities to salvage topsoil are envisioned to be the first, in a series of opportunities likely to be presented over the next five years tied to future development. Working through the partnerships established over the last two years, the intent of NCC staff is to work within the timelines and guidelines established by the Irvine Company, to salvage up to 15,000 Cubic Yards of soil in a given year, repeating the effort no more than three times over a five-year period, recognizing soil salvage is to be used to support habitat restoration in the Reserve and not used at sites already highlighted for mitigation or contractual obligations.

In 2016, \$160,000 was approved by the Board to support the final three years (2017, 2018, and 2019) of maintenance of the 9.7-acre site at CCSP. Maintenance activities largely involve hand weeding of the site.

In 2017, \$110,000 was approved by the Board to support the final three years (2018, 2019, and 2020) of maintenance of the 5.7-acre site at Whiting Ranch. Maintenance activities largely involve continued hand weeding of the site.

The temporary planting of 500 mature, salvaged cactus clumps at the McFadden Ranch House at Whiting Ranch in 2014 has provided for the support of ongoing and future cactus scrub restoration within the Park and adjoining conservation lands.

## 17. Land Manager Training

Project ID	XXXX-XX
Project Title	Land Manager Training
Contractor(s)/Researcher	Land IQ;
Time Period	2014-2017
Total Project Cost	\$45,000
Amount Budgeted	\$15,000 (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Complete
Project Progression	On schedule
Program Class	Education/Training
Program Area	Habitat Restoration
Resource	Coastal Sage Scrub
Project Purpose	Provide land manager training in the field of habitat restoration and fuels management
Available Report(s)	--
Available GIS Product(s)	--



## *Overview*

The land manager training program is to provide both classroom and field-based training in the field of habitat restoration and fuels management. As envisioned, training would involve site visits to active habitat restoration sites and fuel modification zones both within and outside the NCCP Reserve, demonstration projects, as well as field and lab based lectures on pertinent restoration and fuel management topics, including, but not limited to: soils, mycorrhizae, site selection, site preparation, seed collection, use of topsoil, seed and planting, irrigation, vegetation thinning, and site maintenance. The training program would be offered to land managers, landowners, and key partners involved with the Central/Coastal OC NCCP.

## *Progress*

The first expression of the program providing land managers with training on priority natural resource issues is now considered to be complete. In 2014, NCC, together with Land IQ, sponsored a two-day training workshop on the role of soils in habitat restoration for land managers, researchers, and conservation practitioners. The workshop featured the soil scientist, David Kelley, and was structured to offer a morning in-class lecture experience followed by an afternoon field program on both days. The relationship between soils and southern California plant communities was highlighted, as well as techniques in soil assessment and habitat restoration methodologies. The in-class lectures were held at the IRWD Community Meeting Room. Upper Chiquita Canyon served as the focus area for the field lectures and hands-on training.

In the spring of 2015, NCC, together with Land IQ, sponsored a second workshop on soils and restoration in partnership with Crystal Cove State Park. The two-day training workshop was designed to highlight two long-running restoration projects on the bluffs at Crystal Cove State Park and San Onofre State Beach. The two projects emphasize the role of soil compaction and microbes in the restoration of coastal sage scrub. Over the course two-days in April, participants, together with David Kelley and the team from Land IQ, explored both restorations and discussed the specific strategies used to overcome the unique challenges presented by each site. In addition to David Kelley and the team from Land IQ, David Pryor, retired environmental scientist with State Parks, attended the workshop to share his experience with participants as the project lead both at San Onofre and the bluffs at Crystal Cove State Park.

No training activities were offered in 2016. A third workshop, initially consider for the fall of 2016, on the use of native seeds in restoration has been postponed indefinitely. In lieu of the workshop, informal communications have taken place (and are due to continue) among partners and knowledgeable restoration contractors on the potential for development of a native seed storage cooperative, and collection and use policy for the Reserve.

In May, 2017, following approval of the Wildland Fire Management Plan and Stakeholder Implementation Guide, NCC staff hosted a workshop for landowners and stakeholders discussing the evolution and important components of the Wildland Fire Management Plan. Contractors, Michael Huff (Dudek) and Carol Rice (Wildland Res Mgt), involved with development of the plan and individual stakeholder guides, participated in the meeting, addressing questions and providing the audience with an overview of the process involved with plan development.

### *Key Milestones*

1. Organize and host Soils Workshop (Due: 31 December 2014): *Workshop organized and completed in November, 2014*
2. Organize and host Soils Workshop II (Due: 15 May 2015): *Workshop organized and completed in February, 2015*
3. Organize and host Fuels Management Workshop (Due: 15 December 2017): *Workshop delayed per retirement and hiring of OCFA Fire Resource Planner; workshop/field trip is planned for 2018*

### *Key Findings*

Following creation and implementation of the first three years of land manager-based workshops, NCC staff has found workshop participants to often cite the experience itself or specific lessons covered during the workshops as influential in changing their perception or understanding about how best to approach restoration and fuels management. With regards to restoration, the complexity and importance of considering soils prior to initiating a seeding or planting event was clearly a take-home message well received.

In the weeks following both workshops on soils and restoration, when asked to provide comments, participants expressed appreciation for the opportunity to learn from the extremely knowledgeable professionals teaching the multi-day classes. Participants appreciated also being given instruction and lectures in both the classroom and field settings. Comments received from the first workshop helped to direct the location and topics covered in the second workshop and reinforced the belief by NCC staff that bringing together a diverse group of professionals to address and consider a common land management challenge helps to strengthen comradery and the concept of teamwork across an otherwise multi-agency, multi-jurisdictional lands collaborative.

### *Notes*

In collaboration with COAST and other partners, NCC is developing a strategic plan to reduce roadside ignitions and limit the spread of fires into wildlands. Working with partners, NCC is identifying and prioritizing strategies for roadside vegetation management, restoration, fire detection, roadside operations and maintenance standards, and public education. Future training opportunities tied to advancement of this work are numerous and will be explored by NCC staff as appropriate in the coming years.

## 18. Western Spadefoot Mgmt

Project ID	XXXX-XX
Project Title	Western Spadefoot Mgmt
Contractor(s)/Researcher	--
Time Period	2016-2018
Total Project Cost	\$150,000
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	Requires additional attention by NCC staff and/or contractors
Program Class	Research/Monitoring
Program Area	Sensitive Biological Resources
Resource	Western Spadefoot
Project Purpose	Identify movement corridors or hotspots of genetic diversity for purposes of directing the location and informing the restoration strategy for construction of new breeding pools to augment the viability of the Western Spadefoot in Central-Coastal OC
Available Report(s)	<i>Project Update Western Spadefoot Population Genetics. Prepared by University of California, Los Angeles. July, 2016.</i>
Available GIS Product(s)	--

### Overview

Funding covers a two-year study conducting cutting-edge genetic analysis of all Western Spadefoot breeding sites within and around the Nature Reserve of Orange County. The work is to include analysis of comprehensive historical specimens sampled over the last two decades from throughout southern California, and new samples to be non-destructively collected in 2016 and 2017 breeding seasons from Central-Coastal OC.

Collectively, this effort will use population and landscape genetics methods to: quantify population size and connectivity as it has existed across the region historically, and in present-day; evaluate whether current, relatively passive management has led to healthy and stable populations; and, identify regions within the migratory capacity of the species where newly constructed vernal pool breeding sites stand the best chance of augmenting the viability of the species across Orange County, focusing on Central-Coastal.

Field visits in 2016 and 2017 will follow significant rainfall events. Survey locations are to be determined using GIS tools, expert advice and experience, and knowledge of known historical sites. All laboratory work and analysis of genetic data will be completed at UCLA.

## *Progress*

In 2016, field surveys of known breeding locations within Central-Coastal OC were completed following rain events in both early and late 2016. Although the amount of rainfall was limited in early 2016, researchers from UCLA, working with the US Geological Survey and The Nature Conservancy, were successful in collecting tissue from several locations in the central portion of the Central-Coastal Subregion.

Lab work conducted in 2016 at UCLA included DNA extraction from Orange County tissues collected in 2016 and previously (totaling approximately 600 samples), and preparation of DNA libraries for sequencing, and submission of completed libraries for sequencing. Data analysis completed in 2016 included range-wide population genetic analyses using previously-generated genetic data (5 genetic loci) and ecological niche models. Results of the work indicated that *S. hammondi* is comprised of two genetically and ecologically distinct Northern and Southern clusters that, pending further analysis, may be recommended for recognition as unique species. Results were presented in a talk on July 8 in New Orleans at the Joint Meeting of Ichthyologists and Herpetologists.

The wet winter of 2016-17, brought about by above-average precipitation in November, December, and January, resulted in approximately an additional 500 tissue samples being collected from low-lying areas of protected open-space in Orange County, including Crystal Cove State Park, Laguna Coast Wilderness Park, Limestone Canyon, Riley Wilderness Park, and Caspers Wilderness Park. Lab work and data analysis is ongoing and expected to continue into 2018 extending through the winter and spring.

In early 2018, UCLA is scheduled to lead a working session centered on the results of the work on the conservation genomics of the species. With the lab work nearing completion, the collection of hundreds of tissue samples from Orange County over the last two years, together with expected returns of sequence data from roughly 80,000 loci, is expected to allow for precise determinations of genetic structure, genetic diversity, and landscape resistance in Orange County. Results, coupled with recent pond-enhancement work led by The Nature Conservancy, and now-funded fieldwork on terrestrial habitat use of the spadefoot to be completed by the USGS, are expected to contribute significantly to the identification of locations where newly constructed wetlands are most likely to augment the long-term viability of the species within Central and Coastal Orange County.

## *Key Milestones*

1. Pond surveying and tissue sampling (Due: 1 June 2017): *Completed on schedule*
2. DNA extraction and RADseq library preparation (Due: 31 December 2016): *In progress*
3. Analysis of genetic sequence data (Due: 1 August 2017): *In progress*
4. Interim Report Preparation (Due: 1 November 2016): *Completed in July 2016*
5. Draft Report Preparation (Due: 31 October 2017): *Postponed until September, 2018*
6. Final Report Preparation and Delivery of GIS Data (Due: 31 December 2017): *Postponed until September, 2018*

## Key Findings

Although findings are largely not available at this time, as the project is ongoing, the discovery of two distinctive *Spea hammondi* lineages, a southern and northern California lineage, together with the greater amount of habitat loss across the range of the southern lineage than in the north, suggests *Spea hammondi* in Orange County and the rest of southern California may require more urgent protection than previously believed. Additional findings will be made available following submission of deliverables in September, 2018.

## Notes

Expected products or deliverables from UCLA are to include: a map of all surveyed sites with presence or absence of spadefoot toads noted; genetic-based estimates of the current and historical effective population sizes of identified population units (breeding pools, pond complexes, whole study area); maps of spadefoot genetic connectivity and diversity, both currently and historically; and recommendations of localities for potential establishment of new artificial breeding ponds or migration corridors, based on observed genetic connectivity and diversity.

The USGS was awarded a Local Assistance Grant from the Department of Fish and Wildlife in 2017, for fieldwork to be completed in 2018 and 2019 documenting terrestrial habitat use of the spadefoot in Coastal and Central Orange County. The novel information expected to result from the funded study on use of terrestrial habitat, adult migration patterns and distances, and timing of movement with regards to environmental cues is expected to inform how much and what kinds of terrestrial habitat to protect around breeding sites of the western spadefoot. New information on preferred habitat associations is likely to help NCC properly site the creation of novel breeding habitat planned to be initiated in the coming years in response to the historic habitat loss and future changes in climate potentially affecting natural vernal pool phenology.

## 19. Aerial Weed Survey/Central

Project ID	XXXX-XX
Project Title	Aerial Weed Survey/Central
Contractor(s)/Researcher	Wildlands Conservation Science, LLC
Time Period	2016-2017
Total Project Cost	\$132,000
Amount Budgeted	\$60,000 (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	OCP (\$20,000); IRC (\$44,000); TNC (\$8,000)
Landowner Involvement	OCP, COI, CDFW
Project Status	Complete
Project Progression	On schedule
Program Class	Monitoring/Research
Program Area	Weed Control
Resource	Coastal Sage Scrub
Project Purpose	Identify the relative abundance and geographic distribution of targeted invasive plant species within the central portion of the Subregion

Available Report(s)	--
Available GIS Product(s)	--

*Overview*

Since 2011, the Irvine Ranch Conservancy (IRC) and OC Parks have used information from aerial surveys to guide annual control efforts for targeted invasive plants within the Irvine Ranch Open Space and neighboring areas. Information gained from the inaugural aerial survey implemented in 2011 and covering 27,000+ acres is considered to have been invaluable in helping land managers develop and implement a multi-year treatment program for priority invasive weeds over the last five years. Conducting a repeat survey of the 2011 effort in 2016 is to provide a new perspective on the distribution and cover of invasive plants and help in evaluating the effectiveness of the invasive plant program implemented in the Central Subregion over the last five years. The resulting project report and supporting spatial data are to be shared with the California Invasive Plant Council (Cal-IPC) in support of their anticipated 2016-17 effort to develop a more systematic regional prioritization of invasive plants within the central portion of the Subregion. The new spatial information on the distribution of invasive plants will also be provided to Land IQ for consideration during the update of the Habitat Restoration & Enhancement Plan, currently scheduled to run through 2018.

*Progress*

The project is considered to be complete. In 2016, NCC worked with Cal-IPC, and partners, IRC and OC Parks, to identify specific partner needs and evaluate different approaches proposed by Wildlands Conservation Science (the aerial weed survey contractor) for completing the surveys. An outreach plan was developed with a “News Release” uploaded to the NCC website and provided to OC Parks, Irvine Ranch Conservancy, City of Lake Forest, and City of Anaheim for notification of residents and park visitors of the planned flights to take place above Santiago Oaks Regional Park, Peters Canyon Regional Park, Irvine Regional Park, Irvine Ranch Open Space, Whiting Ranch Wilderness Park, Coal Canyon Ecological Reserve, City of Irvine Open Space North, and Siphon Reservoir. Irvine Ranch Conservancy and NCC reached out to the Emergency Operations Center and Anaheim Police Department to notify law enforcement about the planned flights.

Wildlands Conservation Science (WCS) completed surveys in June 2016 using a small helicopter flown at low speed and altitudes. Flights were limited to the hours between 7:00 AM and 6:00 PM. Daily updates were provided by WCS to IRC, OC Parks, and NCC through the duration of the surveys. Surveys lasted 9 days and covered 28,000 of the originally planned 32,000 acres. Compiled data was submitted to partners and Cal-IPC for analysis.

In 2017 a new budget, timeline and abbreviated scope of work to cover the remaining 4,000 acres still needed to be flown was submitted to NCC by WCS for review and approval. Following creation of a news release, coordination with law enforcement, and communication with the County, Department of Fish and Wildlife, and neighboring cities, flights above Coal Canyon Ecological Reserve, Santiago Oaks Regional Parks, Irvine Ranch Open Space, and the City of Irvine Open Space North were initiated on 9 August and continued for several days.

An initial copy of the GIS database generated by second-year of flights was shared with NCC and project partners in early September, 2017 for review and comment. The final project geodatabase covering both years of flights was provided to NCC and shared with partners in early December, 2017.

*Key Milestones*

1. Project Planning and Coordination (Due: 1 June 2016): *Flight schedule and outreach plan developed and executed prior to the initiation of flights in June 2016*
2. Execution of Aerial Weed Survey (Due: 31 July 2016): *Approximately 90% of planned survey area was surveyed in June 2016*
3. Compilation of Survey Data (Due: 31 September 2016): *Final dataset for area surveyed in 2016 submitted in November 2016*
4. Execution of Aerial Weed Survey II (Due: 31 July 2017): *Remaining 10% of planned survey area was surveyed in August 2017*
5. Final Report Preparation and Delivery (Due: 31 December 2017): *Final delivery of project geodatabase was delivered in December 2017; final project report has been postponed to a date uncertain*

*Key Findings*

Across the two years of flights, a total of 3,905 observations (or populations) of 37 species of invasive plants were recorded over 12 days of flying. The cumulative gross acreage of discovered invasive plant populations equaled 1,539. Total net acreage equaled 116.6. When sorted by gross acreage the top ten species identified were horehound (*Marrubium vulgare*) at 270.5 acres and 603 populations, tree tobacco (*Nicotiana glauca*) at 240.4 acres and 1,329 populations, artichoke thistle (*Cynara cardunculus*) at 225.8 acres and 508 populations, fountain grass (*Pennisetum setaceum*) at 183.5 acres and 257 populations, brittlebush (*Encelia farinosa*) at 156.9 acres and 108 populations, tamarisk (*Tamarix sp.*) at 119.9 and 152 populations, fennel (*Foeniculum vulgare*) at 118.1 and 389 populations, castor bean (*Ricinus communis*) 107.2 and 95 populations, giant reed (*Arundo donax*) at 25.7 acres and 75 populations, and milk thistle (*Silybum marianum*) at 21.7 acres and 17 populations.

*Notes*

Data generated by the two-days of flights scheduled for summer 2017 was immediately provided to Cal-IPC at the conclusion of the survey to be included in their analysis of changes in the distribution of invasive plants across the central portion of the Subregion between 2011 and 2016/17. Results of the comparisons between years of mapped distributions and abundance of detected species are forthcoming and will be shared with partners at the conclusion of the analytical work conducted by Cal-IPC due to be complete by the end of spring 2018.

**20. Reserve Photo Archive**

Project ID	XXXX-XX
Project Title	Reserve Photo Archive
Contractor(s)/Researcher	--

Time Period	2016-2017
Total Project Cost	--
Amount Budgeted	\$25,000 (2016-17); -- (2017-18)
Fund	Endowment
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Postponed
Project Progression	Project is approved, but not initiated
Program Class	Database Management
Program Area	Sensitive Biological Resources
Resource	Coastal Sage Scrub
Project Purpose	Compile, format, reference, and archive NCC's historical photo inventory of the natural resources and landscapes present within the NCCP-Reserve
Available Report(s)	--
Available GIS Product(s)	--

### *Overview*

Since the mid-1990s, working with key partners, NCC has compiled a photo library of approximately 15,000 digital images of the Reserve. Most of the photos were originally taken and organized by The Nature Conservancy, working with NCC on development of an over-arching habitat restoration and enhancement plan for the Reserve in the late 1990s. The images offer a unique visual perspective of the Reserve's landscapes and natural resources dating back 15 to 20 years ago.

### *Progress*

Although further advancement of the project has been temporarily postponed, NCC has reviewed and catalogued many of the available digital images and researched different opportunities to archive the collection for purposes of making the images available to partners and the public. In 2016, NCC met with UCI Libraries - Special Collections and Archives Division to discuss the opportunity to partner with the University to house and archive the collection of images. UCI Libraries expressed much interest in receiving the collection and a dialogue about the potential one-day donation by NCC of the images to the University continued in 2017.

### *Key Milestones*

Milestones have not been identified, as the project has yet to be formally initiated.

### *Key Findings*

Findings are not available at this time, as the project has yet to be formally initiated.



## Notes

As a precursor to the donation of the landscape images, in 2016, NCC began a discussion with the Head of Special Collections and Archives for UCI Libraries about donating the Wilson Collection to the University for preservation and accessibility purposes. The Wilson Collection is a collection of 600+ slides of birds and life list, currently in the possession of NCC, first put together by amateur photographer, Russell Wilson. Mr. Wilson generated the collection over the course of his lifetime from the many birding trips he took throughout California, Arizona, southern Texas, Florida, and Canada in 1940s, 50s, and 60s. Part of the collection is currently showcased as part of the fall 2016 exhibit entitled "Striking a Balance" presented by UCI Libraries.

Following the donation to the University of the collection, NCC will be granted special access to the collection which is to be housed and managed by UCI Libraries Special Collections and Archives in a digital format for the benefit of the public, in perpetuity. The donation of this collection to UCI Libraries, expected to formally occur in 2018, is the first of potentially several more donations of images and information from NCC to the University for preservation and accessibility purposes.

## 21. BMPs/Trail Maintenance

Project ID	XXXX-XX
Project Title	BMPs/Trail Maintenance
Contractor(s)/Researcher	--
Time Period	2015-2017
Total Project Cost	--
Amount Budgeted	-- (2016-17); -- (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, COI, CCSP, CDFW, CONB, UCI, TCA, TIC
Project Status	Postponed
Project Progression	Project is approved, but not initiated
Program Class	Management
Program Area	Recreation
Resource	Coastal Sage Scrub
Project Purpose	Provide support for the identification, development, and publication of BMPs supporting a sustainable trail network.
Available Report(s)	--
Available GIS Product(s)	--

## Overview

In support of sharing science, monitoring, and land management information among partnering organizations involved in management of the NCCP-Reserve, NCC has allocated funding to provide support for the identification, development, and publication of Best Management Practices (BMPs) supporting a sustainable trail network, with the focus in 2015 on identifying methods for minimizing impacts to natural resources during trail maintenance activities.

### *Progress*

Initiation of the project has been postponed indefinitely. In 2015, NCC reached out to key partners and visited field sites in an effort to better understand priority trail maintenance issues. Although no specific scope of work or action plan was developed, in 2015, NCC staff initiated new discussions with outside experts concerning available knowledge in the scientific literature and applied in practice by California Department of Parks and Recreation, and the National Park Service applicable to operations within Central-Coastal OC.

In 2016, plans to connect to outside experts associated with State Parks, Cleveland National Forest, Santa Monica Mountains National Recreation Area, as well as contacts within the East Bay Regional Park District to discuss trail maintenance programs and outreach material implemented through their organizations were postponed indefinitely.

### *Key Milestones*

Milestones have not been identified, as the project has yet to be initiated.

### *Key Findings*

Findings are not available at this time, as the project has yet to be initiated.

### *Notes*

Investment by NCC in funding development of BMPs for trail maintenance has been postponed until an initial field assessment of the condition and location of authorized and unauthorized trails in high-use areas is completed by the team of recreation ecologists from Utah State University and Oregon State University. Assessment is to inform creation of recreation management and trail maintenance strategies designed to minimize habitat degradation and the disturbance of sensitive resources located in high-use areas.

## **22. Recreation Mgmt & Human Valuation**

Project ID	XXXX-XX
Project Title	Recreation Mgmt & Human Valuation
Contractor(s)/Researcher	Utah State University; Oregon State University
Time Period	2017-2020
Total Project Cost	\$492,000
Amount Budgeted	\$175,000 (2016-17); \$175,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CONB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Planning
Program Area	Recreation
Resource	Coastal Sage Scrub

Project Purpose	Identify highest ranking recreation management priorities related to natural resource protection present within the NCCP-Reserve
Available Report(s)	--
Available GIS Product(s)	--

### *Overview*

Managers of urban-proximate wildland settings must often strike a careful balance with providing nature-based recreation experiences with the maintenance of ecological integrity. With over 3 million residents within a 30-minute drive of the natural areas of central and coastal Orange County, the demand for recreation experiences is ever present, and increasing. Equally important is the increasing need and desire for the conservation of natural resources and preservation of the rich natural heritage of an iconic area of the California coast.

Resource management planning and implementation strategies in natural areas are often more successful when informed by interdisciplinary research that combines both ecological and social science approaches in a location specific manner. The Natural Communities Coalition has partnered with national leaders in the field of recreation ecology from Utah State University and Oregon State University to implement a multi-year project designed to address ecological aspects, human benefits and values, and contemporary management approaches tied to recreation within the region.

Fourteen management units within the Nature Reserve of Orange County are considered a high priority for assessment and monitoring of recreation use and associated management uses. The majority of units fall under the management of OC Parks, California State Parks, and the Irvine Ranch Conservancy. The project will employ both continuous assessment and sampling approaches to establish baselines conditions. Work is to include field assessment of the location and condition of trails, sites, and other areas of visitor use, determination of the spatial distribution of use, and assessment of visitor attributes and preferences, demographics, motivations, values and judgements of resource and social conditions. Work will be conducted in two distinct phases. The first phase is three years in duration, with social and biophysical field sampling to begin spring 2017.

### *Progress*

In early 2017 a scope of work was finalized to serve as a general guidance for an agreement between the Natural Communities Coalition and Utah State University. The scope covers the first phase of research that is to cover a three-year period beginning in 2017 and extending to 2020.

In March, 2017, Chris Monz (from Utah State University), together with members of his team, traveled to Orange County to hold a "kick-off" meeting for the multi-year, recreation management research effort. The meeting was hosted by NCC and held at the Irvine Ranch Historic Park (OC Parks Headquarters). At the meeting, Chris laid out the strategy for the 2017 field season. Specifically, addressing his strategy for establishing baseline social and ecological conditions for recreation resources across priority areas within Central-Coastal OC in the first year of fieldwork. Representatives from OC Parks, State Parks, Irvine Ranch Conservancy, and UCI were present at the meeting.

During the same visit to Orange County in March, the team visited a number of prospective staging areas from which the researchers could survey park visitors. The list of visited sites follows.

- Nix Nature Center (Laguna Coast Wilderness Park)
- Willow Staging Area (Laguna Coast Wilderness Park)
- El Moro (Crystal Cove State Park)
- Coastal Terrace (Crystal Cove State Park)
- Ridge Park Trail Head
- Bommer Canyon Trail Head (City of Irvine Open Space South)
- Aliso & Wood Canyons Wilderness Park Main Entrance
- Top of The World Trail Head (Aliso & Wood Canyons Wilderness Park)
- Peters Canyon Regional Park
- Irvine Regional Park
- Augustine Staging Area (Irvine Ranch Open Space)
- Black Star Canyon Road
- Glenn Ranch Road Staging Area (Whiting Ranch Wilderness Park)
- Borrego Wash Staging Area (Whiting Ranch Wilderness Park)

Working with each of the respective land-owning organizations, and the research team, NCC staff identified a subset of these locations that worked best for staging the team's survey work. Surveys were completed by the research team over the course of 7 weeks in May and October of 2017.

In June, 2017, the NCC Science Coordinator made a presentation detailing the project scope entitled "Recreation Management and Human Valuation, the Fusion of Social and Ecological Sciences" at the International Urban Wildlife Conference held in San Diego.

In December, 2017, Chris Monz together with Ashley D'Antonio and Abby Sisneros-Kidd presented their first-year results and discussed the direction of activities planned for 2018 at a working session organized for members of the Technical Advisory Committee and key partners. The meeting focused on the results of the questionnaires and movement data collected from visitors earlier in the year.

In 2018, Chris and his team are prepared to initiate the second-year of fieldwork focusing on mapping and assessment of ecological condition in select areas, and addressing scaling issues associated with the use of mobile device data for determining wide-spread spatial and temporal patterns of visitor-use across the study area.

### *Key Milestones*

1. Finalization of Scope of Work (Due: 1 January 2017): *Completed on schedule*
2. Execution of Agreement between NCC and USU (Due: 31 January 2017): *Completed on schedule*
3. Project Initiation Meeting with Managers and Stakeholders (Due: 30 March 2017): *Completed on schedule*

4. Field Sampling (Social and Biophysical) (Due: 30 September 2017): *Completed in May and October, 2017*
5. First-annual Working Session with Board Members, Managers, and Stakeholders (Due: 31 December 2017): *Completed on 6 December, 2017*
6. Data Analysis and First Annual Report (Due: 30 March 2018)

### *Key Findings*

Key findings are not available at this time, as project is still in progress. Initial findings are due to become available in March 2018, following delivery of the first annual progress report for the project.

Note, conclusions derived from the first-year of field sampling at the following listed locations and shared during the December working session are provided below.

- Nix Nature Center (Laguna Coast Wilderness Park)
- Willow Staging Area (Laguna Coast Wilderness Park)
- El Moro (Crystal Cove State Park)
- Ridge Park Trail Head
- Bommer Canyon Trail Head (City of Irvine Open Space South)
- Aliso & Wood Canyons Wilderness Park Main Entrance
- Top of The World Trail Head (Aliso & Wood Canyons Wilderness Park)
- Peters Canyon Regional Park
- Black Star Staging Area (Irvine Ranch Open Space)
- Black Star Canyon Road
- Glenn Ranch Road Staging Area (Whiting Ranch Wilderness Park)
- Borrego Wash Staging Area (Whiting Ranch Wilderness Park)

The survey provided a reliable measurement tool to evaluate visitor motivations. Following analysis of the results of hundreds of completed surveys, the primary motivations of visitors were found to be solitude and escape, learning about and experiencing nature, and spiritual renewal. Motivations differed across areas by visitor type. Almost two to one, park visitors could be described as more nature-oriented than exercise-oriented visitors.

Visitors reported a strong attachment to place, poor understanding of conservation history of visited parks, and belief in the importance of conservation, but still wanting to be a participant in the story and have the chance to experience the land.

### *Notes*

The research project, as designed, is to have four overall dimensions: 1) a determination of visitor use levels and spatial distributions; 2) an assessment of biophysical resource conditions; 3) an understanding of visitor perceptions, values and judgements; and 4) providing scientific expertise in park planning and management.

### 23. Bio Monitoring & Communication

Project ID	XXXX-XX
Project Title	Bio Monitoring & Communication
Contractor(s)/Researcher	Center for Environmental Biology
Time Period	2017-2018
Total Project Cost	\$350,000
Amount Budgeted	\$200,000 (2016-17); -- (2017-18)
Fund	Endowment
Matching Contribution(s)	Voth Family Foundation (\$150,000)
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	Requires additional attention by NCC staff and/or contractors
Program Class	Monitoring/Research
Program Area	Sensitive Biological Resources
Resource	Coastal Sage Scrub
Project Purpose	Monitor landscape-level change in vegetative composition and structure through time and create dashboard metrics concerning the health of the Reserve
Available Report(s)	--
Available GIS Product(s)	--

#### Overview

Discussed collectively among partnering agencies and organizations over the last couple of years, development of an effective vegetation monitoring program for the Reserve is being led by UC Irvine's Center for Environmental Biology (CEB). The program, as presently outlined, will provide defensible, objective measures of the extent and quality of coastal sage scrub and associated habitats within the Reserve and adjacent conservation lands. Collected information is to capture changes in vegetative community composition, structure, and dynamics over time, promoting a shared understanding of the vegetative response to drivers and informing decisions related to management.

In a related context, NCC is working with CEB to explore opportunities to leverage the structures and activities of the established National Climate Assessment (supported by the U.S. Global Change Research Program) for purposes of developing a sound and informative assessment of the health of the Reserve. Working at the scale of the Reserve, the assessment would help partners understand, assess, predict, and respond to natural and human-induced processes tied to global change. NCC, together with CEB, recognizes the assessment needs to be clear and supported by good science for communicating successfully with the NCC Board, elected officials, partners, the public, and to support priorities for next step monitoring, science, and management action. At present, the process outlined for development of the assessment of Reserve health includes establishment of an advisory committee, creation of a local knowledge network and supporting activities, hosting of an annual integration congress, writing of an annual policy impact report, and dissemination of findings.

## *Progress*

Following the meeting of the Technical Advisory Committee, in August 2016, in which preliminary plans for advancement of a vegetation monitoring and communications program were shared, NCC staff and the Center for Environmental Biology met to identify a way forward for addressing identified short-term needs of both programs. The end result was a scope of work from the Center for Environmental Biology covering the first 12 months of the monitoring and communications program. Specifically, the scope: (1) highlights opportunities to achieve programmatic benchmarks for the vegetation program communicated to the NCC Board as being attainable over the first 12-months, and (2) allows for assembly of a team to address the items identified by partners and the TAC as immediate needs for advancing development of a long-term vegetation monitoring program. Work outlined is a first and significant step towards development of a comprehensive multi-year vegetation monitoring plan for the Central-Coastal Subregion. The work is expected to go a long way to informing discussions with partners and members of the TAC about options for development of a comprehensive long-term plan covering the next 5 to 10 years.

Deliverables and work products to be delivered over the first 12 months:

- Assessment of change in CSS cover over the last ten years based on analysis of existing vegetation monitoring data collected by SDSU and other partners;
- Based on the results of the assessment, production of a report serving as the first tool for communication on the health of the Reserve;
- Identification of knowledge gaps and existing spatial-temporal gaps requiring adjustment of current monitoring approach;
- Refinement of existing and planned vegetation monitoring for the next two growing seasons (2017-18, and 2018-19);
- Finalization of a consensus conceptual model for data integration relating ecosystem features to data sources and assumptions, applicable to adaptive management of key ecosystem types within the Reserve;
- Creation of a work plan and development of a protocol for scaling vegetation dynamics between field-based protocols and remotely sensed efforts;
- Meta-analysis and description of alternative data-model techniques to maximize use of existing data;
- Establishment of a common, consensus-based conceptual model of critical ecosystem dynamics;
- Integration with San Diego to share best practices, evaluate common trends in ecological condition, document early tipping points, and evaluate regional trends;
- Compilation, curation, and dissemination of common data used by the many NCC partners for effective decision-making (GIS data layers); and
- Data registry, assistance with data sharing and archiving, and documenting partner plans for data collection and use

In 2017, CEB completed a multi-year assessment of change in the cover of coastal sage scrub based on analysis of transect data collected within the Subregion over the last ten years by, first, San Diego State University under contract to The Nature Conservancy and Natural Communities Coalition, and second, UC Irvine under contract to TNC. Analysis resulted in production of a draft manuscript shared with stakeholders in October, 2017. Also, in 2017, CEB collected an additional year of transect data and began to work through adjustments of the current monitoring approach, following identification of existing knowledge and spatial-temporal gaps. Plans for vegetation monitoring over the next two growing seasons (2017-18, and 2018-19) were refined and scheduled for execution.

In June, 2017, a meeting of the NCC Technical Advisory Committee was held to discuss goals and objectives of the vegetation monitoring program for the reserve and greater Subregion. Members were asked to come prepared to share their perspectives concerning the most pressing questions needing to be addressed, as well as key processes understood to be governing change (or stability) of the greater coastal sage scrub habitat mosaic through time. The meeting topic was recognized as being timely as an interest exists by other NCCPs and the Wildlife Agencies to come together in support of a first-ever coordinated, regional vegetation monitoring program for the South Coast Ecoregion. NCC staff and CEB recognized in order to participate in and help lead the regional effort, NCC needed to first better define what is most important for Central-Coastal Orange County. At the meeting, Travis Huxman shared results of the synthesis and analysis of existing vegetation monitoring data and initiated a general discussion about the vegetation monitoring goals and objectives, and process for developing a conceptual model explaining current conditions as well as constraints and opportunities for active management within the Subregion. Committee members, during the meeting, expressed the importance of predicting or understanding temporal and spatial changes in habitat quality, integrity, resilience, target species abundance, vulnerability, composition, and valuation by society.

A follow-up meeting to advance discussion about conceptual model development with regards to vegetative processes and consensus concerning the most important questions to be addressed in support of land management activities was held in July, 2017. During the meeting, the need to operationalize habitat value in the context of covered species was identified, as was the importance of recognizing differences between modeling ecosystem dynamics, which involves analytical and simulation modeling, and creation of a conceptual model of habitat value. The focus of data collection on invasive species and grasses was a consistent theme throughout the meeting, with members of the Committee recognizing a model framework that addressed both invasive species and their management was historically used and embraced by all stakeholders including partners in San Diego.

In support of the planning work and ongoing discussions centered on vegetation monitoring, NCC staff initiated a conversation with CEB and the Wildlife Agencies in August with the purpose of reaching consensus on the over-arching goals and questions tied to the program. The inter-agency dialogue culminated in a meeting in Carlsbad in November and drafting of a guiding principles document by CEB to establish, operate, and optimize the monitoring program. As defined in the document, a coherent, adaptive monitoring program was recognized as essential to understand, document, and potentially prevent the loss of habitat value within the Subregion.



Ultimately, to be successful, the monitoring program was recognized as needing to be paired with the over-arching biological goals and threats facing the NCCP-Reserve. In 2018, the participants in the meeting agreed to bring examples of successful monitoring goals and objectives employed in other NCCPs and reserve to the planned discussions with the Technical Advisory Committee on reporting on reserve health.

### *Key Milestones*

1. Assessment of Change in CSS Cover (Due: 30 September 2017): *Draft manuscript produced and shared in October 2017*
2. Work-plan for Scaling Vegetation Dynamics Between Field-based Protocols and Remotely Sensed Efforts (Due: 15 October 2017): *Postponed until 30 September 2018*
3. Refinement of Vegetation Monitoring (Due: 15 December 2017): *In progress*
4. Protocols for Integration of Data Streams into the Monitoring Plan (Due: 31 December 2017): *In progress*
5. Creation of an On-line, Updated, Shared GIS Database (Due: 31 December 2017): *In progress*
6. Propagation of Data to OC Data Portal (Due: 31 December 2017): *Postponed until 30 September 2018*

### *Key Findings*

Not all findings are available at this time, as the project is still in progress. Key results and conclusions made from analysis of existing transect data follow.

- Analysis of monitoring data collected from 2007 through 2016 revealed resilient native shrub communities, and a decline in native perennial bunchgrasses.
- Chaparral communities are hypothesized to demonstrate substantial resilience in composition, while CSS appears to demonstrate greater variation in the amount of resistance and resilience.
- A slight decline in the cover of native perennial bunchgrasses over the last 10 years, suggests that long-term persistence of native grasslands is a management concern.
- Burned transects had significantly more non-native annual grasses than unburned transects in the grassland community in all years, suggesting non-natives were able to take advantage of open spaces and persist in greater numbers through time.
- Transitional grass-shrub transects exhibited more of an increase in shrub cover, during recent reductions in precipitation, than areas with higher native cover. The surprising result may be due to lower soil moisture in areas with high shrub density, where established shrubs draw down available soil water.
- Coastal locations sampled during the survey period had higher native shrub cover and a greater proportion of native species than inland areas, supporting the idea that proximity to coast may reduce vegetation-type conversion from shrub to grassland, despite the variability present in the CSS transects in the data set.

## Notes

The total estimated cost for NCC for the work is \$200,622 with an estimated \$151,741 in matching funds provided by CEB. The project is to be a Research Specific Agreement (RSA) falling under the approved Master Agreement with UCI limited to 17.5% overhead.

### 24. SHB Mgmt & Monitoring

Project ID	XXXX-XX
Project Title	SHB Mgmt & Monitoring
Contractor(s)/Researcher	UC Riverside; UC Santa Cruz
Time Period	2017-2019
Total Project Cost	\$412,000
Amount Budgeted	\$55,000 (2016-17); \$55,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	CDFW LAG (\$175,000); OC Parks (\$85,000); TNC (\$25,000); IRC (\$17,000, in-kind)
Landowner Involvement	OCP, OCWR, COI, CCSP, CDFW, CNB, UCI, IRWD, TCA, TIC, MWD
Project Status	Ongoing
Project Progression	On schedule
Program Class	Monitoring/Research
Program Area	Invasive Wildlife Control
Resource	Riparian Woodland
Project Purpose	Define a path forward for making informed decisions on best approaches to management of the invasive shot hole borer
Available Report(s)	--
Available GIS Product(s)	--

#### Overview

The exotic pest complex *Fusarium Dieback* (FD) is recognized by state and federal agencies as a serious threat to the viability of native riparian and oak woodland plant communities throughout the greater South Coast Ecoregion. FD is formed by two invasive Shot Hole Borer (SHB) beetle species each associated with specific fungal pathogen species (*Fusarium* spp.). The broad range of alternative hosts has fostered rapid spread throughout urban and wildland forests and commercial avocado groves in Los Angeles, Orange, San Diego, and most recently Riverside and Ventura Counties. Recent observations confirm previous predictions indicating native riparian plant communities in southern California are particularly susceptible to invasion and mortality by FD-SHB, leading to creation of a State SHB Coalition organized by CDFW in southern California.

At these early stages of the epidemic, preventative and containment measures are believed to have the ability to be effective, providing adequate, rapid assessment of key landscape factors. At present, knowing which management approaches are more effective is limited by the lack of data on how the pest-disease complex spreads across a complex landscape.

Monitoring efforts have recently focused on avocado groves (due to immediate investment in research and development by the agricultural industry), but the broader landscape must be considered to allow for regional planning and land management that will reduce or manage this threat within the Central & Coastal Subregion and neighboring protected areas.

In 2016, NCC was awarded a Local Assistance Grant from the California Department of Fish and Wildlife (CDFW) supporting a two-year, initiative directed at the management and monitoring of the pest complex across the 208,000-acre planning area for the County of Orange Central & Coastal Subregion NCCP/HCP. The funded work defines a path forward for making informed decisions on best approaches to management. Working with CDFW, NCC, together with the greater project team, is committed to supporting development of a policy and management response in-line with the magnitude of the identified problem and working collaboratively with agencies and personnel advancing complementary research and management initiatives throughout southern California. Because no control methods are currently available for use in native vegetation, the project will be a success when habitats most vulnerable to the disease complex and important to its spread are identified and control measures supporting elicited rapid and effective management responses evaluated.

### *Progress*

The project was initiated in 2017, following finalization of an agreement with UC Riverside. The greater project team, in addition to NCC, includes, UC Riverside, UC Santa Cruz, OC Parks, The Nature Conservancy, and Irvine Ranch Conservancy. The first objective of the two-year initiative is centered on development of a predictive model to identify which native habitats are most vulnerable to FD-SHB invasion and impacts. Based on site conditions, the model will be used to help identify those sites most likely to suffer FD-SHB damage and the riparian corridors serving as transmission vectors. In support of development of the model, data on beetle population dynamics and distribution will be repeatedly collected across 75+ permanent monitoring plots across the study area. The project team recognizes opportunities to collect additional data over the same period in other areas in southern California will support development, parameterization, and validation of an over-arching regional model allowing for better prediction of the risk and spread of FD-SHB throughout OC and the greater region.

The second objective relies on using cultural and molecular techniques to identify beneficial endophytic fungal and bacterial candidates for biocontrol measures from core samples collected from select trees in the monitoring plots. Sampling of trees will allow team members to test for differences in the microbial communities between infested and non-infested trees within host species. Through repeat sampling, team members will be able to determine how endophytic communities change over time and evaluate how widespread the association is between beneficial endophytes that inhibit the growth of *Fusarium* spp. pathogens and natural limits of the FD-SHB infestation, forecasting use of endophytes as a control measure to slow the rate of spread and ameliorate the effects of the exotic pest complex on the land.

In 2017, researchers established permanent monitoring plots in recently infested and non-infested locations in riparian corridors throughout Orange County. Endophyte screening was begun in the fall with sequencing analyses to be initiated by early 2018.

In November, 2017, NCC hosted researchers from UC Riverside and UC Santa Cruz, to discuss project progression made during the first 10 months of the project. During the meeting researchers reviewed progress made in regards to development of the predicative model and identification of beneficial endophytic fungi and bacteria for biocontrol measures. Additionally, the researchers discussed the greater context of their work, including work performed in San Diego, and the known status of the beetles in southern California. The audience was largely made-up of members from the Technical Advisory Committee and land-managers from State Parks, OC Parks, and the City of Irvine.

### *Key Milestones*

1. Project Set-up: Coordination & Information Transfer (Due: 31 March 2017): *Working session to discuss project progression with stakeholders hosted in November, 2017*
2. Permanent Plot Establishment (Due: 30 April 2017): *Completed by December, 2017*
3. Permanent Plot Monitoring (Due: 31 January 2019): *In progress*
4. Trap Monitoring, Counting, and Morphological Identification (Due: 31 January 2019): *In progress*
5. Results of Endophyte Screening & Evaluation (Due: 31 January 2019): *In progress*
6. Predictive Model Analysis (Due: 15 February 2019)
7. DRAFT Report Preparation (Due: 15 February 2019)
8. FINAL Report, Risk Model, and GIS Data & Field Workshop (Due: 30 March 2019)

### *Key Findings*

Key findings are not available at this time, as project is still in progress. Initial findings are due to be made available in January 2018, following delivery of the first interim progress report for the project.

### *Notes*

Phase I of the envisioned four-year project was funded, in 2016, by NCC with \$302,000 in assistance from project partners. The California Department of Fish and Wildlife awarded NCC a Local Assistance Grant in 2016 for the amount of \$175,000 to offset the cost of the first two years (Phase I) of the project; OC Parks committed \$85,000; The Nature Conservancy committed \$25,000; and \$17,000 in in-kind support was committed by IRC.

## **25. Fuel Mod Field Tour**

Project ID	18BBB
Project Title	Fuel Mod Field Tour
Contractor(s)/Researcher	NA
Time Period	2018
Total Project Cost	\$15,000
Amount Budgeted	\$15,000 (2017-18)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	All

Project Status	New
Project Progression	On schedule
Program Class	Fire Management
Program Area	Habitat Restoration
Resource	All Habitats
Project Purpose	Maintenance of fuel medication zones that minimize impacts to native habitat
Available Report(s)	--
Available GIS Product(s)	--

### *Overview*

To prevent the spread of wildland fires into the urban environment, management of vegetative fuels is implemented around structures and housing developments to control flame length, rate of spread, and heat intensity. These areas, identified generally as defensible space or fuel modification zones, abut and overlap the Reserve and account for significant acreage of impacted potential habitat. Fuel treatment design, extent, effectiveness, and impact to adjacent Reserve habitat varies across the landscape. Opportunities exist to influence change in fuel management standards in a direction that may minimize adverse impacts to the habitat along the Reserve's edge. The intent of the Fuel modification (Fuel Mod) Field Tour Project is to facilitate an open dialogue among land owners/managers and stakeholders regarding vegetation treatment prescriptions in fuel modification areas.

### *Progress*

The first field trip is scheduled for February 20, 2018, and is being led by OCFA. The field sites are in Riverside County with representatives from CalFire leading the discussion on challenges and strategies of fuel modification treatment planning, implementation, and management. Participating agencies include OCFA, CalFire, City of Irvine, Rancho Mission Viejo, The Nature Conservancy, and CA State Parks. The time and location of a second trip is to be determined.

## **26. NDVI Fuels Map**

Project ID	18AAA
Project Title	NDVI Fuels Map
Contractor(s)/Researcher	TBD
Time Period	2018
Total Project Cost	\$24,000
Amount Budgeted	\$24,000 (2017-18)
Fund	Endowment
Matching Contribution(s)	TBD
Landowner Involvement	All, OCFA
Project Status	New
Project Progression	Delayed
Program Class	Fire Management
Program Area	Monitoring
Resource	All Vegetation Types

Project Purpose	Increase accuracy of fuels condition description for fire management planning
Available Report(s)	--
Available GIS Product(s)	--

### Overview

The Normalized Differenced Vegetation Index (NDVI) is considered a reliable indicator of plant biomass and vegetation primary productivity and time series have been routinely used to measure vegetation dynamics and ecosystem phenology over large geographic areas. Important variables include the magnitude of greening, peak activity, and drying phases of vegetation, providing information on key aspects of vegetation functionality, such as seasonality, productivity and inter-annual variability. These factors are critical for fire resource and management planning since the phenological status of vegetation represents the main driver affecting fuel availability and moisture content. The goal of this project is to explore the appropriate spatial and temporal scale and fuel moisture variable (NDVI vs. other similar derived variable) in mapping the condition of fuels.

### Progress

The project is in the planning stage. The appropriate contractor and opportunities for funding are still being evaluated. The CalFire Fire Prevention Fund was restructured in 2017, which has delayed the opening of the grant funding cycle to mid-2018, thereby postponing any landscape scale imaging for the 2018 growing season. In addition, OCFA recently purchased drones with NDVI technology for project-based use applicable to fire management. Evaluations of the appropriate method (OCFA drone vs. contractor) and scale (map resolution) will continue among the team through spring in preparation for the next grant funding period.

## 27. UCI EP Fuel Modification

Project ID	18CCC
Project Title	UCI EP Fuel Mod
Contractor(s)/Researcher	TBD
Time Period	2018-2020
Total Project Cost	\$25,000
Amount Budgeted	\$25,000-- (2018-19)
Fund	Restoration
Matching Contribution(s)	--
Landowner Involvement	UCI
Project Status	New
Project Progression	On schedule
Program Class	Fire Management
Program Area	Habitat Restoration
Resource	Coastal Sage/Cactus Scrub
Project Purpose	Restoration of fuel modification zone at UC Irvine Ecological Preserve
Available Report(s)	--

Available GIS Product(s)	--
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### Overview

Generally, modification of vegetation around structures for fire protection does not occur within the Reserve. Yet, there is a large amount of space along the perimeter of the Reserve where vegetation is treated to protect urban communities and other infrastructure. These areas tend to be managed through extensive clearing and maintenance of non-native, sometimes highly invasive plant species. Impacts to the Reserve occur through reduction of native vegetation and spread of invasive species. This project at UC Irvine Ecological Preserve (EP) will serve as a model for vegetation management along the urban community edge (i.e., defensible space and fuel modification zones) that serve dual purposes: minimize impact to native habitat, and provide for defensible space for fire protection. There are several components to this effort including fuels reduction, public education and outreach, and cactus restoration. These activities in the EP will provide many opportunities to educate both the public and land managers on techniques that meet multiple land and fire management objectives.

### Progress

This project is still in the planning stage. There are a couple of factors that may delay progress. First, the below-normal rainfall that is expected to continue this winter will delay cactus planting. While newly planted cactus pads have a high survivorship rate it may be more effective to delay planting to winter of 2018-2019. Second, the CalFire Fire Prevention Fund was recently restructured, which postponed their last grant funding cycle. The open application period is expected to resume later this year. The fuels reduction phase of this project is anticipated to be partially supported through this or other funding programs. Development of the treatment design and public outreach components are expected to continue through the spring in preparation for the grant applications.

## 28. Canyon Fires Rare Plant Survey

Project ID	18-02
Project Title	Botanical Assessment of the 2017 Canyon Fires
Contractor(s)/Researcher	Fred Roberts
Time Period	2018-2020
Total Project Cost	\$75,100
Amount Budgeted	\$50,100 (2018-19); \$25,000 (2019-20)
Fund	Restoration
Matching Contribution(s)	OCP (\$20,000), TNC (\$14,000)
Landowner Involvement	OCP, CDFW, CHSP
Project Status	New
Project Progression	On schedule
Program Class	Monitoring
Program Area	Sensitive Biological Resources
Resource	Rare Plants

Project Purpose	Inventory, map, and determine the distribution of rare plants in Canyon Fires burn area, and identify management measures
Available Report(s)	--
Available GIS Product(s)	--

*Overview*

Understanding the condition of the biological resources requires a complete and accurate inventory assessment, and a long term monitoring program to track changes in status, abundance, and distribution. Linking these changes to environmental conditions and management activities provides information to guide future management. The recent Canyon Fires in the fall of 2017 provide an opportunity to conduct a rare plant survey in support of the NCCP/HCP Rare Plant Monitoring and Management Program. The purpose of this project is to identify new populations of rare and sensitive plant species and update the status of existing populations within the burn perimeter for two years.

*Progress*

NCC staff, working with the Fred Roberts has developed a tentative project scope and deliverables for inclusion in a future agreement. As of mid-February contract and schedule of work is still being finalized. Field work is expected to commence in the spring of 2018. The winter 2017-18 has been drier than normal and the pattern is expected to continue into the spring. If the suboptimal conditions continue the field survey effort may have to be weighted towards the spring of 2019.



## 2.4 Habitat Restoration and Enhancement Summary Table

Total acres of new, ongoing, and completed upland habitat restoration sponsored by NCC in 2017 organized by management area

Land Area	New	Ongoing	Completed	Total
Laguna Canyon Wilderness Park (OCP)	--	--	6.2*	6.2
Whiting Ranch Wilderness Park (OCP)	--	5.7	4.0	9.7
Crystal Cove State Park	--	9.7	4.0	13.7
San Diego Creek (OCFCD)	--	--	0.2	0.2
Bonita Canyon (TCA )	--	--	0.6	0.6
Coyote Canyon Landfill (OCWR)	--	--	0.3	0.3
UC Irvine Ecological Preserve	--	8.5	4.0	12.5
Irvine Ranch Open Space (OCP)	--	4.3	--	4.3
City of Irvine Open Space**	--	2.9	--	2.9
<b>Total</b>	--	31.1	19.3	50.4

*\*Includes 3.7 acres of elderberry enhancement*

*OCP = Orange County Parks*

*OCFCD = Orange County Flood Control District*

*TCA = Transportation Corridor Agencies*

*OCWR = Orange County Waste & Recycling*

*\*\*Portola Staging Site*

## **3.0 NROC CONSERVATION CUSTODIAL FUNDS**

### **3.1 2017 Pacific Pocket Mouse Custodial Fund**

Pursuant to a Letter of Agreement between the US Fish and Wildlife Service, the California Department of Fish and Wildlife, and the Natural Communities Coalition, a fund was created in 1998 to support research, recovery and enhancement efforts for the Pacific pocket mouse.

The agreement obligated Chandis Sherman (now Headlands Reserve LLC) to deposit funds annually for seven years into a segregated custodial account held by NCC, for a total of \$350,000. All funding has been received. Funds are dispersed at the direction of USFWS and CDFW for projects in support of pocket mouse research, recovery and enhancement. The 2017 calendar year beginning balance of the Pacific Pocket Mouse Custodial Fund was \$119,115.75, and the ending balance on December 31, 2017 was \$119,115.75.

### **3.2 2017 Cowbird Fund**

The beginning balance of the Cowbird Fund January 1, 2017, was \$1,632,001.41, and the ending balance on December 31, 2017, was \$1,815,384.08. A total of \$39,368.94, was spent on the Brown-headed cowbird management program in 2017. The results are summarized in project descriptions (Section 2.0) above.

The 2018 NCC work plan includes a continued assessment of goals, methodology and results to date among all parties engaged in cowbird management in the Central and Coastal Subregion of Orange County. Working with these partners and the Wildlife Agencies, the plan is to design an adaptive cowbird management protocol that is more responsive to current and future needs of the species impacted by cowbirds and the ecological health of the Reserve, and to better coordinate management efforts across the subregion.

## **4.0 NCCP/HCP RESERVE MANAGEMENT PLANS & POLICIES**

### **4.1 Wildland Fire Management Plan**

The 2017 work plan is set forth in the 2016-2018 NCC Strategic Plan, focusing on the implementation of the Wildland Fire Management Plan (WFMP). Key components include: educate land owners/managers on the theory, science, and implementation of actions specified in the plan; assessment of the status and condition of vegetation management along fuel modification zones; reducing ignitions and fire rate of spread along the Reserve edge; and coordinating management activities with our partners. Important 2017 milestones and activities for 2018 are described below.

- WFMP / Stakeholders Implementation Guide (SIG) Introduction Meeting: Presented the development and components of the WFMP to the land owners/managers on May 3rd. The presentation included the final authors of these documents: Mike Huff (Dudek) and Carol Rice (Wildland Res Mgt). The main focus was highlighting the tools available to conduct fire management activities, including the specific pre-fire fuels management actions to be undertaken in specific areas on each property enrolled in the Reserve. Meeting was well received by participants.

- County of Orange Area Safety Taskforce (COAST): Continue participating in working group to discuss, plan, and implement initiatives aimed at decreasing fire risk and increasing fire safety throughout county. Main activities for 2017 included the development of the county-wide Community Wildfire Protection Plan (CWPP) and discussions with Caltrans on the Roadside Ignition Reduction Strategic Plan.
- Roadside Ignition Reduction Strategic Plan: After a productive start, efforts to develop a strategic plan through the COAST Roadside Subcommittee stalled due to changes in Caltrans personnel. The subcommittee had several meetings in the first half of the year to discuss the general concept for developing a plan, the different strategies available to reduce ignitions and limit fire spread, and the geographical and infrastructure spatial data requirements. In 2018, emphasis will change towards a project based approach, focusing in high priority areas and on improving communication and relationships.
- County-Wide Community Wildfire Protection Plan (CWPP): Through COAST, the plan was completed and signed in mid-2017. Most of the time in the six meetings in 2017 was spent on the final review of the plan and introducing participants to grant programs that are available to implement projects. Assisting our partners in fire and fuels management project development and submission to grant programs will continue in 2018. Participating on project implementation will help strengthen professional relationships, and benefit the Reserve by providing more opportunities for collaboration on fire and fuels management.
- Assessment of fuel modification zones/Defensible Space Zone Management Plan (OC Parks): The plan's scope-of-work includes developing best management practices for defensible space zones, treatment protocols and inspections, examples of well-maintained zones, and steps involved in implementing a project that minimizes impacts to habitat. While there may be components applicable to newer communities, this plan focuses on areas adjacent to older communities that don't have an existing fuel modification plan. Information relevant to the Reserve will be incorporated into the revision of the NROC WFMP. While the contract was stalled for most of 2017, efforts to resume addressing components of the plan through other projects will continue in 2018.
- Fire Resource Advisory Information and Contact Protocol: Update fire resource and tactical advisory maps for use during wildfires. Previous version was from 2007. These maps are important reference documents to inform fire suppression tactical response during a wildfire in the Reserve. Activities for 2018 include a review of maps with resource managers, a transfer of resource data to new OCFA Wildland Resource Planner, and a new program to increase situational awareness and communication between fire responders and resource managers.

Wildfires- In California, 2017 was a record breaking year for wildfires. More than 1.3 million acres burned, with 5 of the 20 most destructive fires in the State’s history occurring between October and December. In addition to the few small wildfires that typically occur within and adjacent to NROC (Table 1 summarizes wildfire statistics for 2017), there were two significant wildfires impacting the Reserve in late September and early October. Canyon Fire 1 and 2 burned in the northern portion of the Central Subregion, an area that has burned multiple times over the past century; the most recent were in 2006 (Sierra Fire) and 2007 (Windy Ridge Fire). According to a post-burn soil survey conducted by the California Natural Resources Agency, Dept. of Conservation, the Canyon Fire 2 burn severity was mostly moderate, with pockets of high severity in Weir Canyon. The impact assessment on the natural resources in and adjacent to the Reserve is ongoing and being led by Irvine Ranch Conservancy. Once complete, this report will be available on file. Additional projects scheduled for this spring such as the rare plant and cactus wren surveys, will further assess the impacts of the wildfires.

A total of 3,160 acres within the Reserve burned in 2017. Human activity continues to be the cause of ignitions and this is an obvious concern because of the potential for large, damaging wildfires if these ignitions were to occur during periods of low humidity and high winds, such as the Canyon Fire 2.

Table 1. Fire statistics for the NROC in 2017. FMU, Fire Management Unit.

Date	FMU	Area	Cause	Total Acres	Acres in NROC
05/20	11.01	IRP, picnic area near wash	BBQ coals dumped into wash	0.5	-
05/20	10.01	261 fwy, near Handy Creek Rd	Fireworks found in burn area above road	0.1	0.1
05/21	13.01	South Talbert Park	Homeless encampment	0.01	0.01
08/19	7.02	Irvine Q, across from IRC seed farm	Powerline	4	4
08/31	4.05	Hwy 133, north of Nix	Roadside ignition, car accident	0.001	-
09/24	12.01-12.03	Canyon Fire 1: Coal and Gypsum Canyons	Roadside ignition (91 @ Coal Canyon)- Maintenance	2,662	62
10/09	8.01, 10.03-10.04, 11.01-11.03, 12.01-12.02	Canyon Fire 2: Gypsum, Fremont, Weir, and Peters Canyons.	Rekindle from Canyon Fire 1 in Gypsum Canyon	9,217	3,094
11/17	4.03	IROS Preserve South, water tank area	Human Caused, adjacent party rock	0.1	0.1
12/07	13.01	South Talbert Park	Homeless encampment	.04	.04

#### **4.2 Habitat Restoration and Enhancement Plan (HREP)**

The HREP was completed and approved by the Board of Directors in 2003, and has periodically been reviewed but not updated since that time. In September, 2015, NCC engaged, Land IQ, a consulting firm specializing in earth sciences and habitat restoration, in a three-year effort to review and revise the plan, and propose a list of prioritized sites within the Reserve for specific restoration actions. Key themes being addressed over the course of the project include: landscape-scale restoration actions; sources of uncertainty tied to climate change, fire, seedbank condition; adaptive management; cost-effect methods; natural rainfall driven restoration; maximization of return of investment; integration of planning efforts; measure of success; and stakeholder and resource agency engagement.

During the first two years of the project, Land IQ has developed GIS-based models supporting identification of site-specific ecologically appropriate vegetation community restoration targets, advanced development of Best Management Practices based on lessons learned from active and historic restoration projects and practitioner expertise, and finalized a generalized, adaptive management approach for landscape-scale habitat restoration across the Reserve. Field assessments to validate and refine the results of Reserve-wide analysis of restoration opportunities, needs, targets, and success measures are planned for spring 2018. The finalized, updated Habitat Restoration and Enhancement Plan is to be submitted to the Board of Directors and Wildlife Agencies for approval in the fall of 2018.

#### **4.3 Recreation Management Plan**

In support of a long-term recreation management program for the Nature Reserve of Orange County, NCC partnered with national leaders in the field of recreation ecology from Utah State University and Oregon State University in 2016 to plan and implement a multi-year research project. As designed, the project is to have four overall dimensions focused on: (1) determining visitor use levels and spatial distributions; (2) assessment of biophysical resource conditions; (3) understanding of visitor perceptions, values, and judgements; and (4) providing of scientific expertise in park planning and management.

Working with signatories of the NCCP and other partners, the project leads identified fourteen management units within the Nature Reserve of Orange County as a high priority for assessment and monitoring of recreation use and associated management uses. The majority of units fall under the management of OC Parks, California State Parks, and the Irvine Ranch Conservancy. The project, as designed, will employ both continuous assessment and sampling approaches to establish baseline conditions. Work is to include field assessment of the location and condition of trails, sites, and other areas of visitor use, determination of the spatial distribution of use, and assessment of visitor attributes and preferences, demographics, motivations, values and judgments of resource and social conditions. Work will be conducted in two distinct phases. The first phase is three years in duration, with social and biophysical field sampling beginning in spring 2017 and extending through 2019.

#### **4.4 Grazing Management Plan**

Though a Grazing Management Plan was adopted, grazing in the reserve by livestock ceased in 2002. No plans are being discussed at this time to reintroduce livestock as a management tool. As a result, there is nothing to report in 2017 and no 2018 Work Plan.

**5.0 IMPACTS TO COASTAL SAGE SCRUB HABITAT IN THE COUNTY OF ORANGE  
CENTRAL/COASTAL SUBREGION NCCP/HCP 2017**

**5.1 Authorized Take in the Reserve System by Participating Landowners as  
Reported to NCC in 2017**

Letters dated March 7, 2017, were jointly sent by the Wildlife Agencies to the current executive officers representing each of the 1996 entities who signed the NCCP/HCP Implementation Agreement for the Central and Coastal Subregion of Orange County. The letters requested assistance accounting for habitat impacts implemented by the signatories within the boundary of the Central and Coastal Subregion Reserve within Orange County. The purpose of the accounting process was to review and accurately document all past habitat impacts by participants since the inception of the plan and to ensure a uniform and timely process for future take accounting.

The table below is a summary of habitat impacts to date. Metropolitan Water District and the University of California Regents are not included in the table because they have not utilized any of the credits authorized in the Implementation Agreement for the Central and Coastal Subregion NCCP/HCP for Orange County. The figures in the table are based on Wildlife Agencies' archives, records from past Annual Reports and input from landowners in response to the Wildlife Agencies' March 7, 2017, letter.

It should be noted that there are a few projects listed where the Wildlife Agencies and landowner have not yet resolved the accounting. Resolution of these few projects and their accounting will be the focus of the Wildlife Agencies, landowners and NCC in 2018.

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
12/01/96	OC Parks	Laguna Coast Wilderness Park (LCWP) Riding & Hiking Trail	0.1	394.9	Yes	
03/05/98	OC Parks	Laguna Cyn Rd Emergency Repair	0	394.9	Yes	
12/01/98	OC Parks	Santiago Oaks Regional Park – Suncal Encroachment	0	394.9	Yes	Boundary Amendment approved in 1999
12/01/98	OCW&R	Phase V-A Liner Project at Frank R. Bowerman Landfill (FRB)	16.5	378.4	Yes	
12/01/99	OCW&R	Phase V-B/C Liner Project at FRB Landfill	13.1	365.3	Yes	
12/08/00	OCW&R	Phase V-D at FRB Landfill	16.0	349.3	Yes	
02/01/02	OC Parks	El Modena Orange Oak Acres Mutual Water Company waterline, Santiago Oaks	0	349.3	Yes	
12/01/02	OCW&R	FRB Landfill Emergency Landslide Remediation	13.04	446.26	Yes	
12/01/02	OCW&R	FRB Landfill Phase VII-A	5.2	331.06	Yes	

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
12/01/03	OCW&R	FRB Landfill Desilting Basin	2.4	328.66	Yes	
12/01/04	OCW&R	FRB Landfill Phase V-D Stockpile	1.19	327.47	Yes	
12/01/05	OCW&R	FRB Landfill Fuel Mod. Program	0.48	326.99	Yes	
12/01/05	OCW&R	Canyon II Stockpile	1.56	325.43	Yes	
12/01/05	OCW&R	FRB Landfill Phase VII-B	13.85	311.58	Yes	
12/01/07	OCPW	Laguna Cyn Rd.	21.51	290.07	No	To be reviewed by County of Orange and Wildlife Agencies in 2018
12/01/07	OCW&R	FRB Landslide Back-cut Project	19.68	270.39	Yes	
12/01/08	OCW&R	Drainage 1	6.04	264.35	Yes	
12/01/10	OC Parks	Aliso and Wood Cyns Wilderness Park (AWCWP) Car Wreck Trail		264.35	No	To be reviewed by County of Orange and Wildlife Agencies in 2018
12/01/10	OC Parks	Santiago Oaks Regional Park: Bumblebee, Chutes and Weir Cyn Trails Improvements	0	264.35	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/10	OCW&R	FBR Landfill Phase VIII-C	7.2	257.15	Yes	
12/01/11	OC Parks	AWCWP: Canyon Acres Acquisition Trail	0	257.15	No	To be reviewed by County of Orange and Wildlife Agencies in 2018



<b>Date</b>	<b>Participating Landowner</b>	<b>Location and/or Project Name</b>	<b>CSS Impacts By Project (acres)</b>	<b>Remaining Authorized Take (acres)</b>	<b>Take Accounting Concurrence Between Wildlife Agencies &amp; Landowner</b>	<b>Comment</b>
12/01/11	OC Parks	AWCWP: Mentally Sensitive Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/11	OC Parks	AWCWP: Mathis Cyn Trail	0	257.15	Yes	Potential wetlands impacts
12/01/11	OC Parks	AWCWP: Wood Cyn Trail Bank, Wood Creek Dip Crossing and Valido Trail	0	257.15	Yes	Request ongoing communication with Wildlife Agencies
12/01/13	OC Parks	Irvine Ranch Open Space: Limestone Ridge Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OC Parks	Irvine Ranch Open Space: Marel Spur Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OC Parks	AWCWP: Cholla Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OC Parks	LCWP: Los Trancos Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OC Parks	AWCWP: Hillcrest HOA Drainage	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
12/01/13	OC Parks	LCWP: Ridge Park Road Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OC Parks	Whiting Ranch Wilderness Park: Cactus Hill Trail	0	257.15	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/13	OCW&R	FRB Landfill: South Basin/Wetland Basin	0.32	256.83	Yes	
12/01/13	OCW&R	FRB Landfill: West Channel Realignment	0.72	256.11	Yes	
12/01/13	OCW&R	FRB Landfill: Phase VIII-C	4.9	251.21	Yes	
12/01/13	OCW&R	FRB Landfill: East Flank Landslide Remediation	8.96	242.25	Yes	
12/01/14	OC Parks	LCWP: Marijuana Grove	0	242.25	Yes	Wildlife Agencies recommend coordination with NCC on future projects of this nature
12/01/14	OC Parks	AWCWP: Cholla Trail	0	242.25	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/14	OC Parks	LCWP: Lizards Trail	0.7	241.55	Yes	
12/01/14	OC Parks	LCWP: Emerald Cyn Bridges and Trail Improvements	0	241.55	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
12/01/14	OC Parks	Little Sycamore Bridge and Trail Improvements	0	241.55	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
12/01/14	OCW&R	FRB Landfill: Phase VII-C	1.5	240.05	Yes	
12/01/14	OCW&R	East Loma Landslide	2.22	237.83	Yes	
12/01/14	OCW&R	FRB Landfill: East Flank Landslide Remediation	5.44	232.39	Yes	
12/01/15	OC Parks	AWCWP: Main Entrance Facility Improvements	0.79	231.6	Yes	
12/01/15	OCW&R	FRB Landfill: Office Facility Expansion	1.3	230.3	Yes	
12/01/15	OCW&R	FRB Landfill: Phase VIII-B1	1.91	228.39	Yes	
01/01/13	OC Parks	Limestone Canyon: Creek Trail	0	228.39	Yes	Wildlife Agencies recommend coordination with NCC on future trail projects
01/01/04	OC Parks	LCWP: Nix Nature Center		228.39	No	Constructed after NCCP/HCP. To be reviewed by County of Orange and Wildlife Agencies in 2018
01/01/02	OC Parks	Upper Newport Bay Interpretive Center	2.7	225.69	Yes	
01/01/10	OCPW	Alton Pkwy	0	225.69	Yes	

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
01/01/98	OC Parks	LCWP: Camarillo Trail	0.01	225.68	Yes	
01/01/08	OCPW	San Diego Creek Maintenance Project	1.6	224.08	Yes	
01/01/17	OCW&R	FRB Landfill: Phase VII-B2	8.72	215.36	Yes	
<b>County of Orange</b>			<b>Total Take 179.64</b>	<b>Beginning Balance 395</b>		

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
07/1997	Irvine Company	Laidlaw Gasline	0.07	1.93	Yes	
06/1999	Irvine Company	Tustin Ranch Estates	0.16	1.77	Yes	
01/2001	Irvine Company	Chambord Entry Wall	0.07	1.7	Yes	
02/2002	Irvine Company	Laidlaw Steel Pole Removal	0.004	1.696	Yes	
10/2002	Irvine Company	Coyote Cyn Gas Probes	0.0001	1.6959	Yes	
02/2003	Irvine Company	Bommer Cyn East Fork Ranch Road	0.094	1.6019	Yes	

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
06/2008	Irvine Company	Santiago Hills Phase II: Infrastructure Improvements-Irvine Regional Park and Peters Canyon Reservoir	0.5484	1.0535	Yes	
<b>Irvine Company</b>			<b>Total Take 0.9465</b>	<b>Beginning Balance 2</b>		

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
02/13/97	Irvine Ranch Water District (IRWD)	Allen-McColloch Pipeline	0.005	59.995	Yes	
02/14/97	IRWD	Parcel 4 Sewer and Cart Path north of Spillway	0.18	59.815	Yes	
07/27/99	IRWD	Shady Cyn Reservoir and Pipelines	1.6	58.215	Yes	
12/23/99	IRWD	Mason Park Slope Repair	0.25	57.965	Yes	

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
09/19/00	IRWD	Shady Cyn Sewer Line Extension	0.14	57.825	Yes	
12/01/07	IRWD	Minor Amendment (MA07-02) for IRWD	12.45	45.375	Yes	
12/01/14	IRWD	Baker Water Plant/ Serrano Creek Outlet	0	45.375	Yes	Utilized In-Lieu Mitigation Fee Program
12/01/14	IRWD	Baker Raw Water Pump Station and Pipeline Project	0	45.375	Yes	
12/01/15	IRWD	Serrano Summit	0	45.375	Yes	Utilized In-Lieu Mitigation Fee Program
	IRWD	Siphon Reservoir Interim Facilities	0.04	45.335	Yes	CDFW Records. No date
	IRWD	Irvine Lake Pipeline North Conversion Project	0.96	44.375	Yes	CDFW Records. No date
<b>Irvine Ranch Water District</b>			<b>Total Take 15.625</b>	<b>Beginning Balance 60</b>		

Date	Participating Landowner	Location and/or Project Name	CSS Impacts By Project (acres)	Remaining Authorized Take (acres)	Take Accounting Concurrence Between Wildlife Agencies & Landowner	Comment
2003	Southern California Edison (SCE)	Shady Cyn Special Linkage: Convert Overhead 66kV to Underground (Santiago-Crown-Morro 66kV)	1	1.4	Yes	
2003	SCE	Shady Cyn Special Linkage: Convert Overhead 66kV to Underground (Santiago-Coygen-Crown 66kV)	1	0.4	Yes	
<b>Southern California Edison</b>			<b>Total Take 2.0</b>	<b>Beginning Balance 2.4</b>		

## 5.2 Take by Non-Participating and Participating Landowners – In-Lieu and Other Mitigation Fee Options

The US Fish and Wildlife Service, and the California Department of Fish and Wildlife approved a total of three Non-Participating Landowners projects to utilize the In-Lieu Mitigation Fee Option. There was a total take of 7.91 acres of coastal sage scrub outside of the Reserve and \$514,150 of mitigation payments. The table below summarizes the project impacts and approved mitigation:

Non-Participating Landowner	Participating Landowner	Project Description	Acres of CSS Approved Take	Approved In-Lieu Mitigation Fee	Date Fee Received by NCC
	Irvine Ranch Water District	Baker Water Treatment Plant, City of Lake Forest Civic Center & Serrano Summit	1.42	\$92,300.00	07/12/2017
Monarch Coast II		Salt Creek Trail Segment Repair City of Dana Point	0.06	\$3,900.00	07/25/2017
Lennar Homes		Serrano Summit City of Lake Forest	6.43	\$417,950.00	10/24/2017

<b>Totals</b>			<b>7.91</b>	<b>\$514,150.00</b>	
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## 6.0 ACCOUNTING OF FUNDS RECEIVED AND DISPERSED BY NCC

No funds were dispersed to NCCP/HCP participants. However, NCC provided in-kind contributions and science and land management services through its contracts to reserve landowners in the form of invasive plant eradication and habitat restoration on reserve lands. For a detailed breakdown of expenditures and success of the program in 2017, see Section 2 above.



**7.0 BOUNDARY CHANGES/MINOR AMENDMENTS IN THE RESERVE SYSTEM**

There was one Boundary Amendment reviewed by the NCC Boundary Amendment and Acquisition Committee and approved by the Board of Directors and Wildlife Agencies in 2017. The Irvine Company was the applicant and the impact occurred within Neighborhood 3, Orchard Hills Development, City of Irvine. There were a total of 0.35 acres of mixed scrub habitat impacted. The NCC Board and Wildlife Agencies approved the addition of 1.83 acres of adjacent land as mitigation resulting in a net increase of 1.48 acres to the Reserve. The table below provides a summary of the mitigation:

<b>Minor Amendment Number</b>	<b>Date Approved by the Wildlife Agencies</b>	<b>Reserve Property Impacted</b>	<b>Reserve Acres Impacted</b>	<b>Acres Added to the Reserve</b>	<b>Net Change to the Reserve</b>
MA 17-01	06/19/2017	Siphon Reservoir Parcel (Irvine Ranch Water District)	0.35 <i>(Mixed scrub habitat)</i>	1.83 <i>(0.5 ac mixed scrub, 0.11 ac of bush mallow scrub, and 1.22 ac of annual grasslands)</i>	+1.48 acres

# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.0**

Reserve

Landowner/Manager

Progress Reports and

Work Plans

# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.1**

California Department of  
Fish and Wildlife

Upper Newport Bay Ecological Reserve  
Newport Beach, Orange County

**Annual Work Report**

*Prepared by:*

Carla Navarro Woods  
Land Management Program  
South Coast Region 5  
California Department of Fish and Wildlife

February 2018

## **I. Introduction and Summary**

The Upper Newport Bay Ecological Reserve (UNBER) is located in Newport Beach in Orange County, California. UNBER is a 752 acre coastal wetland located along the upper reaches of the Newport Bay, Orange County, California. Newport Bay is divided into two distinct areas: (1) the heavily developed lower Bay, known for its recreation and commercial significance; and, (2) the less developed upper Bay, known for its ecological significance. UNBER generally includes most of Upper Newport Bay north of the Pacific Coast Highway, from the southwestern boundary at Shellmaker Island along the center line of Back Bay Drive to the northeastern boundary at Jamboree Road Bridge.

UNBER is one of the last remaining coastal wetlands in southern California that continues to play a significant role in providing critical habitat for a variety of migratory waterfowl, shorebirds, and endangered species of birds and plants. The unique marine and terrestrial habitats within UNBER provide habitat for approximately 200 species of birds, 75 species of fish, 19 species of herpetofauna, 17 species of mammals, 12 orders of insects, and over 1,000 species of marine invertebrates. In addition, UNB is of commercial significance because it provides critical habitat for commercially important species of fish, such as California halibut (*Paralichthys californicus*), sand bass (*Paralabrix* spp.), topsmelt (*Atherinops affinis*), and anchovy (*Engraulis* spp.).

UNBER was designated as an ecological reserve by the California Fish and Game Commission in 1975 to conserve, restore, and enhance wetland habitats. The creation of UNBER was the result of several years of efforts by Federal, State, and local agencies as well as members of the community to preserve UNB from increasing pressures from surrounding development. The creation of UNBER was made possible by the Newport Bay Settlement Agreement, signed by the Irvine Company (TIC), the County of Orange, the City of Newport Beach, and the California Department of Fish and Game (CDFG). The initial land agreement included 527 acres; an additional 214 acres was added to UNBER in 1989. The guiding document for UNBER is the Land Management Plan (Gerstenberg 1988). The property has not had a PAR analysis performed and there is no endowment for management.

The purpose of this Annual Report is to report on the accomplished tasks from January 1-December 31, 2017. The Department fiscal year encompasses the period from July 1, 2016 through June 30, 2017. Department supported program numbers for the Back Bay Science Center are for the Department fiscal year, not calendar year. Unless otherwise stated, all tasks were performed by Department staff, including Carla Navarro Woods (Orange County Land Manager), Robin Madrid (Education Coordinator), Tim Ford (Fish and Wildlife Technician), and Scientific Aides.

## **II. Management Activities**

### **A. Improvements**

#### 1. General Maintenance

1. North eastern boundary. Wooden fencing damaged by San Diego creek overflow during rainy season. Approximately 20 linear feet of t-post fencing installed to allow for water flow in case of heavy rains. Signage attached to fencing.
2. Big Canyon trail and parking lot. Trail and parking lot is regularly maintained by DFW staff to remove vegetative overgrowth, repair the trail surface, remove trash, and identify areas of trespass and/or illegal behaviors.
3. Big Canyon. Signage replaced at all access points. Bike rack added to parking area. Designated fishing area equipped with signage and fishing line disposal container.
4. East Bay Marsh Trail Closure. Through collaboration with OC Parks, access to east bay marsh trail has been closed to reduce trespass onto marsh area.
5. Ongoing sign replacement and/or repair when needed.

### **B. Biological Surveys**

#### 1. California least tern (*Sterna antillarum browni*) monitoring

There is one least tern colony that nests at Tern Island (also referred to as ‘Hot Dog Island’). In May, remote monitoring begins upon when birds are observed on the island. Weekly nest searches are conducted by CDFW staff to document the numbers of eggs, nesting pairs, nesting sites, and estimated fledglings. All of the data is sent to Nancy Frost and Hans Sim of DFW in the South Coast Region.

#### 2017 Season

During 2016, 17 nests were observed at Tern Island. A total of seven chicks were observed after hatching, but the number of dead chicks observed on-site was higher than expected. We suspect harassment from black skimmers that nested on the western end of the island.

#### 2018 Season Planning

Nest site preparation was performed by DFW staff and volunteers in November and December. Target cover during the breeding season is 15-30% cover. To accomplish this, vegetative cover is reduced to approximately 10% cover to account for expected vegetative growth during the breeding season.

#### Camera Monitoring

In an effort to identify potential predators and document nest attendance, Bushnell trail cameras and a Moulter panoramic camera were placed on Hot Dog Island before

the start of the avian breeding season. Cameras were checked weekly for battery replacement and data downloads were performed during on-site nest searches. Camera deployment, maintenance, photo downloads were performed by Department staff and/or volunteers. Analysis of the photos has been ongoing since summer 2017. Due to the high number of images produced, DFW staff is still sorting and analyzing the photos.

## 2. Light footed Ridgway's rail (*Rallus obsoletus levipes*)

Monitoring is provided annually under a Memorandum of Understanding (MOU) with Dick Zembal. The MOU allows for annual nest searches and egg collection to the breeding program at the SeaWorld. Surveys were conducted during the start of the breeding season and include approximately coastal wetlands from the Ventura County to the Mexican Border. The survey data is provided as part of a final annual report submitted to DFW.

In 2016, 12 rail rafts were constructed by Dick Zembal and volunteers for placement throughout the reserve. The rafts are used as escape cover during extreme high tides, when the marsh plain is inundated. The raft is composed of a small wooden platform (24 in. x 33 in.) constructed of pine boards on the top and sides. The bottom contains compartments with secured styrofoam for flotation. The entire raft is anchored with PVC onto the marsh. Each platform has a cover; the cover is created of willow or metal caging material then covered with palm fronds to create a refuge from elements and make the platform less conspicuous in the marsh. For the 2017 season, there were no rails thought to have used the nesting platforms during the season. Inspections of the platforms by Dick Zembal and his research associates indicated that rail guano was found on the platforms but they have yet to use them for breeding. The next platform search is planned for February 2018.

### 2017 Season

The annual rail census report for 2017 was not yet available at the time this report was produced. It will be included in the next annual report.

### 2016 Season

In 2016, a total of 202 pairs were documented to exhibit breeding behavior. Although it still represents the largest subpopulation in the state, there was an overall decline of 13.7% compared to 2015.

## 3. Beldings savannah sparrow (*Passerculus sandwichensis rostratus*)

Monitoring is provided every five years under a Memorandum of Understanding (MOU) with Dick Zembal. The last survey effort was completed in April 2015 and next survey effort would occur in five years in 2020. In 2015, 278 territories were recorded at Upper Newport Bay; this represents a 4% increase from 268 territories identified in 2011. This subpopulation is ranks 5<sup>th</sup> within a total of 30 marshes. The majority of the territories were observed in the northwest corner of the bay, above the salt dike, and below the Muth Center towards Jamboree Bridge. Colonies are

concentrated in dense pickleweed (*Salicornia* sp.) in the mid marsh, a little higher than they are typically observed. It is thought that they are nesting in higher marsh areas to avoid more frequent tidal inundation. However, this makes the population more vulnerable to human and pet trespass, mammalian predators, stands of Algerian sea lavender, and habitats dominated by song sparrows. Management efforts for 2017 will be focused on removal of Algerian sea lavender and reducing human trespass.

#### 4. Algerian Sea Lavendar

Department staff began presence/absence surveys of Algerian Sea Lavender in the upper reaches of the bay, prioritizing sensitive habitats necessary for bird nesting. The project is growing with the help of Newport Bay Conservancy, Dick Zembal of Orange County Water District, and funding provided by the U.S. Fish and Wildlife Service. The program objective is to identify areas of heavy infestation and test removal techniques such as tarping, hand removal and herbicide application.

Surveys of

#### 5. Osprey (*Pandion haliaetus*)

The BBSC has a nesting platform that was erected in 1993 and has been successfully utilized by nesting ospreys from 2006-2016. In 2017, one chick was banded by Pete Bloom and his associates. The new osprey mate has stayed and the pair were observed exhibiting breeding behavior in early 2018.

Below is a summary of the Osprey data to date.

1993 - Nest Platform Constructed and Erected by Russ Kerr and the California Department of Fish and Game

2003 - Nest Spruced up - more Sticks Added

2005 - First Attempt at Nesting Produced 2 Failed Eggs

2006 - First Successful Fledging of 2 Chicks

2007 – Two Chicks Successfully Fledged

Platform moved after breeding season to its current location to complete the Back Bay Science Center.

2008 - Three Chicks Fledged, both were banded.

2009 – Four Chicks Banded and Fledged

2010 - Three Chicks Banded and Fledged

2011 - Three Chicks Banded and Fledged

2012- Three chicks banded and fledged

2013- Reproductive failure, cause unknown.

2014-Three chicks banded and fledged.

2015-Two chicks banded and fledged. One egg unhatched and taken for analysis.

2016-Three chicks banded and fledged.

2017-One chick banded and fledged.



## **C. Habitat Restoration and Maintenance**

1. The California Coastal Commission's Community-Based Restoration and Education Program.

The Restoration program is working at sites on City of Newport Beach, County of Orange and State of California property. Through monthly "ROOTS Events", large groups (up to 120 volunteers) remove invasive plants and install native plants to restore coastal sage scrub habitat. During weekly "Steward Days", small groups (12-15) of volunteers focus on propagating native plants that will be installed in the field during the rainy season. The group operates a native plant nursery of Department of Fish and Game property at the Back Bay Science Center. They are currently working in Newport Valley, a City property adjacent to Back Bay Drive. For specific program information, please contact Matt Yurko. Mr. Yurko's email is: [myurko@coastal.ca.gov](mailto:myurko@coastal.ca.gov)

### **2. Exotic Weed Removal**

Herbicide application and/or hand removal of nuisance or non-native vegetation is part of the maintenance routine at UNBER. Prior to the start of the avian breeding season (September 2-March 1), the primary focus is non-native vegetation removal and during the breeding season (March 1 –September 1) the maintenance efforts shift to trail maintenance, repairs and sign replacement. The nesting season does vary by species and year, so access to sensitive areas may be restricted at any time from January through September. Approximately 10 acres were treated for non-native and/or nuisance species throughout the reserve.

### **3. Nesting Island Maintenance**

UNBER has two nesting islands located in the upper reaches of the bay. Tern Island, is an island that is used by California Least terns, Black Skimmers, American Avocets, and killdeer for nesting. Every winter and early spring the island is maintained by removing non-native vegetation through hand removal and herbicide treatment.

New Least Tern Island is a new island created in 2008 by the Upper Newport Bay Restoration Project. It is 2.3 acres at MLLW.

Tern (aka HotDog) Island is the primary nesting location for a small colony of California Least Terns. For the 2017 season, vegetation management of Tern Island began early with hand removal and herbicide treatment of nuisance vegetation. Breeding information for the Least terns are provided under Biological Surveys section. The rare and endangered coastal woolly head (*Nemacaulis denudata*) has an established population on the island. We take care to avoid any damage to this annual species.

## **D. Public Services**

The Back Bay Science Center and the Ecological Reserve provide planned research, education, and recreational opportunities provided through the Department or in coordination with our partners and local non-governmental organizations. Many of these

services include volunteer coordination, educational programs and public outreach, access requests, trail designation, maintenance of lands and facilities, patrol, enforcement and research.

### **Public Events within the Reserve**

1. Newport Bay Conservancy (NBC)

The Newport Bay Conservancy is a local nongovernmental organization that supports the DFW lands mission by providing educational opportunities for the community at large to learn about our watershed and ecology of the Newport Bay. NBC hosted BBSC public tours, kayak tours, outrigger tours, docent-led walking tours around the bay to help support education and outreach of the estuary. For more information, please visit their website at: [www.newportbayconservancy.org](http://www.newportbayconservancy.org)

2. Newport Beach Triathlon

The Newport Beach Triathlon is a race event that utilizes Back Bay Drive for the bike portion of its race. The event begins at Newport Dunes with a one mile swim, then participants ride their bikes on a loop through Back Bay Drive, and return to Newport Dunes for the final three mile run. A special use permit was granted to the race organizers and the race was held in October 2017 with approximately 500 participants. Pre- and post-event coordination and meetings have been handled the Reserve Manager.

3. CROP Hunger Walk

Each year, the Our Lady Queen of Angels elementary school holds a small walking event to raise money for disadvantaged youth. The event is usually held in October, where walkers use a portion of Back Bay Drive from San Joaquin Hills to East Bluff as part of the charity walk route. In October 2017, the event attracted approximately 100-125 walkers to participate. The organizers provided one water station at the Big Canyon parking lot where walkers stop to hydrate and throw their trash into receptacles before continuing.

4. Sea and Sage Audubon Society Monthly Bird Counts

Every third Wednesday of each month, the Sea and Sage Audubon Society conducts monthly bird counts at the Reserve. The Newport Sea Base provides a pontoon for birders to count birds observed from the southern Reserve boundary to New Least Tern Island. Monthly reports are provided to the Department. Bird species list can be found on the Audubon Society website at: [www.seaandsageaudubon.org](http://www.seaandsageaudubon.org).

### **Research Access at Upper Newport Bay**

1. Chris Crompton, Orange County Watersheds

The County of Orange/OC Watersheds is required by the Santa Ana Regional Quality Control Board to conduct water quality, algae, and sediment monitoring as described in the Municipal National Pollutant Discharge Elimination System (NPDES) permit and the Nutrient Total Maximum Daily Load (TMDL) Monitoring Program for Newport Bay.

Monthly water, benthic and algal samples are collected from established sampling locations each year during favorable tides. Quarterly reports are made available to the Department and also published online for the public to review. Advance notice of sampling dates are coordinated with the Reserve Manager.

2. Richard Ambrose, UCLA

Long term climate change and sedimentation. Access allows researchers to conduct vegetation surveys, collect sediment cores, and install tidal loggers on intertidal mudflats  
Data collection is ongoing.

3. Sea and Sage Audubon Society

Monthly bird counts, as described above under 'Public Events'

### **Educational Programs and Outreach at the Back Bay Science Center**

The Back Bay Science Center is a teaching and research facility located at the southeast corner of the ecological reserve on Shellmaker Road, off Back Bay Drive. The facility has three buildings and is maintained through a joint partnership between the Department of Fish and Wildlife, the City of Newport Beach and County of Orange. The administrative building provides office space for staff and volunteers of the California Department of Fish and Wildlife, City of Newport Beach, and California Coastal Commission. A second building provides office and laboratory space for the County of Orange Public Health Laboratory and a third building is a teaching lab used for education and research.

Educational programs are coordinated through DFW staff Robin Madrid. During the fiscal year, the Department, operating and/or supporting partners provided 273 educational programs for 8,495 participants at the Back Bay Science Center. The facility hosted educational programs and/or provided meeting space for various public organizations including Boy Scouts of America, Orange County Marine Protected Area Council, Newport Bay Conservancy, Newport SeaBase, the Environmental Nature Center, City of Newport Beach, UC Irvine, and the Community Restoration Program. Event types ranged from the monthly Marine Life Inventory, teacher trainings, Sunday community days, Natural History lecture series, environmental symposia, State wide meetings and teacher training.

1. Marine Aquaria

There are four indoor aquaria and three outdoor tanks at the Back Bay Science Center (BBSC), which are used as educational displays of native fish and invertebrate species from the Newport Bay. These tanks are used in educational programs, tours, and public outreach events. Aquaria maintenance is possible through the efforts of volunteers and scientific aides. Some of the duties include: weekly water changes, regularly scheduled cleanings and feedings, food preparation and storage, regular system checks and repairs, water quality testing, supplies and equipment orders, and the coordination of volunteers and staff to assist with each task.

## 2. Marine Life Inventory and Research

Ongoing monitoring studies have been taking place at the BBSC for several years. The Marine Life Inventory (MLI) is one of the most popular and well-known programs. The MLI occurs one Saturday of each month, as determined by the tide schedule. This program is designed to monitor seasonal changes as well as natural and/or human-mediated changes observed throughout the year in the Back Bay. To study these changes we call on the help of high school students, college students, and sometimes the general public to assist our scientists and educators in collecting data. There are three different collection methods used to collect marine life from different habitat areas of the estuary: (1) a mud grad collects mudflat inhabitants; (2) a 100' seine net collects fish and invertebrates from the water column; and, (3) an otter trawl collects bottom dwellers. The marine life are collected, identified, measured, and then released. This long term monitoring information is collected and inputted into computer database. The BBSC also collaborates with several local colleges to coordinate research projects, provide access letters, or letters of support. This fiscal year, 12 MLI events were held for 300 students/volunteers participants.

## 3. Coastal Cleanup Day

In September 2017 approximately 700 participants from the community attended the clean-up efforts around the Back Bay as part of the state-wide Coastal Cleanup Day. The Peter and Mary Muth Interpretive Center is the headquarters for the land-based clean-up, which is coordinated by OC Parks and the Newport Bay Conservancy (NBC). Land based cleanup effort is focused within the Upper Newport Bay Preserve that is managed by OC Parks. The Back Bay Science Center is the headquarters for the water-based clean-up, which is coordinated by the Department, with assistance and support from NBC, and 150 volunteers arrived for clean up at this site.

## 4. Newport Bay Conservancy (NBC) Public Programs

The NBC usually holds one major public event each quarter for the community at the Back Bay Science Center. The primary focus of these events is to inform the public of current research at the Bay or topics of interest to the general public.

## 5. Boy Scouts of America and the Newport Sea Base

The Boy Scouts regularly collaborate with the BBSC for Eagle Scout Projects. Two projects were successfully completed: (1) 100 linear feet of split doweled fencing and trex were installed near the amphitheater to connect two trails with the same trex material; and, (2) 11 wooden benches were sanded, painted and outfitted with new stainless steel hardware. These projects require careful planning and coordination, and permit preparation through the Department and the California Coastal Commission.

The BBSC also offers two summer programs from June-September: the Shark Camp and Fishing for Science for Boy Scout participants. DFG coordinates these events with the Newport Sea Base to teach fishing techniques, fishing safety, shark and skate ecology, and most importantly, teach a strong sense of conservation values.

The Newport Sea Base is part of the Boy Scout program that offers sailing and marine education open to both boys and girls ages 5-17. The majority of their programs are hosted at their own facility In Newport Beach but they also utilize the Reserve and the Back Bay Science Center for educational programs about our local watershed and coastal wetlands ecology. Advance coordination with the Reserve Manager and Educational Programs coordinator is required for an Access Permit and space availability at the BBSC.

## **Patrol and Enforcement**

### 1. Staff Patrol

Department staff provide regularly scheduled outreach and information for the Reserve, other DFW properties in Orange County, and at local fishing areas. Frequent property patrols are performed to identify missing signage and property damage on the Reserve. There are many access points to the Reserve and adequate monitoring of illegal uses is difficult.

### 2. Unplanned Public Contact

These are often unplanned encounters with the public that require information or enforcement. Throughout the Reserve we have areas of sensitive habitat that the public is not allowed to enter or have equipment and/or activity restrictions. These common occurrences often require immediate attention from the Reserve Manager.

## **E. Operations Administration**

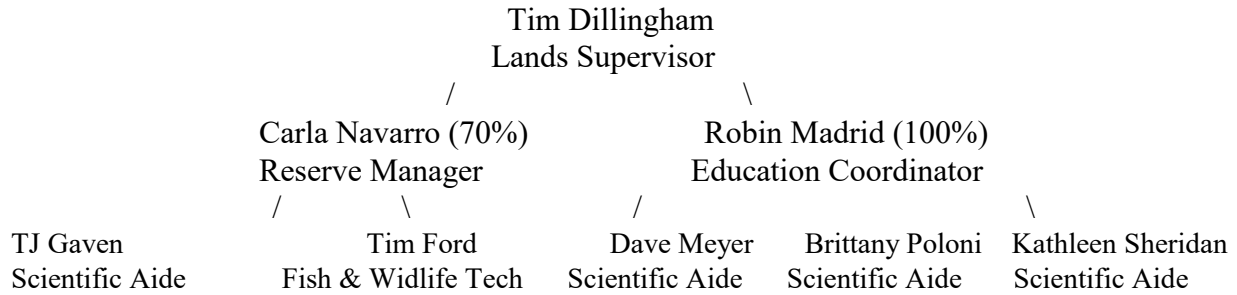
Training and meetings

### 1. Coordination Meetings, Reserve Manager

- a. The Reserve Manager usually meets with each Access Letter Permittee to review permit conditions, resolve issues, and coordinate event needs at the Reserve.
- b. BBSC Facilities Meeting. Quarterly meetings of the BBSC operating partners to discuss facilities issues.
- c. NCC Landowners Meetings. Meetings with NCC to discuss issues of participating NCCP properties. At UNBER, only the upland portions are part of the NCCP.
- d. Orange County Marine Protected Area Council. Quarterly meeting to coordinate research, monitoring, and enforcement of marine protected areas.
- e. Newport Bay Watershed Executive Committee Meetings. Quarterly meetings to discuss watershed issues among the participating cities, including: Costa Mesa, Santa Ana, Irvine, Newport Beach, Lake Forest, and Tustin. For more information please visit website at:  
<http://www.ocwatersheds.com/programs/ourws/wmaareas/wmacentraloc/nbexeccomm>
- f. Public Events meetings. Access coordination to ensure habitat protection on the day of the event.

### III. Workload

#### A. Supervision and Staffing



Tim Dillingham is the Lands Program Supervisor for staff in Orange, Los Angeles, Ventura, and Santa Barbara, and San Diego Counties. All special projects, access letters, and large public events require management staff approval. Educational programs, special events, and volunteer activities that operate within the BBSC complex are under the jurisdiction of Robin Madrid. Restoration, biological monitoring, construction projects and volunteer activities that occur within the Reserve and are outside of the BBSC are under the jurisdiction of Carla Navarro. Programs or events that overlap the BBSC and the reserve are cooperatively managed by both Carla Navarro and Robin Madrid.

#### B. Scheduling

The schedule in Appendix 2 identifies the approximate schedule of field work throughout the fiscal year. Those tasks (both field and non-field) with specific critical milestone dates are listed below in chronological order. The field tasks with critical dates are bolded in the schedule.

## Appendix 1: Annual Task Schedule

<b>Task</b>	<b>July-September</b>	<b>October-December</b>	<b>January - March</b>	<b>April - June</b>
Nest Site Preparation	After September 15th	X	Before March 15th	
Least Tern Monitoring	X			X
Weed Eradiation	X	X	X	X
Habitat Restoration		X	X	
Trail Maintenance	X	X	X	
CA coastal gnatcatcher surveys				X
Light footed clapper rail survey				X

# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.2**

California Department of  
Parks and Recreation



**CRYSTAL COVE STATE PARK  
2017  
NCCP/HCP ANNUAL PROGRESS REPORT**

**I. Recreation Use, Monitoring and Management**

**A. Current Use Policies**

Crystal Cove State Park (CCSP) includes approximately 2,400 acres of backcountry and 400 acres along the coastal terrace. There are 18 miles of marked backcountry trails, both dirt road and single track, open to all hike, bike and equestrian users. There are three environmental campgrounds located from two to three miles inland as well as the Moro Campground and Day Use area with 60 campsites. Paved bike/pedestrian paths along the coastal terrace connect with 6 beach-access parking lots and 10 access ramps. The park's 3.2 miles of beach is fringed with intertidal reef pools that connect with the 1,140 acre Underwater Park/Marine Life Refuge. The Crystal Cove Historic District is on the National Register of Historic Places which consists of 46 beach cottages built in the vernacular style of architecture between 1920 and 1940 set within its similarly distinctive historic landscape. General park areas are open every day from 6 AM until dark, while the Historic District welcomes day use fee visitors from 6AM to 10PM daily and currently hosts registered guests overnight in sixteen of the cottages. The park is part of the Irvine Ranch National Natural Landmark and the Irvine Ranch California Natural Landmark.

Over the next 18 months, State Parks will be preparing a Natural Resource Management Plan for Crystal Cove State Park. The plan will develop goals and objectives for management of the Park's nearly 3,000 acres of terrestrial natural resources. The plan will focus on several key areas including management of wildlife and sensitive plants, invasive species, wildfire, recreational use and infrastructure, and opportunities for public engagement and stewardship. This is a pilot project for State Parks in conjunction with the Irvine Ranch Conservancy.

**B. Recreation Monitoring**

Per the official statistical report released by the Department of Parks and Recreation for July 2015 through June 2016, Crystal Cove received an estimated 1,877,517 day use visitors and 119,609 campers for a total of 1,997,126 visitors. The day use estimate includes free and paid day use, park entry by any means including by motor vehicle of any type, on foot, on bicycle, by boat or on horseback. Admission based on the use of annual passes is incorporated into this data. This is the latest information available as the most recent statistics are still under calculation.

Trail use is monitored through patrols by peace officers, natural resource staff as well as volunteers enrolled in the park's trail assistant volunteer program (TAV). All legal trails are named and found on complimentary maps and at signed trail intersections in the backcountry. Some illegal trails have been marked with signs noting closure/resource impacts, fenced and obscured with cut vegetation. This effort has also been undertaken on the Coastal Terrace in areas where dry vegetation has become trampled.

TRAFx brand trail counters have been installed at all of the nine entrance points into the backcountry portion of the park. With the software included, DPR is now able to accurately estimate backcountry use of Crystal Cove. Park use of the backcountry varied from 20,410 in September to 62,000 in April. These are approximate numbers; the total number of users was halved to account for entrance and exit in an attempt to eliminate double counting. State Parks is currently undergoing a process to calibrate the individual trail counters throughout the park based on a protocol developed by Chris Monz at Utah State and graduate students at Oregon State University. Once this is completed, we hope to be able to account for the multiple entrances and exits people may do on their hike based on the property boundaries, the trail layout, and the subsequent counter placement. We will then have stronger visitation numbers.

We also experienced issues with theft and vandalism; we lost two TrafX counters at the end of 2016 and were unable to get the replacements online until February and March. We also experienced some technical failures on one of our counters in December 2017, so our data is skewed for this month as well. Our highest months of backcountry use in 2017 (despite missing data) were March and April and lowest were January and February, although the missing counters are areas with high ingress and egress traditionally. We plan on continuing this program to try to determine recreation patterns and hope to expand to the coastal side of the park. This will hopefully dovetail with the recreation monitoring work funded through NCC and in process with Chris Monz and his students.

A total of 92 film permits were issued with a total of 750 total days of filming permitted in 2017. 169 special events were permitted within Crystal Cove, including weddings, picnics, parties, photo shoots and group gatherings, located primarily along the coast. Events are reviewed for potential impacts by the Special Events Program Permit Coordinator and Supervising Peace Officer. A small gathering may need no more than a reminder to haul out trash, whereas larger events may go through the Department's project review process for compliance with CEQA, PRC 5024.5 and applicable permitting requirements. As necessary the department will assign patrol officers and resource monitors at events. All events are allowed only with approved activities or conditions as necessary to ensure no adverse impacts to park natural or cultural resources. Special event program guidelines were updated during 2012 and again in 2014 to ensure protection of park resources and to address the park and concession operations at the Historic District.

### C. User Compliance Programs

Park facilities and trails are open daily from sunrise to sunset, but may be closed seasonally due to rain-saturated roads or extreme fire danger. The area in and immediately adjacent to the Historic District is open until 10PM.

One avenue for achieving user compliance is through educational programming. Several groups have embraced coordination with and education of the public within the park, including: The Crystal Cove Conservancy (Crystal Cove's cooperative association), Inside the Outdoors, SHARE (a biking / conservation group), Trails 4 All, the Irvine Ranch Conservancy, the Laguna Canyon Foundation, Friends of the Newport Coast, REI as well as trained docents to lead tours on the topics of the Historic District, the backcountry, the beach and tide pools, flora, geology, and cycling. The park participates in other area-wide coordinating groups, including: Orange County Wild, the Orange County Marine Protected Area Council, South Coast Wilderness Group, Orange County Coastkeeper, and the Marine Life Refuge Committee, a subset of the Orange County Coastal Coalition.

The park has a current staff of eight State Park Peace Officers [One - State Park Peace Officer (Ranger), Two - State Park Peace Officer Supervisor I (Lifeguard)s, and Five - State Park Peace Officer (Lifeguard)s]. They patrol and monitor all sectors of the park and enforce rules and regulations with warnings, citations, and arrests. The park attracts over one and a half million visitors each year and visitation is projected to steadily increase with nearby residential and commercial property development. The beach and Historic District continue to be the major visitation attractions. The backcountry trails and campsites have experienced steadily increasing visitation as well. Public safety/law enforcement activity increased in terms of total contacts in 2017. 1,458 swimmer rescues were made during 2017 with an additional 4,378 preventative aquatic actions. 75 major medical aids occurred in the park and 348 minor medical aids were recorded. State Park law enforcement action included 132 citations, 6 arrests, 5,248 warnings for violations and thousands more public contacts.

#### D. Educational Outreach

Interpretive and educational programs are a core component of the State Park mission of informing and educating the public about natural, cultural, and historic resources. In 2017, over 4,200 students attended guided school programs. Thousands of members of the public attended public interpretive programs including Historic District tours, tide pools tours, beach processes, gray whales, geology, subtidal life, terrestrial habitats, native flora, Native American culture, raptors, night animals and bats, and mountain biking etiquette. Classes were taught by professional interpreters, park docents, and partners such as Crystal Cove Conservancy and Inside the Outdoors. In addition, virtual field trips using online videoconferencing courtesy of PORTS (Parks Online Resources for Teachers and Students) has allowed students from all over the nation to visit Crystal Cove State Park remotely and participate in tide pool study, reaching just under 9,602 students through 305 programs. Additional interpretive activities include contact with visitors through self-guided tours, trails, videos, brochures, or contact with volunteers at the visitor centers.

Community outreach efforts include coordination with neighboring homeowners associations on mission-based resource topics such as pet and feral cats and dogs in the park, over-watering and water quality, exotic invasive plants, enforcement patrols, water safety, fuel modification zones and fire safety. Other activities include volunteer events such as Earth Day, which draws volunteers from the local community as well as three corporate events which worked on several projects including habitat restoration/vegetation planting, trail maintenance, power-washing of park monument signs, clean-up of the maintenance yard. The park benefitted from 14,932 hours of volunteer labor in 2017.

## **II. Recreation Facility Construction and Maintenance**

### A. New Construction/Expansion

Crystal Cove State Park was purchased in 1979, a General Plan adopted in 1982, and the majority of recreational facilities and infrastructure constructed by 1985. A General Plan Amendment and EIR were finalized in November 2003 resulting in the Crystal Cove Historic District – Preservation and Public Use Plan (PPUP). The first phase of cottage restoration, a \$14.2 million public works project, was completed on March 29, 2006 and included the restoration of 22 cottages, road and utility improvements, slope stabilization, accessibility improvements, infrastructure upgrades, a new entrance station, accessibility and parking improvements, historic landscape restoration, and water quality measures. On November 16,

2007, the Office of Historic Preservation presented a Governor's Historic Preservation Award to Crystal Cove State Park for the Phase I Restoration of the Historic District cottages.

In March of 2006, State Parks awarded a twenty-year concession contract to the non-profit Crystal Cove Conservancy (recently renamed from Crystal Cove Alliance) for the management and operation of food and lodging services in the park. These concession amenities include the Crystal Cove Shake Shack located on PCH, the Beachcomber Café in Cottage #15, and 13 cottages for overnight lodging. The lodging operation opened to public use on June 26, 2006 and has since enjoyed an astounding 99% occupancy rate. The Beachcomber Café which opened on August 15, 2006 continues to generate favorable reviews and gain in popularity. The concession operation generated over \$13 million in gross revenues during 2017 and has proven to be a successful model for business partnerships serving the people of California.

Phase II of restoration was completed in 2012. This phase restored seven cottages and a series of garages: two cottages were restored as overnight rentals; three for educational purposes, research and special events; cottage 13 is a museum dedicated to film history; one garage was converted to public restrooms and the remainder are storage for State Parks and Crystal Cove Conservancy as well as a prep kitchen for the Beachcomber restaurant.

After over four years of work and preparation by State Parks, the California Coastal Commission voted unanimously to approve the coastal development permit for the third and final phase of cottage restoration within the Historic District of Crystal Cove State Park. Phase III will restore the remaining 17 cottages on North Beach, which will open up an additional 22 overnight rental opportunities. In addition, the approval granted an educational endowment of \$1 million to build a coastal engineering program focused on sea level rise, coastal erosion, and water quality concepts and lessons; provide students an opportunity to stay in cottage #20 and conduct experiments relevant to park management; and partner with UC Irvine's School of Engineering to develop curriculum and lesson plans.

Fundraising is currently underway to raise the projected \$35 million needed to complete the project. The first phase of implementation includes the development of the infrastructure for the cottages, including retaining walls, utilities, and sewer system upgrades. Once funds for the infrastructure portion of the project are raised (an anticipated \$17.75 million), work will begin and is expected to take two to two-and-a-half years to complete. The second phase of implantation is the historic restoration of the 17 cottages (expected to cost \$16 million), which is expected to take three years to complete once ground is broken. Rental occupancy will be doubled when the project in its entirety is finished, which is expected to take five years from beginning to end.

The Moro Campground and Day Use Area, formerly a trailer park, opened to the public July 1<sup>st</sup>, 2011. The coastal campground boasts 60 campsites with ocean views. The day use area features picnic areas that can be rented for special events, 200 day use parking stalls with beach access, an interpretative area, public restrooms, water quality improvements and habitat enhancement. Over 119,609 campers enjoyed this facility as well as the three other environmental campgrounds within the park.

The Berns Environmental Study Loop (ESL) was completed in January 2014. The study loop development included improvements to the amphitheater, an interpretive facility near the amphitheater, and five educational stations exploring various resource-based research themes and installations allowing for such programming as citizen science projects and cultural

heritage demonstrations. In 2017, 21 programs reaching over 1200 5<sup>th</sup>, 7<sup>th</sup>, and/or high school students were conducted in the ESL.

## B. Maintenance of Existing Facilities

The Los Trancos parking lot was recently repaved and restriped as referenced in the 2016 annual report. In addition to resurfacing the lot, an additional 40 spaces were added. Lights were also added along the parking lot perimeter and within the islands scattered throughout the parking lot, bringing much needed lighting to this historically very dark parking lot and increasing public safety. Two additional lanes were built within the access road to the parking lot to help facilitate ingress and egress, although they are currently not in use yet. Crystal Cove State Park is currently transitioning to a new parking system, which is expected to come online in 2018. Once the new system is in place, all four lanes will be opened for park visitor ease of access. Lastly, sidewalks were added around and through the Los Trancos parking lot to allow park visitors to move safely through the facility.

The tunnel that has been converted to a pedestrian walkway under PCH to access the Historic District was redone in Fall 2017. Water that continually runs down the length of the tunnel and pools on the coastal end was redirected to either side of the tunnel. The walking surface was raised and crowned, allowing sheet flow water to drain along the sides and flow into Los Trancos Creek. This greatly improves access and safety for park visitors by creating a dry walking surface.

Through the completion of the tunnel project, it became apparent that the coastal end of the walkway that crosses over Los Trancos Creek had become seriously undermined, and the rip rap concreted in place in the 1990s during the expansion of PCH was no longer effective. Planning has started to address this issue as well as the accumulation of large amounts of sediment throughout the downstream portion of the creek, which poses a flooding hazard to several historic cottages and facilities. Permitting and designs have begun, and this project is expected to begin in Fall 2018. Current designs favored included the removal of the failing rip rap and the placement of a bulk head to protect the tunnel, walkway and ultimately PCH.

The area immediately offshore of Crystal Cove State Park has the designation of “Area of Special Biological Significance”, or ASBS. This is a designation that aims to limit waste and other detriments to water quality from entering the protected area. In 2011, a small portion of the Reef Point parking lot 5 was reconfigured to include bio filtration basins, permeable pavement, and a catchment filter. The goal is to catch the “first flush” of contaminants concentrated in the first inch of rain. Anything beyond 1” will bypass the filtration basins and will continue to normal drainages and outfalls. These efforts are now being expanded to include the other parking lot at Reef Point and two other parking lots at Pelican Point. This work is expected to be in 2018.

The bridge that connects Pelican Point to Treasure Cove along the multi-use trail known as “the slinky” has been in disrepair for many years. The metal frame of the bridge has slowly rusted away, and the bridge that once supported vehicles is now restricted to foot traffic and bikes only. The evaluation for the replacement of this structure has begun with the goal of furthering these efforts in 2018.

Efforts continue to replace the modular structure at Los Trancos with an upgraded, current code compliant structure. Park-wide, the 30 plus year old infrastructure is consistently becoming more and more of a burden. State Parks continues repairing buildings as they

begin to fail in an attempt to keep our infrastructure sound. Annual maintenance continues to increase in cost with reduction in long-standing benefit within the challenge of such a dynamic marine-influenced environment and aging infrastructure.

For example, the relatively new Moro Campground is already beginning to suffer failures, including plumbing and sewer lift station issues.

The Historic District is a focus of heavy maintenance attention, and we are fairly successful in keeping the restored facilities in good shape due to the funds dedicated for maintenance through the concession contract.

### C. Facility Replacement/Repair

In 2016, Crystal Cove State Park secured a grant for \$10,000 through Crystal Cove Conservancy for improved trail signage and trail maintenance. The installation of trail markers at all trail intersections with directional arrows and trail names affixed to 4' x 4' posts has been completed by Eagle scouts as well as park staff support. Crystal Cove State Park and Crystal Cove Conservancy secured an additional \$10,000 in 2017, which will be used on "Dead End/Utility Road" signs to be installed at all the Sothern California Edison spur roads that do not connect with the rest of the trail system as well as trail maintenance efforts and new picnic benches for the environmental campgrounds. This additional signage will hopefully reduce the number of lost park visitors.

### **III. Infrastructure Construction and Maintenance**

Operation and maintenance activities are focused within existing footprints of developed areas, i.e. parking lots, restrooms, operations buildings, and roads and paved paths. The interface of open space with these facilities is controlled along their edges by brushing back to maintain Department standards for safe operations and viewshed. Trails and backcountry roads are also brushed back to maintain Department trail standards. If these maintenance activities are conducted during sensitive bird nesting season, a biological monitor will conduct surveys to identify conditions and measures for ensuring adverse impact avoidance.

### **IV Habitat Restoration and Enhancement**

Since 1982, State Parks has undertaken continuous restoration efforts in support of coastal sage scrub, grassland, and riparian habitats within the park. Using Department funding sources during 2017, several hundred acres of weeds were controlled by use of herbicides, mowing, and hand pulling. Artichoke thistle, black mustard, fennel, arundo, iceplant and hemlock were the primary targets as well as some newer invasive species, such as Sahara mustard, *Emex spinosa* and *Onocosiphon* sp. Natural Communities Coalition (NCC) supported two weeks of treatment within the park with efforts focusing on artichoke thistle as well as targets that were identified in the 2014 aerial weed survey on the coastal terrace.

In 2017, State Parks received deferred maintenance funds to begin a project restoring coastal sage scrub (CSS) and grasslands within the backcountry area called "The Bowl." This project was developed in partnership with UC Irvine's Center for Environmental Biology's intern program (CEB) and Crystal Cove Conservancy. With UCI, an experimental setup was designed to look at cost-effective and efficient ways to do grassland restoration and seeding strategies to look at competition among different plant functional groups within CSS. The experimental design created seven replicates with three different years of treatment (site prep,

seeding, various maintenance strategies) for both CSS and grasslands within each replicate. Plot setup as well as site prep for year one got underway in March 2017 with continued invasive plant control within each year one plot through 2017. Drill seeding of grasses and hand seeding of coastal sage scrub species will happen in early 2018, and either spraying of selective herbicides or hand weeding will continue through 2018. Site prep for the year 2 plots will begin in early 2018 as well. UCI CEB interns will help with monitoring efforts and Crystal Cove Conservancy has started a butterfly monitoring citizen science program for the area. We are also working with the Conservancy to secure additional grant funds since the State Parks' deferred maintenance dollars sunset in June 2018.

Two acres of mature cactus restoration was started in 2011, led by NCC in an effort to create habitat suitable for coastal cactus wrens. Degraded sites were chosen within eyesight of existing cactus patches that support nesting cactus wrens. The sites were cleared of all thatch which was then removed from the sites. Mature cactus up to 5 feet tall and 7-8 feet across were moved by truck and heavy equipment from a site in Lake Forest slated for development. Cactus branches as well as pads were also planted and watered in. The cactus patches will then be weeded and monitored for the next few years. At year 4, these sites have really taken off with lots of CSS germination and budding cactus pads. An additional 9.7 acres was established in 2014 along the "No Brains" closed trail. At this point, the cactus pads, segments and clumps have been planted and watered in, and weeding treatments continue. In addition, an interpretive cactus wren panel was created and has been installed at the original restoration areas. The 9.7 acre site will be hydroseeded in early 2018, later than originally anticipated due to several years of drought and low seed availability.

Crystal Cove State Park is a pilot park for a state-wide trail inventory program that commenced in 2012. In the summer of 2011, park staff reviewed digital maps of the park and assigned attributes to each segment of trail, including use type, trail vs. road, dimensions, material, accessibility, etc. Once this phase was complete, park staff was outfitted with a Toughbook, GPS, rolling wheel, and GPS camera to walk every segment. The goal of this exercise is to ground truth the original assessment, as well as capture other data such as trail construction, failures and issues with the trails, potential problem areas, geologic features such as major and minor drainages and unstable slopes. Work continues on this project and will wrap in 2018.

Crystal Cove is also a pilot park for State Parks' early detection rapid response program (EDRR). With help from the State Parks' botanist, 16 weeds were identified as targets. The majority of designated search areas (pre-determined based on proximity to roads, facilities, and high traffic areas) within Crystal Cove were searched this year. As a result, NRM discovered and treated several populations of Sahara mustard throughout the park as well as the new threat *Oncosiphon*, spending 40 staff hours treating this emergent weed. NRM will continue EDRR efforts and will continue to monitor the sites where targets were previously discovered. An EDRR program was also developed with NCC and partners, and contractor James Bailey found several populations of new target species within Crystal Cove State Park. State Parks' NRM staff as well as

#### **V Fire Management Activities**

No controlled burns were conducted at CCSP in 2017 as most of the fire-prepared plots have recently received intense planting and seeding and jeopardy to young plants is thus avoided.

Fuel modification zones breaks were treated by the Department surrounding the park HQ and above El Morro School. Fuel Modification Zones were cut by contract under existing

agreements with Emerald Bay and Irvine Cove Crest. Pre-maintenance breeding bird surveys were conducted by the Department in coordination with the various homeowner associations.

In 2016 the community of Emerald Bay received a grant through Cal Fire to improve the existing fuel modification area within the park and immediately adjacent to the community. This began in 2017 and included removal of non-native species such as Tocolote, Russian thistle and Eucalyptus and the planting of rooted cactus and cactus pads. The current phase of the project is complete, but there may be more planting in this fuel modification zone in the future.

## **VI Miscellaneous Activities**

Crystal Cove State Park recently reconfigured its website and can now be found at [www.crystalcovestatepark.org](http://www.crystalcovestatepark.org).



# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.3**

County of Orange

# 2017 ANNUAL COASTAL SAGE SCRUB TAKE REPORT

*and*

## 2018 ANNUAL WORK PROGRAM

NATURAL COMMUNITY CONSERVATION PLAN  
CENTRAL/COASTAL SUB REGION



 OC Parks

 OC Public Works

 OC Waste & Recycling

**Prepared for:**

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**February 2018**

## **INTRODUCTION**

This 2017 Annual Coastal Sage Scrub (CSS) Take Report and 2018 Annual Work Program was prepared following the guidelines provided by the US Fish and Wildlife Service and California Department of Fish & Wildlife "Recommended Outline for Reserve Owner/Manager Annual Work Programs," dated February 10, 2003, and uses the NCC recommended table format.

The status of OC Parks, OC Public Works and OC Waste & Recycling (collectively the "County") CSS take from 1996 through planned 2018 activities is presented in **Table 1**. The Habitat Management Site Matrix, which covers general management programs & activities; recreation use, monitoring & management; recreation facility construction & maintenance; infrastructure construction & maintenance; restoration & enhancement; fire management activities; and miscellaneous activities & management program are presented in **Table 2**. A Mitigation Matrix, which provides detailed information for mitigation sites within the Orange County Central/Coastal NCCP Reserve System, is presented in **Table 3**.

**TABLE 1  
STATUS OF CSS TAKE: 1996 THROUGH PLANNED 2018 ACTIVITIES**

<b>Year</b>	<b>County Agency</b>	<b>Location / Project</b>	<b>Impact in Acres</b>	<b>Total Remaining CSS Take Authorization</b>
1996	County of Orange	Original Central/Coastal NCCP/HCP CSS Take Allocation	0.00	390.00
1998	OC Parks	Laguna Coast Wilderness Park: Camarillo Trail	0.01	389.99
1998	OCWR	FRB: Phase V-A Liner	16.50	373.49
1999	OCWR	FRB: Phase V-B/C Liner	13.10	360.39
2000	OCWR	FRB: Phase V-D	16.00	344.39
2002	OCWR	FRB: Emergency Landslide Remediation	13.04	331.35
2002	OC Parks	Upper Newport Bay: Interpretive Center	2.70	328.65
2003	OCWR	FRB: Landfill Phase VII-A	5.20	323.45
2003	OCWR	FRB: Desilting Basin	2.40	321.05
2004	OCWR	FRB: Phase V-D Stockpile	1.19	319.86
2004	OC Parks	Laguna Coast Wilderness Park: Nix Nature Center	0.35	319.51
2005	OCWR	FRB: Fuel Modification Program	0.48	319.03
2005	OCWR	FRB: Canyon II Stockpile	1.56	317.47
2005	OCWR	FRB: Landfill Phase VII-B	13.85	303.62
2007	OCPW	Laguna Canyon Road: Seg I - III Alignment	6.21	297.41
2007	OCWR	FRB: Landslide Back- cut project	19.68	277.73

Year	County Agency	Location / Project	Impact in Acres	Total Remaining CSS Take Authorization
2008	OCWR	FRB: Drainage 1	6.04	271.69
2008	OCPW	San Diego Creek: Channel Maintenance	1.60	270.09
2010	OCWR	FRB: Phase VIII C	12.10	257.99
2011	OC Parks	Aliso and Wood Canyons: Canyon Acres Acquisition <sup>1</sup>	0.00	257.99
2013	OCWR	FRB: South Basin/Wetland Basin	0.32	257.67
2013	OCWR	FRB: West Channel Realignment	0.72	256.95
2013	OCWR	FRB: East Flank Landslide Remediation	8.96	247.99
2014	OC Parks	Laguna Coast Wilderness Park: Lizards Trail	0.70	247.29
2014	OCWR	FRB: Phase VIII-C	1.50	245.79
2014	OCWR	FRB: East Loma Landslide	2.22	243.57
2014	OCWR	FRB: East Flank Landslide Remediation	5.44	238.13
2015	OC Parks	Aliso and Wood Canyons: Main Entrance Facility Improvements	0.79	237.34
2015	OCWR	FRB: Office Facility Expansion	1.30	236.04
2015	OCWR	FRB: Phase VIII-B1	1.91	234.13
2017	OCWR	FRB: Phase VII-B2	8.72	225.41
<b>Planned 2018 Activities</b>				
2018	OCWR	No planned activities requiring use of take.	0	225.41
2018	OCPW	No planned activities requiring use of take.	0	225.41
2018	OC Parks	No planned activities requiring use of take.	0	225.41
		<b>Total Take (acres)</b>	<b>164.59</b>	
		<b>Remaining Balance of Take (acres)</b>		<b>225.41</b>

**LEGEND:**

FRB – Frank R. Bowerman Landfill  
OCPW – OC Public Works  
OCWR - OC Waste & Recycling

<sup>1</sup> Included in table for accounting clarification. This property was not and is not enrolled in the NCCP/HCP and was newly acquired by OC Parks in 2011. Management activities did not expand existing infrastructure, but included grading existing roads, posting signage and implementing regular patrols.

**Table 2  
Habitat Management Site Matrix**

<b>General Management Programs &amp; Activities</b>		
<b>County Agency</b>	<b>Project, Program, Activity</b>	
OC Parks	General Use Policies	Designated trails open to mountain biking, hiking and equestrian use. Dogs allowed on 6-ft. leash on designated trails (including all Regional Trails). Special uses/events allowed with OC Parks permit. All permit requests reviewed by park staff.
OC Parks	Closure Policies	Majority of NCCP parks open from 7:00 am to sunset. Parks may close for up to 72 hours following rain events. Parks are evacuated and closed in emergency situations such as fire, flooding and mountain lion incidents.
OC Parks	Ordinance Enforcement	Park Rangers obtain compliance with Orange County Codified Ordinances and use progressive enforcement, utilizing citation authority as “last resort.” Volunteer Park Ranger Reserves supplement park patrols throughout the year.
OC Parks	Fire Watch Volunteer Program	Park volunteers monitor for fire and suspicious activity at strategic locations in majority of NCCP facilities on Red Flag days.
OC Parks	Natural Resources Management Staffing	Reforming Natural Resources Management Group to include one Natural Resources Manager to focus on programming and large-scale initiatives, and two Resource Management Specialists assigned to parks to focus on facility Resource Management Plans, invasive plant management, habitat restoration and BMP implementation.
OC Parks	Five-year Weed Management Plan	Partnering with Natural Communities Coalition (NCC), California State Parks and Irvine Ranch Conservancy (IRC) with California Invasive Plant Council (Cal-IPC) contract to develop consistent, mutual approaches to prioritizing target weeds for annual treatment with inclusion of an Early Detection, Rapid Response (EDRR)

General Management Programs & Activities		
County Agency	Project, Program, Activity	
		component. Initial phase in 2017 includes Coastal Reserve facilities; 2018 will expend to include Central Reserve facilities.
OC Parks	Defensible Space Zone Management Plan	Developing OC Parks Defensible Space Zone Management Plan through contract in collaboration with OC Fire Authority, Irvine Ranch Conservancy, local fire departments, NCC and other partners.
OC Parks	Tree Monitoring Program	Following plan to monitor tree health throughout OC Parks facilities.
OCPW	None	N/A
OCWR	None	N/A

Recreation Use, Monitoring & Management			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Recreation Monitoring: - Trail Monitoring	Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails while utilizing outreach and progressive enforcement to gain user compliance. Monitored recreation attendance with volunteers.	Ongoing.

Recreation Use, Monitoring & Management			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Recreation Monitoring: - Park Visitor Count, Survey and Tracking	Utah State University completed Year 1 of 3 of park visitor data collection and analysis for recreation management data.	Ongoing through 2020.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Educational Outreach: - Parks	Park staff conducts monthly programs, including hikes, music and crafts and Career Day at local school to educate public about natural resources.	Ongoing. Increase Native American heritage programming based on strategies outlined in park's Resource Management Plan (RMP). Increase programming contingent upon opening new interpretive center.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Educational Outreach: - Parks & Laguna Canyon Foundation Educational Programs	Conducted school tour programs beginning in March. Continued LCF programs in Spring. Kept public updated via interpretive signage. Maintained native plant garden with interpretive signs. Hosted monthly information tables with volunteers within park to share information with park visitors.	Ongoing.
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Recreation Monitoring: - Trail Monitoring	Installed trail counter to monitor after-hours usage in 2016. Continued monitoring.	Install additional camera.
OC Parks	<i>Irvine Regional Park</i> Recreation Monitoring: - Trail Monitoring	Captured data from two cameras at end of Roadrunner Loop.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Recreation Monitoring: - Attendance Tracking	Contracted Park Attendants provided monthly attendance statistics and volunteers tracked visitor attendance at Nature Center.	Ongoing.

**Recreation Use, Monitoring & Management**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> Recreation Monitoring: - Public Surveys	Continued public satisfaction surveys at four locations in park. Results charted by OC Parks Communications for Balanced Scorecard Reports to County Board of Supervisors.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Recreation Monitoring: - Recreation Management Research	Utah State University completed Year 1 of 3 of park visitor data collection and analysis for recreation management data.	Ongoing through 2020.
OC Parks	<i>Irvine Regional Park</i> User Compliance Programs: - Paws for Pink	Continued contracted special event to educate public about keeping dogs leashed.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Educational Outreach: - OC Parks Public Programs	Continued opening Nature Center to public on weekends and weekdays with volunteer staffing. Held programs throughout year including Paws for Pink, Night Hike Series and California History for 4 <sup>th</sup> Graders, nature documentary movie night and Kids' Fishing Clinic. Reinitiated 2 <sup>nd</sup> Saturday Land Steward Day.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Educational Outreach: - OC Parks Natural Play Area	Apply for grant to redesign four-acre Children's Garden Trail in park interior.	Pending grant approval, implement design and build of natural play area to engage children up to age 12 in learning about and interacting with nature.
OC Parks	<i>Irvine Regional Park</i> Educational Outreach: - OC Department of Education "Inside the Outdoors" School Field Trips	ITO naturalists continued to provide educational interpretive programs during school year.	Ongoing.



**Recreation Use, Monitoring & Management**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> Educational Outreach: - Public Flyers	Developed outreach materials for hiking and biking etiquette in 2016. Distributed materials to park users.	Continue distributing. No further action.
OC Parks	<i>Laguna Coast Wilderness Park</i> Recreation Monitoring: - Trail Monitoring	Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails while utilizing outreach and progressive enforcement to gain user compliance. Volunteers monitored photos from remote wildlife cameras and reported unauthorized use to staff. Monitored 13 cameras with additional monitoring by Laguna Canyon Foundation.	Ongoing.
OC Parks	<i>Laguna Coast Wilderness Park</i> Recreation Monitoring: - Attendance Tracking	Tracked total park, Nix Nature Center, program and cell phone tour attendance. Tracked public and school programs and quarterly newsletter mailings.	Ongoing.
OC Parks	<i>Laguna Coast Wilderness Park</i> Recreation Monitoring: - Recreation Management Research	Utah State University completed Year 1 of 3 of park visitor data collection and analysis for recreation management data.	Ongoing through 2020.
OC Parks	<i>Laguna Coast Wilderness Park</i> User Compliance Programs	Staff and volunteers continued utilizing wildlife cameras to monitor presence of dogs in park and informed visitors with dogs about park policy.  Patrolled for homeless encampments and unauthorized access/use. Targeted after-hours (night) access violations.	Ongoing.

**Recreation Use, Monitoring & Management**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Educational Outreach:                      - OC Parks &amp; Laguna Canyon Foundation Docent Programs</p>	<p>Conducted school and public programs throughout year. Updated two Nix Nature Center exhibits and initiated work to update two additional exhibits.</p>	<p>Ongoing. Complete Nix Nature Center exhibits.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Recreation Monitoring &amp; Management:                      - General Development Plan (GDP)                      - Resource Management Plan (RMP)</p>	<p>Initiated developing both GDP and RMP with County contract. Contractor conducted biological, recreational and infrastructure surveys to support plans.</p>	<p>Continue developing plans.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Recreation Monitoring:                      - Park Visitor Count, Survey and Tracking</p>	<p>Utah State University completed Year 1 of 3 of park visitor data collection and analysis for recreation management data.</p>	<p>Ongoing through 2020.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Recreation Monitoring:                      - Trail Monitoring</p>	<p>Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails while utilizing outreach and progressive enforcement to gain user compliance.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Educational Outreach:                      - OC Parks Programs</p>	<p>Continued hosting Restoration Sundays volunteer events to remove non-native, invasive plants and restore native vegetation. Held programs for several community schools, performed HOA outreach about coyotes in the wildland-urban interface and conducted Bark Patrol to increase awareness of responsible dog ownership in parks.</p>	<p>Ongoing.</p>

**Recreation Use, Monitoring & Management**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Santiago Oaks Regional Park</i> Recreation Monitoring: - Trail Monitoring	Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails while utilizing outreach and progressive enforcement to gain user compliance. Continued monitoring for after-hours use.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Recreation Monitoring: - Recreation Planning	Formed trail sub-committee for recreational trail flow planning under umbrella of Friends of Harbors, Beaches and Parks and initiated meetings with local community groups. Prioritized trail maintenance within park.	Ongoing. Implement trail maintenance priorities.
OC Parks	<i>Santiago Oaks Regional Park</i> Educational Outreach: - OC Parks Programs & Special Events	Hosted Mountain Bike Skills Clinics, Non-dot Adventures Race, Into The Wild Race, Volunteer Habitat Restoration and Trail Work Days. Conducted Backcountry Patrol to increase awareness of responsible dog ownership, compliance and visitor safety in parks. Nature Center manned and nature hikes led by volunteers.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Educational Outreach: - OC Department of Education “Inside the Outdoors” School Field Trips	Hosted ITO field trips with habitat themes March-May.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Educational Outreach: - Trail Etiquette	Developed trail etiquette mountain bike outreach materials to educate all user groups about trail safety and etiquette.	Install trail etiquette signage in strategic locations throughout park.

Recreation Use, Monitoring & Management			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Talbert Nature Preserve</i> Recreation Monitoring: - Trail Monitoring	Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails.	Ongoing. Increase patrols.
OC Parks	<i>Talbert Nature Preserve</i> Educational Outreach: - Educational Programs	None.	Ongoing.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Recreation Monitoring: - Trail Monitoring	Patrolled regularly to monitor for new unauthorized trails. Continued brushing and blocking unauthorized trails while utilizing outreach and progressive enforcement to gain user compliance.	Ongoing.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Educational Outreach: - OC Parks Programs	Early College High School Service Learning Project- Worked for eleventh year with ECHS freshman on year-long Service Learning Project learning about and performing habitat restoration over 3-acre site.  Held 2 <sup>nd</sup> Sunday s Habitat Restoration & Specialty Volunteer Restoration Events monthly at various restoration sites throughout Bay.  Hosted Coastal Cleanup, Earth Day and educational events.	Ongoing.

**Recreation Use, Monitoring & Management**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Upper Newport Preserve Nature Preserve</i>                      Educational Outreach:                      - OC Parks Partnerships</p>	<p>Reduced programming due to staffing. Partnered with local organizations including YMCA, Newport Bay Conservancy, Newport Aquatic Center, UC Irvine and ECHS.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Upper Newport Preserve Nature Preserve</i>                      Educational Outreach:                      - Park Signage</p>	<p>Continued partnership with City of Newport Beach, Department of Fish and Wildlife and Newport Bay Conservancy to create interpretive panels for placement in strategic locations throughout the Bay.</p>	<p>Continue partnership to finalize and place interpretive panels.</p>
OC Parks	<p><i>Upper Newport Preserve Nature Preserve</i>                      Educational Outreach:                      - OC Department of Education “Inside the Outdoors” School Field Trips</p>	<p>Hosted ITO field trips with habitat themes during school year.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Whiting Ranch Wilderness Park</i>                      Recreation Monitoring:                      - Trail Monitoring</p>	<p>Patrolled regularly to monitor for new unauthorized trails and after-hours unauthorized access. Continued brushing and blocking unauthorized trails while utilizing progressive enforcement to gain user compliance. Monitored one trail camera for wildlife activity and ordinance violations.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Whiting Ranch Wilderness Park</i>                      Educational Outreach:                      - OC Parks Programs &amp; Special Events</p>	<p>Assisted O’Neill Regional Park with Acorn Day and volunteer events. Held annual mountain bike Poker Ride event and Non Dot race and conducted individual interpretive programs as requested. Continued volunteer group for back country projects, including maintenance and interpretive programs.</p>	<p>Ongoing.</p>

Recreation Use, Monitoring & Management			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OCPW	None	N/A	N/A
OCWR	None	N/A	N/A

Recreation Facility Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> New Construction or Expansion: - Park Office and Interpretive Center	Developed plans for park office, visitor center and public restroom at main park entrance in 2016. Finalized plans, obtained permits and Board of Supervisors approval.	Initiate construction in April. Take accounted for with 12/1/2015 "Main Entrance Facility Improvements."
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Maintenance of Existing Facilities: - Park Office and Entrance Improvements	County Design Division staff implemented main park entrance improvements as outlined in park's RMP.	Conduct replacement planting and maintenance as needed. No further action planned at this time.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Maintenance of Existing Facilities: - Laguna Canyon Foundation (LCF) Trail Maintenance Master Plan	LCF initiated development of master plan for trail maintenance throughout park. General plan completed.	Finalize trail-by-trail plans and initiate implementation.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Maintenance of Existing Facilities: - Homeless Encampment Cleanup	Initiated development of homeless encampment cleanup scope of work and located contractor to perform work in 2016.  Coordinated responses with Orange County Sheriff's Department (OCSD).	Ongoing.

Recreation Facility Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
		Executed contract with successful pilot project work.	
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Maintenance of Existing Facilities: - Day Use Area Improvements	Planned and initiated improvement of public day use area at junction of Aliso Canyon and Wood Canyons with new tables, interpretive signage, mulch and large boulders.	Complete improvements.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Maintenance of Existing Facilities: - SOCWA Forcemain Project - SOCWA Road Repairs	Initiated planning and permitting to replace forcemain adjacent to Aliso Creek.  Planned and submitted permit applications to repair roadway lost to erosion.	Continue improvements until projects complete.
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> New Construction or Expansion	N/A	N/A
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Maintenance of Existing Facilities: - Weed Abatement	Continued performing weed abatement via mowing and line trimming per County Agricultural Commissioner postings along areas adjacent to NCCP boundaries.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> New Construction or Expansion: - Park Front Entry Redesign	Continued developing plans to improve park entrance for user traffic flows, drainage and signage. Contractor performed initial evaluation to eliminate flooding at park entrance.	Continue in coordination with Project Managers.

**Recreation Facility Construction & Maintenance**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> New Construction or Expansion: - Restrooms 9 and 11	Initiated work on Restroom 9 project to replace existing facility with new, structurally sound unisex restroom. Anticipated completion of Restroom 9 in December 2017. Restroom 11 burned in Canyon 2 Fire and will not be replaced.	No further action on Restroom 9. Complete demolition for Restroom 11.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Existing Facilities: - Signage	Continued replacement of aged signage throughout park for clarity and consistency.	Work with Project Manager to complete new signage installation.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Existing Facilities: - Tree Trimming and Removal	Continued annual tree trimming and dead tree removal with County contract outside of nesting season.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Existing Facilities: - Water Conservation	Reduced irrigation by 28% and identified turf zones to be type-converted to drought-tolerant landscapes in 2015. Installed ½-acre of turf conversion zones to further reduce watering by 60%.	Consider replacing irrigation with reclaimed water source in conjunction with installation of Santiago Hills Phase II development. No further action until development activities resume.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Existing Facilities: - Gopher and Ground Squirrel Control	County contractor performed rodent control for public safety and aesthetics.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Existing Facilities: - Lake Maintenance	County contractor performed lake treatment for algae blooms as needed.	Ongoing. Install new water pumps and associated electronics.



**Recreation Facility Construction & Maintenance**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      New Construction or Expansion:                      - Woods End-Ridge Top-Gravel Road Connection</p>	<p>Identify connection to rectify missing trail loop for bikers to connect from El Toro Road (Woods End entrance) to Nix Center and propose converting trail from hiker only to multi-use. No action.</p>	<p>Work pending coordination with OC Parks Design Division to gather stakeholder input and assess options.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      New Construction or Expansion:                      - Emerald Canyon to Boat Road Connection</p>	<p>No action. Both roads are currently dead ends.</p>	<p>Evaluate options for connection between bottom of Emerald Canyon and Boat Road.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Maintenance of Existing Facilities:                      - Laguna Ridge Trail Improvements                      - Old Emerald Trail Improvements</p>	<p>Undertook trail maintenance improvements and vegetation rehabilitation on Laguna Ridge and Old Emerald Trails to address sustainability, maintenance and recreational issues. Completed work on Old Emerald Trail.</p> <p>Assessed Camarillo to reduce footprint to single-track trail and address sustainability issues.</p>	<p>Monitor through first rain season. No further action planned at this time.</p> <p>Implement and monitor Camarillo trail maintenance improvements.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Maintenance of Existing Facilities:                      - Unauthorized Trail Closure</p>	<p>Identified Marie Callendars and additional unnamed unauthorized trails (approximately ¾-miles in length) for closure with volunteer groups in 2016. Initiated closures with brushing and signage for several hundred yards of trail entrances.</p>	<p>Work with park staff and partners to implement closures.</p>

**Recreation Facility Construction & Maintenance**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Peters Canyon Regional Park</i> New Construction or Expansion: - IRWD Water Treatment Station	In 2015, IRWD submitted plans to install approximately 200 yards of pipeline along Peters Canyon Trail to Jamboree and expand footprint of treatment station. Work was originally slated for completion in 2016, however IRWD has not yet initiated project.	Unknown; dependent on IRWD.
OC Parks	<i>Peters Canyon Regional Park</i> New Construction or Expansion: - Santiago Hills Phase II Drainage	84-inch pipe with header planned for installation to drain water from Santiago Hills Phase II development into Peters Canyon Reservoir. No action by developer.	Work anticipated to begin in 2018.
OC Parks	<i>Peters Canyon Regional Park</i> Maintenance of Existing Facilities: - Trail Conversion	Assessed south end of park for possible conversion from trail to road for safety access.	Defer possible conversion to General Development Plan.
OC Parks	<i>Peters Canyon Regional Park</i> Maintenance of Existing Facilities: - East Ridge View Trail	Initiated planning to reroute portion of East Ridge View Trail currently subject to steep grade, severe erosion and peripheral habitat loss of coastal sage scrub.	Defer installation of reroute to General Development Plan. No further action at this time.
OC Parks	<i>Peters Canyon Regional Park</i> Maintenance of Existing Facilities: - Eucalyptus Trail - Scout Trail - East Ridge View Trail - Lake View Loop Trail - Cactus Point Trail	Contractor completed trail maintenance and improvements through installation of drains, addressing minor grading issues and installing fencing in strategic locations.	No further action at this time.

Recreation Facility Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Santiago Oaks Regional Park</i> Maintenance of Existing Facilities: - Arizona Crossing Repair	Obtained all permit approvals in 2016.	Implement pending Project Manager scheduling.
OC Parks	<i>Santiago Oaks Regional Park</i> Maintenance of Existing Facilities: - Anaheim Hills Trail - Peralta Hills Trail - Chutes Trail	Improved sustainability of Anaheim Hills-Weir Canyon loop connector.  Improved sustainability of Peralta Hills-Anaheim Hills Regional Riding & Hiking Trail connector.  Improved sustainability of Chutes Trail in anticipation of Santiago Hills Phase II development.	No further action.
OC Parks	<i>Santiago Oaks Regional Park</i> Maintenance of Existing Facilities: - Orange Grove	Improved maintenance regime. Initiated development of grove management BMPs.	Continue development and implementation of grove management BMPs under new contract.
OC Parks	<i>Talbert Nature Preserve</i> New Construction or Expansion	N/A	N/A
OC Parks	<i>Talbert Nature Preserve</i> Maintenance of Existing Facilities	No action. Unable to conduct routine maintenance such as trail brushing and grading due to negotiations with California Coastal Commission.	Unknown.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> New Construction or Expansion	N/A	N/A
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Maintenance of Existing Facilities: - FEMA Site Repairs: Site 1, PW# 2916 Storm Repair Project 2004/05, Bayview Bridge Erosion Repair	Cultural and Paleontological Resource Phase I Survey Report completed. Draft F&G Section 1600 application and COE 404 permit / 401 certification completed	No action, pending Mitigated Negative Declaration. Continue to close bridge during heavy rain events.

Recreation Facility Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
		in 2015 and engineers recommended bridge closure during heavy rain events. No action.	
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Maintenance of Existing Facilities: - Muth Interpretive Center Improvements	Developed project to replace outdoor amphitheater seating of decomposed granite, wood and rock with lower maintenance, higher functioning alternative.	Obtain approvals and implement with OC Parks Planning & Design.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Maintenance of Existing Facilities: - Parking Lot	Resurfaced parking lot with decomposed granite and sealer for maintenance. Considered replacing decomposed granite parking lot with concrete aggregate.	Meet with Project Manager to determine direction and implement.
OC Parks	<i>Whiting Ranch Wilderness Park</i> New Construction or Expansion: - Edison Viejo Mitigation Bank	Edison continued negotiations to annex approximately 101-acre "Edison Viejo" mitigation bank to Whiting Ranch. OC Parks did not agree to manage property; property will be managed by Southwest Resources Management Association.	No further action.
OC Parks	<i>Whiting Ranch Wilderness Park</i> New Construction or Expansion: - Development Adjacent to Park along Glenn Ranch Road	Baldwin & Sons completed grading for residential development adjacent to secondary park entrance and Edison Viejo parcel. Trail/road access to park via Coyote Brush Road closed.	Work anticipated to continue until completion. Coyote Brush Road to be rerouted along OC Parks easement upon project completion.

Recreation Facility Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Whiting Ranch Wilderness Park</i> Maintenance of Existing Facilities: - Borrego Trail	Applied for permits to restore Borrego Creek entrance and trail after major storm damage sustained in 2010. Posted Mitigated Negative Declaration.	Initiate project pending permits.
OCPW	None	N/A	N/A
OCWR	None	N/A	N/A

Infrastructure Construction & Maintenance			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OCPW	San Diego Creek – Reach 1 Operations & Maintenance Plan	OCPW in permit negotiations with Army Corps of Engineers and USFWS regarding Section 7 Consultation. 1.60 acres of take anticipated, which was documented in 2008 (see Table 1).	Ongoing permit negotiations and approval of Operations & Maintenance Plan
OCPW	Laguna Canyon Road – Segment 4, Phase 1	OCPW coordinating with Caltrans [lead] on Project. Project in design phase. 0.007 acre of take anticipated; letter submitted to USFWS and CDFW on September 14, 2011 documenting take.	Project Design and Permitting
OCWR	None	N/A	N/A

**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Aliso and Wood Canyon Wilderness Park</i>                      Exotic Plant Control:                      - Manual Removal of Non-native, Invasive Plants                      (OC Parks, Natural Communities Coalition Funding)</p>	<p>Utilized labor resources including staff and volunteers and special groups to remove targeted species including puncturevine, poison hemlock, garland chrysanthemum, Russian, milk and artichoke thistles, mustard and Arundo. Mowed non-native grasses in lower meadows to deplete seed bank.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Aliso and Wood Canyon Wilderness Park</i>                      Exotic Plant Control:                      - Herbicide Treatment of Non-native, Invasive Plants                      (Natural Communities Coalition, OC Parks, Prop. 50 Funding)</p>	<p>Targeted 141 acres for treatment of artichoke and Russian thistles, Pampas grass, poison hemlock, Arundo and Eucalyptus resprouts with County contractor.</p> <p>Entered Year 3 maintenance phase of Prop. 50 Arundo treatment project targeting approximately 30 acres of Aliso Creek.</p>	<p>Ongoing. Continue implementing 5-year Weed Management Plan.</p> <p>Continue maintenance phase of Aliso Creek Arundo control project.</p>
OC Parks	<p><i>Aliso and Wood Canyon Wilderness Park</i>                      Exotic Animal Control:                      - Cowbird Trapping                      (Natural Communities Coalition Funding)</p>	<p>Continued trapping in two areas along Aliso Creek East.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Aliso and Wood Canyon Wilderness Park</i>                      Habitat Restoration:                      - Cactus Scrub Habitat                      (OC Parks Funding)</p>	<p>Continued cactus scrub restoration project with staff and volunteers near Canyon Acres over 2-acre site.</p>	<p>Continue planting; maintain and monitor.</p>

Restoration & Enhancement <sup>a</sup>			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Habitat Restoration: - Unauthorized Trail Rehabilitation (OC Parks Funding)	Itchy Sticks Trail rehabilitation completed. Continued decompacting, brush, signing and conducting increased enforcement/education on unauthorized trails including Dripping Cave Trail off-shoot and Ranger Station Trail.	Ongoing.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Habitat Restoration: - Dairy Fork Natural Treatment System (NTS) (City of Aliso Viejo, Prop. 54 Funding)	City of Aliso Viejo Public Works completed 2016-17 installation of NTS to improve water quality over 13 acres in Dairy Fork portion of park with Proposition 54 funds.	City of Aliso Viejo to continue maintenance. No further action.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Habitat Restoration: - Army Corp of Engineers Aliso Creek Restoration (ACOE Funding)	ACOE proposing large-scale restoration project of lower Aliso Creek. Conducted biological surveys. Additional stakeholder presentations and surveys completed by ACOE.	ACOE to select restoration design.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Habitat Restoration: - North of AWMA Bridge Arundo Project	Completed planning process, obtained permit approvals and initiated Arundo removal.	Continue work and monitor riparian habitat recovery.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Habitat Mitigation: - Mathis Canyon Trail (OC Parks Funding)	Mathis Canyon Trail repair required 0.12-acre wetland and 0.22-acre riparian mitigation. Mitigation installed in 2012-13. Completed fifth year of maintenance and monitoring with County contractors. Site met all performance criteria except riparian cover due to failed willow plantings from drought conditions. Contractors installed riparian species in October to meet final criteria.	Continue maintenance and monitoring to meet success criteria until approval of completion by regulatory agencies.

**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Aliso and Wood Canyon Wilderness Park</i>                      Habitat Mitigation:                      - OC Public Works                      - SOCWA                      (OC Public Works, South Orange County Wastewater Authority Funding)</p>	Initiated preliminary development of wetland-riparian mitigation projects along Wood Canyon. Completed surveys.	Complete planning process and submit permit applications.
OC Parks	<p><i>El Modena Open Space [Santiago Oaks Regional Park]</i>                      Exotic Plant Control:                      - Manual Treatment of Non-native, Invasive Plants</p>	N/A	N/A
OC Parks	<p><i>El Modena Open Space [Santiago Oaks Regional Park]</i>                      Exotic Plant Control:                      - Herbicide Treatment of Non-native, Invasive Plants</p>	Targeted 10 acres for two treatment applications of African fountain grass artichoke with County contractor.	Ongoing.
OC Parks	<p><i>El Modena Open Space [Santiago Oaks Regional Park]</i>                      Revegetation:                      - Overlook Rehabilitation</p>	Planned revegetate to deter public from degrading overlook site.	Plan tabled due to lack of staffing. No further action at this time.
OC Parks	<p><i>El Modena Open Space [Santiago Oaks Regional Park]</i>                      Revegetation:                      - Gregory Encroachment</p>	Planned to utilize contractor to reactivate revegetation site in conjunction with Overlook Rehabilitation to increase overall habitat quality.	Plan tabled due to lack of staffing. No further action at this time.
OC Parks	<p><i>El Modena Open Space [Santiago Oaks Regional Park]</i>                      Exotic Animal Control</p>	N/A	N/A



**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Irvine Regional Park</i>                      Exotic Plant Control:                      - Manual Removal of Invasive Non-native Plants                      (OC Parks, Funding)</p>	<p>Staff and volunteers hand-removed non-native, invasive species including spiny emex, Sahara mustard, artichoke, milk and Russian thistles, horehound, cheeseweed, tree tobacco, castor bean, mustard, fennel, fountain grass, Pampas grass, Arundo, white bladder-flower and Palms.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Irvine Regional Park</i>                      Exotic Plant Control:                      - Herbicide Treatment of Invasive Non-native Plants                      (OC Parks Funding)</p>	<p>Treated 30 acres targeting Arundo, Tamarix, tree tobacco, castor bean and fennel, throughout park. Treat ~1/2 acre total of spiny emex and Sahara mustard.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Irvine Regional Park</i>                      Exotic Animal Control:                      - Cowbird Trapping                      (NCC Funding)</p>	<p>NCC contractor monitored and maintained a minimum of three traps.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Irvine Regional Park</i>                      Habitat Restoration &amp; Revegetation:                      - OC Parks Projects                      (OC Parks Funding)</p>	<p>Volunteers continued Harding Trail planting and maintenance. Fenced trail edge to reduce public trampling.</p>	<p>Continue planting maintenance on Harding Trail.</p> <p>Plant 24 coast live oak trees as mitigation for eight oak trees removed for maintenance yard construction pending relief from drought conditions.</p>

**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Irvine Regional Park</i>                      Habitat Restoration &amp; Revegetation:                      - Snag Retention                      (OC Parks Funding)</p>	<p>Continued practice of retaining identified dead trees within park for habitat enhancement for wildlife. Project sponsored by Southern California Bluebird Club and Cavity Conservation Initiative.</p>	<p>Ongoing. No further action.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Exotic Plant Control:                      - Manual and Mechanical Removal of Invasive Non-native Plants                      (OC Parks, Laguna Canyon Foundation, Natural Communities Coalition Funding)</p>	<p>Utilized park staff, LCF staff, contractors, volunteers and Irvine Ranch Conservancy to control target species including Tamarix, poison hemlock, fennel, English ivy, mustard, non-native grasses, veldt grass, Pampas grass, tocalote, Russian and Italian thistles, tree tobacco, castor bean, perennial pepperweed, Sahara mustard and areas with mixed invasive species. Methods included hand removal, weed eating, mowing and tractor.</p> <p>NCC contractor continued treatment of veldt grass.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Exotic Plant Control:                      - Herbicide Treatment of Non-native, Invasive Plants                      (Natural Communities Coalition, OC Parks, Funding)</p>	<p>NCC contractor treated St. John's wort.</p>	<p>Ongoing. Target Arundo at Barbara's Lake and Sahara mustard throughout park.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Exotic Animal Control</p>	<p>No action.</p>	<p>No action.</p>

**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Habitat Restoration &amp; Revegetation:                      - OC Parks Projects                      (OC Parks &amp; Laguna Canyon Foundation Funding)</p>	<p>Camarillo Canyon: Maintained and further enhanced riparian restoration.</p> <p>Willow: Planted approximately ½-acre between trailer and parking lot.</p> <p>Barbara’s Hill: Removed invasive species and installed native coastal sage scrub species.</p> <p>Newport Landslide: Aerially applied hydro seed with mulch to areas with soil disturbance.</p>	<p>Camarillo Canyon: Monitor, seed and weed.</p> <p>Willow- Supplement planting with native seed.</p> <p>Barbara’s Hill: Continue planting and monitoring.</p> <p>Big Bend: Restoration project to be undertaken by Keep It Wild.</p> <p>Newport Landslide: Monitor. No further action planned at this time.</p>
OC Parks	<p><i>Laguna Coast Wilderness Park</i>                      Habitat Restoration &amp; Revegetation:                      - Laguna Canyon Road                      (OC Public Works &amp; Caltrans Funding)</p>	<p>OCPW contractor maintained 17-acre riparian mitigation along Laguna Canyon Road.</p>	<p>Completion of mitigation project, pending sign-off by regulatory agencies. Issues with habitat type success criteria continue.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Exotic Plant Control:                      - Manual Removal of Non-native, Invasive Plants                      (OC Parks Funding)</p>	<p>Volunteers, staff and contractor removed target non-native species, including artichoke and Russian thistles, tocalote, castor bean, fennel and black mustard during restoration volunteer days.</p>	<p>Ongoing.</p>

**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Exotic Plant Control:                      - Herbicide Treatment of Non-native, Invasive Plants                      (Natural Communities Coalition, OC Parks Funding)</p>	<p>Treated 80 acres targeting Tamarix, fountain grass, castor bean, fennel, thistles, tree tobacco and garland chrysanthemum with County contractor throughout park.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Exotic Animal Control:                      - Cowbird Trapping                      (Natural Communities Coalition Funding)</p>	<p>Natural Communities Coalition contractor monitored and maintained three traps.</p>	<p>Ongoing.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Habitat Restoration &amp; Revegetation:                      - OC Parks Projects                      (OC Parks Funding)</p>	<p>Continued planting and maintaining coastal sage scrub species and prickly pear cacti at main park entrance.</p>	<p>Continue planting and maintaining.</p>
OC Parks	<p><i>Peters Canyon Regional Park</i>                      Habitat Restoration &amp; Revegetation:                      - Peters Canyon Wash Mitigation                      (OC Flood Control District Funding)</p>	<p>OCPW contractor continued project initiated on October 24, 2011 to restore 25 Acres of coastal sage scrub, oak woodland and riparian habitat along Peters Canyon Creek. Approximately half the site burned in the Canyon 2 Fire.</p>	<p>Ongoing until regulatory agency sign-off.</p>
OC Parks	<p><i>Santiago Oaks Regional Park</i>                      Exotic Plant Control:                      - Manual Removal of Non-native, Invasive Plants                      (OC Parks Funding)                      -Manual Removal of Sahara Mustard                      (IRC Funding)</p>	<p>- Utilized staff, volunteers and contracts to opportunistically remove small patches of non-native plants throughout park, including artichoke, milk and Russian thistles, Pampas grass, Spanish broom, Arundo and palm trees.                       IRC staff and volunteers removed Sahara mustard throughout the park.</p>	<p>Ongoing.</p>

Restoration & Enhancement <sup>a</sup>			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Santiago Oaks Regional Park</i> Exotic Plant Control: - Herbicide Treatment of Non-native, Invasive Plants	Treated 32 acres of target non-native, invasive plant species with County contractor throughout park.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Habitat Restoration & Revegetation: - OC Parks Projects (OC Parks, NCC Funding)	Staff and volunteers continued revegetating unauthorized trails in key locations within park.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Habitat Restoration & Revegetation: - Oak Woodland Mitigation (OC Waste & Recycling Funding)	OCWR contractor continued monitoring and maintaining oak woodland mitigation project installed in 2011. Several trees burned in Canyon 2 Fire.	Ongoing. OCWR contractor planning to replacement plant burned oaks and will maintain all plantings through 2021.
OC Parks	<i>Talbert Nature Preserve</i> Exotic Plant Control: - Manual Removal of Non-native, Invasive Plants	No action. Large-scale mechanical removal of Pampas grass in South Talbert on hold pending Coastal Development Permit for California Coastal Commission.	Unknown.
OC Parks	<i>Talbert Nature Preserve</i> Exotic Plant Control: - Herbicide Treatment of Non-native, Invasive Plants	No action.	Treat Pampas grass resprouts and other non-native species as needed pending large-scale Pampas grass removal.
OC Parks	<i>Talbert Nature Preserve</i> Exotic Animal Control	N/A	N/A
OC Parks	<i>Talbert Nature Preserve</i> Habitat Restoration & Revegetation: - OC Parks Projects (OC Parks Funding)	Discontinued 1st Sundays habitat restoration program run by park volunteers due to staffing.	Consider potential volunteer program partnership with OC River Park.

Restoration & Enhancement <sup>a</sup>			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Talbert Nature Preserve</i> Habitat Restoration & Revegetation: - OC Parks Habitat Restoration Plan (OC Parks Funding)	Completed Habitat Restoration Plan for park.	No further action planned at this time.
OC Parks	<i>Talbert Nature Preserve</i> Habitat Restoration & Revegetation: - South Talbert Wetland Enhancement Project (California Resources Agency Coastal Impact Assistance Program Funding)	No action.	Complete work plan and submit to NCC and California Resources Agency, pending OC Parks Design action.
OC Parks	<i>Talbert Nature Preserve</i> Habitat Restoration & Revegetation: - OC Flood Control District Mitigation (OC Flood Control District Funding)	OCPW contractor continued to monitor and maintain project initiated in 2009. Riparian mitigation monitoring showed high plant mortality due to high salt content in soils; contractor experimented with planting native halophyte species and improving irrigation.	Ongoing.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Exotic Plant Control: - Manual Removal of Non-native, Invasive Plants (OC Parks, California Coastal Commission ROOTS Funding)	Volunteers, staff and partners removed target non-native species, including Brazilian pepper trees, ice plant, mustard, tocalote, Pampas grass and Moroccan knapweed.	Ongoing.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Exotic Plant Control: - Herbicide Treatment of Non-native, Invasive Plants (OC Parks Funding)	Treated 40 acres of Moroccan knapweed, castor bean, Pampas grass and Arundo with County contractor throughout facility.	Ongoing.

Restoration & Enhancement <sup>a</sup>			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Exotic Animal Control	N/A	N/A
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Habitat Restoration & Revegetation: - OC Parks Projects (OC Parks, California Coastal Commission ROOTS, UCI Funding)	Continued planting, maintaining and removing weeds to enhance approximately five acres of coastal sage scrub and estuarine sites, including Constellation and Parking Lot Sites. Expanded planting along perimeters of existing sites.	Ongoing.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Habitat Restoration & Revegetation: - Westbay Habitat Restoration Project (American Oil Trader Spill Settlement Funding)	8-acre coastal sage scrub and grassland habitat restoration project declined, following end of maintenance period with County contractor. Native vegetation matured and began to self-propagate in many areas; however, vegetation declined in areas with renewed erosion issues.  Facility staff entered project into Project Portal for prioritization and assignment to a Project Manager.	Develop project pending prioritization and assignment to Project Manager.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Exotic Plant Control: - Manual Removal of Non-native, Invasive Plants (OC Parks Funding)	Continued removal of approximately ½-acre of exotic plants, including tree tobacco, artichoke thistle, horsenettle, goat head and mustard with volunteers and staff.	Ongoing.

Restoration & Enhancement <sup>a</sup>			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Whiting Ranch Wilderness Park</i> Exotic Plant Control: - Herbicide Treatment of Non-native, Invasive Plants (OC Parks Funding)	Treated ten acres of target non-native, invasive plant species with County contractor throughout park.	Ongoing.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Exotic Animal Control:	N/A	N/A
OC Parks	<i>Whiting Ranch Wilderness Park</i> Habitat Restoration & Revegetation: - Glass Creek Cactus and Duff Salvage (OC Parks, Natural Communities Coalition, City of Lake Forest Funding)	Maintained duff material and prickly pear cacti salvaged from intact coastal sage scrub habitat slated for development in 2012. Natural Communities Coalition recipient sites are approximately 4 acres; OC Parks recipient site is approximately 1.5 acres.	Ongoing. Continue to control non-natives and monitor.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Habitat Restoration & Revegetation: - Portola Center Cactus Salvage (Natural Communities Coalition Funding)	Installed and maintained prickly pear cactus salvaged from Baldwin & Sons development along Concourse Road. Implemented site restoration plan, site preparation and cactus pad planting in 2016.	Ongoing. Continue to monitor and maintain site.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Habitat Restoration & Revegetation: - Serrano-Raptor Planting (OC Parks, Foothill Ranch Elementary School, Environmental Nature Center Funding)	Utilized local elementary school group to grow native plants for restoration site and installed plants with Environmental Nature Center volunteers in 2016. Continued to plant, maintain and monitor site.	Ongoing.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Habitat Restoration & Revegetation: - Water Tank Road (OC Parks Funding)	Prepared site for Fall 2017 seeding.	Monitor and maintain site with staff and volunteers.



**Restoration & Enhancement<sup>a</sup>**

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OCPW	Laguna Canyon Road Widening (Segments 1-3) (OC Road Funding)	Ongoing maintenance	Ongoing maintenance
OCPW	San Diego Creek Flood Control Capacity Restoration Emergency Project (OC Flood Control District Funding)	Ongoing maintenance	Ongoing maintenance/development of adaptive management measures
OCPW	Laguna Canyon Road Drainages (OC Flood Control District Funding)	Ongoing maintenance	Ongoing maintenance
OCPW	Edinger Bridge over Bolsa Chica Channel (OC Road Funding)	Project in design/permitting phase	Mitigation site installation
OCPW	Lower Peters Canyon (OC Flood Control District Funding)	Project in design/permitting phase	Mitigation site installation
OCPW	Laguna Canyon Road Widening / Multi-Use Trail (OC Road Funding)	Project in design/engineering phase	Finalize HMMP, CEQA and update permits
OCWR	Highline Canal Road (OC Waste & Recycling Funding)	Ongoing maintenance	Ongoing maintenance
OCWR	Wetland Basin (OC Waste & Recycling Funding)	Ongoing maintenance	Ongoing maintenance
OCWR	Loma Ridge Trail (OC Waste & Recycling Funding)	Ongoing maintenance	Ongoing maintenance
OCWR	Round Canyon Trail (OC Waste & Recycling Funding)	Ongoing maintenance	Ongoing maintenance

<sup>a</sup> Refer to Table 3 for additional project details for OCPW and OCWR mitigation sites

Fire Management Activities			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Fire Prevention: - Fire Watch Program	See "General Management Programs & Activities."	Ongoing, as needed.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Fire Prevention: - City of Laguna Beach Fuel Modification - Ridgeview Fuel Mod Tract - Anneliese Vegetation Management	Continued permitted grazing with City of Laguna Beach contractor per agreement with city.  Fulfilled obligations to perform vegetation reduction adjacent to homes to OCFA standards. Initiated geo-survey to evaluate vegetation management on portion of slope.  Continued vegetation management.	Ongoing.  Complete Ridgeview geo-survey and implement recommendations.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> 2017 Fires: - Aliso Creek - Dog Park Fire	Three fires less than ¼-acre each along Aliso Creek bikeway in Winter-Spring 2017. Two fires in ruderal vegetation; one fire in Arundo.  November 18, 2017, approximately two acres of coastal sage scrub and ruderal habitat burned in Dog Park Fire.	No further action.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Post-Fire Management	N/A	N/A
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Fire Prevention	N/A	N/A

Fire Management Activities			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> 2016 Fires	1/2-acre fire in cactus scrub. Monitored site.	No further action.
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> 2017 Fires	N/A	N/A
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Post-Fire Management	N/A	N/A
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Maintenance of Fuel Breaks/Modification Zones	Staff and contractor maintained fuel modification zones identified by City of Orange Fire and OC Fire Authority.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Fire Prevention: - Fire Watch Program	See "General Management Programs & Activities."	Ongoing, as needed.
OC Parks	<i>Irvine Regional Park</i> 2017 Fires: - Santiago Creek Fire - Canyon Fire - Canyon 2 Fire	May 20, 2017, less than ½-acre fire in creek bed ignited by park users dumping charcoal.  September 25, 2017, served for one week as Fire Camp for Canyon Fire.  October 9, 2017, 475 acres of park burned in Canyon 2 Fire. Front country reopened; backcountry assessed for resource and infrastructure impacts. Installed erosion control BMPs.	No further action.  No further action.  Open backcountry in phases based on rain season, safety and resource recovery.

Fire Management Activities			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> Post-Fire Management	N/A	Follow erosion control recommendations through rainy season; strategically treat invasive species.
OC Parks	<i>Irvine Regional Park</i> Maintenance of Fuel Breaks & Fuel Modification Zones	N/A	N/A
OC Parks	<i>Laguna Coast Wilderness Park</i> Fire Prevention: - Fire Watch Program	See "General Management Programs & Activities."	Ongoing, as needed.
OC Parks	<i>Laguna Coast Wilderness Park</i> Fire Prevention: - Emerald Bay Community Fuel Mod Plan	Homeowners Association obtained grant with OCFA to install 1997 Fuel Management Concept Plan specifying 300-foot fuel management zone. Plan modified to plant prickly pear within existing Defensible Space Zone.	Continue working with Homeowners Association and OCFA through project completion.
OC Parks	<i>Laguna Coast Wilderness Park</i> 2017 Fires: - Los Trancos	Less than 50 sq. ft. of ruderal vegetation burned in the Los Trancos fire.	No further action.
OC Parks	<i>Laguna Coast Wilderness Park</i> Post-Fire Management: - 2015 Laguna Fire - 2016 Laguna Ridge Fire	July 2015 fire initiated by SCE Powerline burned 14-acres adjacent to Laguna Canyon Road; Laguna Ridge Fire burned 47 acres in June 2016. Both fires burned primarily coastal sage scrub with some degraded habitat. Monitored and maintained erosion control BMPs. Laguna Ridge Fire dozer scar was seeded.	Continue to monitor and maintain BMPs as site revegetates. No further action planned at this time.

## Fire Management Activities

County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<p><i>Laguna Coast Wilderness Park</i> Maintenance of Defensible Space / Fuel Modification Zones: - Nix Nature Center</p>	Continued planting and maintaining (outside of nesting season) OCFA-mandated plant palette in 170-foot fuel mod zone around Nix Nature Center. Planted additional bunchgrasses.	Ongoing.
OC Parks	<p><i>Laguna Coast Wilderness Park</i> Maintenance of Defensible Space / Fuel Modification Zones: - City of Laguna Beach Fuel Modification</p>	Continued grazing permit with City contractor, Laguna Beach Fire Department.	Ongoing.
OC Parks	<p><i>Peters Canyon Regional Park</i> Fire Prevention: - Fire Watch Program</p>	See "General Management Programs & Activities."	Ongoing, as needed.
OC Parks	<p><i>Peters Canyon Regional Park</i> 2017 Fires</p>	October 9, 2017, approximately one-third of park at north end burned in Canyon 2 Fire. Portion of front country reopened; backcountry assessed for resource and infrastructure impacts. Installed erosion control BMPs.	Open backcountry in phases based on rain season, safety and resource recovery.
OC Parks	<p><i>Peters Canyon Regional Park</i> Post-Fire Management</p>	N/A	Follow erosion control recommendations through rainy season; strategically treat invasive species.
OC Parks	<p><i>Peters Canyon Regional Park</i> Maintenance of Defensible Space / Fuel Modification Zones</p>	Park staff maintained fuel modification zones identified by OC Fire Authority and Country Agricultural Commissioner.	Ongoing.
OC Parks	<p><i>Santiago Oaks Regional Park</i> Fire Prevention: - Fire Watch Program</p>	See "General Management Programs & Activities."	Ongoing, as needed.

Fire Management Activities			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Santiago Oaks Regional Park</i> 2016 Fires: - Cannon	1/2-acre fire in ruderal vegetation at park satellite location in Santiago Creek under Cannon bridge. Monitored site.	No further action.
OC Parks	<i>Santiago Oaks Regional Park</i> 2017 Fires: - Canyon 2 Fire	October 9, 2017, approximately one-third of park at north end burned in Canyon 2 Fire. Portion of front country reopened; backcountry assessed for resource and infrastructure impacts. Installed erosion control BMPs.	Open backcountry in phases based on rain season, safety and resource recovery.
OC Parks	<i>Santiago Oaks Regional Park</i> Maintenance of Defensible Space / Fuel Modification Zones	N/A	Follow erosion control recommendations through rainy season; strategically treat invasive species.
OC Parks	<i>Talbert Nature Preserve</i> Fire Prevention	N/A	N/A
OC Parks	<i>Talbert Nature Preserve</i> 2017 Fires	Over five fires in 2017, all less than ¼-acre in size. Burned habitat included non-native ruderal sites and willow riparian vegetation.	Reduce Pampas grass biomass and limb up Myoporum trees to reduce fire hazards pending permit approvals.
OC Parks	<i>Talbert Nature Preserve</i> Post-Fire Management	N/A	N/A
OC Parks	<i>Talbert Nature Preserve</i> Maintenance of Defensible Space / Fuel Modification Zones	N/A	N/A
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Fire Prevention: - Fire Watch Program	See "General Management Programs & Activities."	Ongoing, as needed.

Fire Management Activities			
County Agency	Project, Program, Activity	2017 Status	2018 Work Plan
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> 2017 Fires	N/A	N/A
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Post-Fire Management	N/A	N/A
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Maintenance of Defensible Space / Fuel Modification Zones	N/A	N/A
OC Parks	<i>Whiting Ranch Wilderness Park</i> Fire Prevention - Fire Watch Program	See "General Management Programs & Activities."	Ongoing, as needed.
OC Parks	<i>Whiting Ranch Wilderness Park</i> 2017 Fires	N/A	N/A
OC Parks	<i>Whiting Ranch Wilderness Park</i> Post-Fire Management	N/A	N/A
OC Parks	<i>Whiting Ranch Wilderness Park</i> Maintenance of Defensible Space / Fuel Modification Zones	N/A	N/A
OCPW	None	N/A	N/A
OCWR	FRB office fuel modification zone	Thinning	Thinning
OCWR	Flare Station fuel modification zone	Thinning	Thinning

Miscellaneous Activities and Management Programs			
County Agency	Project	2017 Status	2018 Work Plan
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Treatment: - Polyphagous Shot Hole Borer	Contractor performed soil injections and drenching of select trees in vicinity of park entrance.	Ongoing.
OC Parks	<i>Aliso and Wood Canyon Wilderness Park</i> Survey: - Polyphagous Shot Hole Borer	UC Extension Riverside continued PSHB surveys.	Ongoing.
OC Parks	<i>El Modena Open Space [Santiago Oaks Regional Park]</i> Study: - Wildlife Monitoring	Cal State Long Beach installed one game camera to capture wildlife, particularly coyote activity, in order determine status as wildlife corridor.	Ongoing until study complete.
OC Parks	<i>Irvine Regional Park</i> Study: - Bluebird Nest	Sea & Sage Audubon Society volunteers continued monitoring in Spring.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Survey: - Owl and Raptor Surveys	Pete Bloom surveyed nesting sites in June.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Treatment: - Red Imported Fire Ants	Vector Control inspected for and treated widespread populations of red imported fire ants throughout park.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Treatment: - Mosquitos and Ticks	Vector Control inspected for and treated mosquitos and ticks throughout park.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Treatment: - Kissing Bugs	Vector Control inspected for and treated kissing bug populations throughout park.	Ongoing.



**Miscellaneous Activities and Management Programs**

County Agency	Project	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> Treatment: - Gypsy Moths and Japanese Beetles	CA State Department of Food & Agriculture placed traps for gypsy moths and Japanese beetles in July.	Ongoing.
OC Parks	<i>Irvine Regional Park</i> Survey: - Restoration Projects	NCC contractor surveyed for potential future restoration projects.	Continue.
OC Parks	<i>Irvine Regional Park</i> Survey: - Gnatcatchers	NCC contractor performed gnatcatcher surveys.	Continue.
OC Parks	<i>Irvine Regional Park</i> Survey: - Spadefoot Toad	NCC-funded UCLA survey of spadefoot toad population genetics completed.	No further action.
OC Parks	<i>Irvine Regional Park</i> Survey: - Polyphagous Shot Hole Borer	PSHB found to be present at low levels. Contractor conducted soil injections, trunk spraying and trunk injections on selected oak and sycamore trees. Ten traps were set out in May and monitored weekly.	Continue.
OC Parks	<i>Irvine Regional Park</i> Study: - Coyote	CSULB initiated study of coyote diet and movement throughout park.	Continue.
OC Parks	<i>Irvine Regional Park</i> Study: - Yellow Jacket	Resumed research initiated by UC Cooperative Extension Agriculture & Natural Resources and UC Riverside in 2015. Study includes 55 stations.	Continue.

Miscellaneous Activities and Management Programs			
County Agency	Project	2017 Status	2018 Work Plan
OC Parks	<i>Irvine Regional Park</i> Study: - Golden Eagles	USGS initiated study of golden eagle populations in 2016. Completed year two of five.	Continue through 2021.
OC Parks	<i>Irvine Regional Park</i> Study: - Emerald Ash Borer Monitoring	Completed USDA continued beetle trap monitoring.	No further action.
OC Parks	<i>Irvine Regional Park</i> Discovery: - Kuroshio Shot Hole Borer	Discovery of KSHB in Irvine Regional Park.	Incorporate KSHB surveys with PSHB surveys.
OC Parks	<i>Laguna Coast Wilderness Park</i> Proposed Introduction: - Pacific Pocket Mouse	USFWS reintroduced endangered Pacific Pocket Mouse (PPM) to park per PPM Reintroduction Plan in 2016.	Continue to coordinate with USFWS on project.
OC Parks	<i>Laguna Coast Wilderness Park</i> Encroachment: - Marijuana Grove	In 2015, discovered two sites encompassing 45 acres of approximately 2,000 plants in Los Trancos and Muddy Canyon and removed majority of debris from sites. Continued to monitor site.	Continue monitoring sites and removing debris as access allows. No further action planned at this time.
OC Parks	<i>Laguna Coast Wilderness Park</i> Survey: - Shot Hole Borer Conditions	UC Riverside and UC Cooperative Extension surveyed for habitat features associated with presence/absence of shot hole borer.	Ongoing.
OC Parks	<i>Laguna Coast Wilderness Park</i> Survey: - Raptors	Pete Bloom performed summer raptor surveys.	Ongoing.

Miscellaneous Activities and Management Programs			
County Agency	Project	2017 Status	2018 Work Plan
OC Parks	<i>Laguna Coast Wilderness Park</i> Survey: - Vegetation	UC Irvine performed coastal sage scrub vegetation surveys.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Study: - Park Trees	Contractor and UC Cooperative Extension monitored trees for disease, post-fire stress and presence of beetles. Except for emergency situations, all tree work performed outside of nesting season.	Ongoing.
OC Parks	<i>Santiago Oaks Regional Park</i> Survey: - Polyphagous Shot Hole Borer	UC Extension staff surveyed and identified a high count of infested sycamores and lower counts of cottonwoods and oaks, all with low levels of PSHB infestation. Followed protocols to remove medium- and high-infestation trees.	Continue monitoring for PSHB presence. Look for post-fire responses.
OC Parks	<i>Santiago Oaks Regional Park</i> Survey: - Ticks	Vector Control conducted tick survey in Rinker Grove and collected samples for Lyme Disease testing.	Unknown.
OC Parks	<i>Santiago Oaks Regional Park</i> Treatment: - Mosquitoes	Vector Control treated mosquito populations in park.	Unknown.
OC Parks	<i>Santiago Oaks Regional Park</i> Encroachment: - Chen Property	No action. Habitat restoration pending conclusion of negotiations with OC Parks Real Estate and homeowner.	Initiate habitat restoration, pending conclusion of negotiations.
OC Parks	<i>Santiago Oaks Regional Park</i> Encroachment: - Lower Santiago	No action. Habitat restoration pending conclusion of negotiations with OC Parks Real Estate and homeowner.	Initiate habitat restoration, pending conclusion of negotiations.

Miscellaneous Activities and Management Programs			
County Agency	Project	2017 Status	2018 Work Plan
OC Parks	<i>Talbert Nature Preserve</i> Survey: - Polyphagous Shot Hole Borer	Surveys identified heavy, widespread PSHB infestation of sycamores and willows throughout park.	Remove hazard trees as needed.
OC Parks	<i>Upper Newport Preserve Nature Preserve</i> Study: - Climate Change and Native Plant Genetics	UC Irvine researchers continued genetics study on approximately 0.25 acres near Muth Interpretive Center.	Ongoing.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Survey: -Christmas Bird Count	Sea and Sage Audubon conducted annual Christmas bird count in mid-December.	Ongoing.
OC Parks	<i>Whiting Ranch Wilderness Park</i> Survey: - Polyphagous Shot Hole Borer	- Staff took over monitoring for PSHB throughout park, and continued to identify infested trees.	Ongoing.
OCPW	None	N/A	N/A
OCWR	None	N/A	N/A

**Table 3  
MITIGATION MATRIX 1997-2018  
Mitigation Sites within the Orange County Central/Coastal NCCP Reserve System**

County Agency	Project / Development Name	Location of Mitigation Sites	Description of Mitigation	Installation Date	Performance Standards Summary	Performance Standards Status	Current Status
OCPW	Laguna Canyon Road Widening (Segments 1-3)	Laguna Coast Wilderness Park	Creation of 2.8 acres of alkali marsh, 2.3 acres of seasonal wetland, 0.9 acre of freshwater marsh, and 1.6 acres of transitional upland	August 2009	For transitional upland, by Year 5: - 80% Absolute cover of native plant species - Less than 10% cover for all non-native species - 0% Cover for invasive species - 60% Plant species diversity - Greater than 75% absolute vegetative cover	Site is in Year 9 of monitoring; as of Year 8, the site is meeting performance criteria for transitional upland habitat.	The extended drought has affected the performance of the alkali marsh, seasonal wetland and fresh water marsh sites. Ongoing maintenance being performed.
OCPW	San Diego Creek Flood Control Capacity Restoration Emergency Project	Talbert Regional Park [Lower]	Creation of 1.5 acres of Coastal Sage Scrub and 18.86 acres of Southern Willow Scrub	2009	For Southern Willow Scrub, by Year 5: - 70% Native plant coverage - Less than 10% cover for all non-native species - 100% Number of species originally planted present. No specific success criteria were given for the coastal sage scrub site	Site B (15.8 acres creation of southern willow scrub) was unable to establish. The remaining parcels were meeting performance criteria in Year 5; however, soon after the site was decimated by Polyphagous Shot Hole Borer.	Negotiations ongoing with resource agencies to determine a suitable replacement for site B and appropriate adaptive management measures in light of Polyphagous Shot Hole Borer infestation and resulting loss of willow habitat.
		Peters Canyon Regional Park	14.96 acres of riparian enhancement	January 2013	By Year 5: - 90% Native plant coverage - 80% survival of planted container species - Less than 5% cover for all non-native species - 0% Cover for invasive species - 5% Maximum percent cover of bare ground - Documentation of stable average percent slope and stable bank PHab measurements - Off irrigation for 2 consecutive years	Site meeting all performance with the exception of cover for invasive species, which in the Year 4 Monitoring Report was estimated at 1%.	Project in Year 5 of monitoring. Additional treatment of Mexican fan palm seedlings and gum is needed.
OCPW	Laguna Canyon Road Drainages	Laguna Coast Wilderness Park	Creation of 0.01 acre of willow woodland and riparian scrub on-site and 0.22 acre of mule fat scrub and sycamore woodland habitat off-site	November 2016	By Year 5: - 70% Native plant coverage - 95% survival of planted native shrubs and trees - Less than 5% cover for all non-native species - 0% Cover for invasive species - 30% Maximum percent cover of bare ground - Off irrigation for 2 consecutive years	To be determined after first year of monitoring is complete.	Ongoing maintenance
OCPW	Edinger Bridge over Bolsa Chica Channel	Talbert Regional Park [Lower]	Creation of 1.26 acres of Salt Marsh and 0.10 acres of Transitional Brackish Marsh	December 2017	By Year 5: - 80% Minimum container plant survival - 5% Maximum non-native plant cover - 65% Native plant cover	To be determined after first year of monitoring is complete.	Initial site grading in December 2017; planting has not occurred yet.
OCPW	Lower Peters Canyon	Peters Canyon Regional Park	Creation of 1.0 acre of riparian habitat composed of native riparian woodland and scrub species	2018	80% survival annually. By Year 5: - 85% Native cover - Less than 5% cover for all non-native species - 0% Cover for invasive species - Off irrigation for 2 consecutive years	To be determined after first year of monitoring is complete.	Installation planned for March 2018

County Agency	Project / Development Name	Location of Mitigation Sites	Description of Mitigation	Installation Date	Performance Standards Summary	Performance Standards Status	Current Status
OCPW	Laguna Canyon Road Widening / Multi-Use Trail	Aliso & Wood Canyon Regional Park	Creation of 1.09 acres of freshwater marsh, 0.83 acre of riparian habitat, and 0.95 acre of riparian habitat enhancement	2018-2019	To be determined upon finalization of HMMP	To be determined after first year of monitoring is complete.	Mitigation project in planning and design/engineering phase. Need to update CEQA and permits.
OCWR	Grading of Loma Ridge Trail	Loma Ridge	0.72 mile of trail margins	2011	40% cover	15% cover	Ongoing maintenance
OCWR	Grading of Round Canyon Trail	Round Canyon	1.27 mile of trail margins	2011	40% cover	15% cover	Ongoing maintenance
OCWR	Grading of Highline Canal Road	Entrance to FRB Landfill	0.16 acre of CSS	2013	50% cover	10% cover	Ongoing maintenance
OCWR	Grading of Drainage 1 on FRB Landfill (wetland basin)	Bee Canyon	2.52 acre of wetland habitat	2013	20% cover	15% cover	Ongoing maintenance

# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Sections: 8.4 – 8.6**

City of Irvine  
City of Newport Beach  
Irvine Company

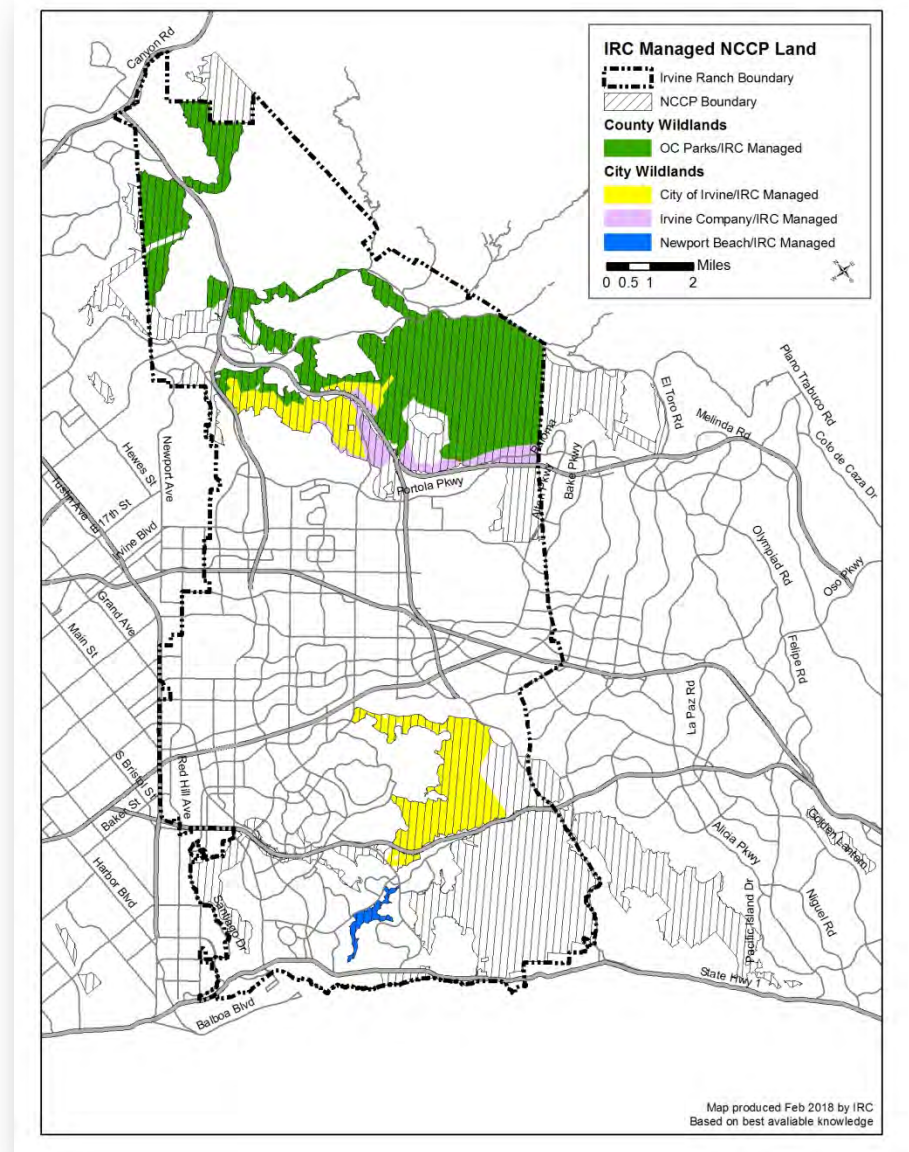
# Central/Coastal Orange County Wildlands Annual Report 2017

## Introduction:

This progress report and annual work program was prepared following the guidelines provided by the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) "Recommended Outline for Reserve Owner/Manager Annual Work Programs" dated February 10, 2003, using the Natural Communities Coalition (NCC) recommended table format.

## Note:

All 2018 research, monitoring, and management projects summarized on the following pages that require NCCP compliance determinations (specifically, projects directly related to the conservation and management of NCCP Target Habitat and Species, namely, coastal sage scrub (CSS), California Gnatcatcher, Cactus Wren, and Orange-Throated Whiptail) or those projects requested by the NCC Technical Advisory Committee (TAC) for review, will be developed as full proposals using the format recommended by USFWS and CDFW (project justification, methods [hypotheses, approach, methodology, sites, analysis], timeline, project outputs, evaluation of potential impacts, investigators, literature cited and reviewed, tables or figures). These proposals will be submitted for review by the TAC as they are developed prior to the initiation of each project. The TAC review period is 45 days, after which projects may be initiated if no comments are received. All CDFW, USFWS, and NCC nesting bird and exotic species control guidelines will be followed. Highest priority issues include fire prevention and control, rapid landscape-scale restoration of native habitats, and landscape connectivity for wildlife. Projects initiated by NCC on OC Parks, City of Irvine, and City of Newport Beach-owned land are not included in this report or work plan (e.g., NCC oak survey, NCC cactus wren survey, NCC California Gnatcatcher survey, NCC vegetation survey), although we look forward to continuing to coordinate and collaborate with these efforts.





## Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<b>Recreation Use, Monitoring, and Management:</b>		
<p>Current Use Policies:</p>	<p>Docent-led hiking, mountain biking, passive recreational fitness activities, and equestrian activities for the public. Limit is generally 25 participants with a minimum of 2 “IRC-Certified” volunteers. However, on the paved Hicks Haul Road, when adequate volunteer coverage is available, we have experimented splitting participants into two groups, with a minimum of four volunteers and a limit of 35 participants. This also allowed for increased safety of small groups travelling closer together.</p> <p>Managed self guided access days continued to be implemented in Limestone Canyon and Black Star / Baker Canyons in 2017. In addition, Agua Chinon Exploration Day was implemented totaling 85 volunteers and participants. Trails used for this new self-guided program were Agua Chinon to the West Sinks Deck up Cactus to Limestone Ridge to East Sinks Deck. Markel Spur has also been made available to users.</p> <p>Large Events: There were three Into the Wild trail run events and one mountain bike race held in 2017.</p> <p>June 3, 2017- Black Star Canyon Trail Run Total runners: 110</p>	<p>Existing policies will remain as the general rule through 2018.</p> <p>Managed self-guided wilderness access days will continue in Limestone Canyon and Black Star / Baker Canyons. Identified sensitive areas, such as raptor nesting locations, are advertised as quiet zones.</p> <p>In 2018, IRC will continue to have one wilderness access day per month on IRC-managed areas: OC Parks Irvine Ranch Open Space and the City of Irvine Open Space Preserve. This allows Wilderness Access Days to rotate between two separate locations to minimize human impacts on wildlife movement.</p> <p>A self-guided Exploration Day will continue in 2018, held every other month in Agua Chinon. This will allow access to the West and East Sinks Decks and Markel Spur loop.</p> <p>In 2018, large events (more than 100 people) such as Into the Wild trail runs and mountain bike races are planned for the following months and locations:</p> <p>April 7: Trail Run, Black Star</p>

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>Total spectators: 20 Total volunteers: 20</p> <p>September 16, 2017: Limestone Mountain Bike Race Total riders: 62 Total spectators: 20 Total volunteers: 8 Total photographers: 2</p> <p>October 7, 2017: Fremont Trail Run Total runners: 24 Total spectators: 20 Total volunteers: 9</p> <p>November 18, 2017: Limestone Trail Run Total runners: 113 Total spectators: 15 Total volunteers: 20 (2 dogs)</p> <p>An average of 3 events per month were offered on the Mesa from the Canyons Staging Area.</p> <p>Access during wet weather was based on the trail assessment by OC Parks rangers. Conditions are now relayed through a color coded trail map providing access abilities dependent on trail conditions, and on days with red flag warning conditions and/or Santa Ana winds as determined by the Orange County Fire Authority and the National Weather Service. In 2017, there was an</p>	<p>May 5: Mountain Bike Race, Fremont. June 2: Trail Run, Fremont. September 8: Mountain Bike Race, Limestone. November 3: Trail Run, Limestone.</p> <p>Activities will continue at the Mesa and Canyons staging areas.</p> <p>Work has begun to develop expanded programming with an educational focus.</p>

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>increased number of red flag warning and wet weather days.</p>	
<p>Recreational Monitoring: - Use and Access</p>	<p>IRC offers an array of activities on the OC Parks portion of the historic Irvine Ranch. This land is currently referred to as the Irvine Ranch Open Space (IROS).</p> <p>The following totals include recreation, education, restoration, citizen science, and more. These include NCCP and easement lands. The time frame was from January 1 through December 31, 2017.</p> <p>Total activities offered: 1,690 Total activities implemented: 1,448 Total volunteers: 7,317 Total volunteer hours: 23,997 Registered public participants: 9,028 Public participant stewardship/trail work hours: 2,611</p> <p>The following public recreation and interpretation activities were offered from January 1 through December 31, 2017. In 2017, there was a large number of days in which activities were cancelled due to fire and wet weather.</p> <p>Note: In the following sections, the term “recreation activities offered” refers to the number of activities publicized for public participation and the term “recreation activities implemented” refers</p>	<p>The volunteer program will continue to expand in an effort to manage and implement recreational and interpretive use of the property, and connect more people to the land in meaningful ways.</p> <p>Public access will continue to be suspended during red flag warning conditions and/or Santa Ana winds as determined by the Orange County Fire Authority and the National Weather Service.</p> <p>The newly updated IRC website (irconservancy.org) and the Let’s Go Outside Website in partnership with multiple land owners and partners will continue to be enhanced in an effort to increase the public awareness and participation in the land.</p> <p>The Irvine Ranch Natural Landmarks also has a Facebook page, which will continue to be used to expand the public awareness and participation in the land.</p> <p>The quarterly program brochure will continue to expand and include the listing of program options throughout the NCCP locations.</p>

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>to the number of activities that took place on the land. Offered activities include any activities that may have been cancelled due to wet weather or red flag warning conditions.</p> <p>Total recreation activities offered: 669                      Total recreation activities implemented: 514                      Total volunteers: 3,738                      Total volunteer hours: 11,860                      Actual public participants: 7,775                      Number of activities implemented per NCCP                      Location (offered less cancelations):                      Limestone Canyon: 368                      Weir Canyon: 64                      Fremont Canyon: 83                      Black Star/Baker: 137</p> <p>Total trail crew activities offered: 7                      Total trail crew implemented: 5                      Total volunteers: 14                      Total volunteer hours: 77                      Total public participants: 0</p> <p>Bi-monthly managed self-guided Wilderness Access Days in Limestone Canyon and Black Star / Baker Canyons were continued in 2017. In many years, sensitive areas such as raptor nesting areas result in quiet zones where the public is able to access, but asked to refrain from gathering or making noise.</p> <p>The Irvine Ranch Natural Landmarks website in</p>	

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>partnership with multiple land owners and partners continues to be used to connect the community with available activities. The site receives more than 70,000 page views and has approximately 6,900 active users per month.</p> <p>A joint effort quarterly program brochure continues to expand to include IRC, City of Irvine, OC Parks, State Parks, Laguna Canyon Foundation, Newport Bay Conservancy, Sea and Sage Audubon, City of Newport Beach, and the Coastal Commission activities. This brochure is distributed county wide through all of the above mentioned organizations and other outside organizations.</p>	
<p>Recreational Monitoring: - Volunteer-only Activities, Outreach Activities, and Patrols</p>	<p>Volunteer-only activities, outreach activities, and patrols have been incorporated into the above recreation and interpretation numbers.</p>	<p>Volunteer-only activities, outreach activities, and patrols will continue in 2018.</p>
<p>User Compliance Programs: - Access Monitoring</p>	<p>Unauthorized Access Monitoring Program:  Camera traps, video surveillance, trail counters, and patrols were conducted to identify and monitor levels of unauthorized access and unauthorized trail use. This allowed IRC and OC Parks Rangers to establish unauthorized use patterns and focus resources to manage the issue.</p> <p>In an effort to reduce unauthorized public access,</p>	<p>Enforcement activities and monitoring equipment used in the Unauthorized Access Monitoring Program will continue in 2018.</p>

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>OC Parks implemented targeted enforcements based on use patterns of unauthorized public access. Enforcement activities included patrols, visual deterrence, and citation of individuals, primarily by 3 OC Parks staff assigned to the IROS.</p>	
<p>User Compliance Programs: - Monitoring and Human Access Management</p>	<p>Seasonal closures for nesting raptors in Limestone Canyon were again not implemented because there were no active nests in the immediate vicinity of trails.</p> <p>In past years, data from public access program reports has been compiled and overlaid onto a trail layer to produce a map of recreational activity. These data are subject to both reporting and entry error and do not include some private hikes and access from management activities. These data are not available for 2017 due to errors with the website used for reporting.</p> <p>CDFW LAG funding was received by NCC in collaboration with IRC to study recreation and its effects on wildlife. Funding totaled \$75,000 and included a supplemental in-kind match from NCC, IRC, and OC Parks. Project title: Assessing effectiveness of adaptive recreation management strategies and evaluation of core NCCP habitat areas. A final report was completed by NCC and is available upon request.</p> <p>Human monitoring access cameras:</p>	<p>Wilderness Access Days will continue to take place in Limestone Canyon and Black Star Wilderness Area. Alternative trails will be available during Wilderness Access Days in the event of seasonal trail closures due to sensitive species' breeding activity.</p> <p>Access by OC Parks permit holders will continue to be tracked with an access request and calendar system to reducing scheduling conflicts and avoid excessive activities in particular areas.</p> <p>OC Parks will continue to allocate up to four rangers to the property. Rangers will be on duty seven days per week 6:30 a.m. to 8:30 p.m. Their hours will flex depending on the unauthorized access monitoring results and the creation of targeted enforcement. OC Parks will continue to document the number of unauthorized interceptions, warnings, and citations on a monthly basis.</p> <p>Budget permitting, implement live-feed still-photo camera locations targeted at known areas of high-risk activities, specifically areas of extensive</p>

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>Total days scheduled: 43                      Total implemented: 29                      Total volunteers: 58                      Total volunteer hours: 348                      Total public participants: 0                      Total cameras: 34                      Total images processed: 399,630</p> <p>Significant losses of equipment due to fire as well as limited access to cameras for servicing due to red flag warnings and wet conditions account for the decrease in total images processed.</p> <p>Designed and implemented a web-based photo database for all trailhead human access camera locations. IRC management and field patrol personnel (OC Parks Rangers) will have direct encrypted access to human access photos as well as a database spreadsheet of unauthorized access. This photo data will provide more effective means for field patrol personnel to target specific days, times, and locations for their patrols.</p>	<p>nighttime use, fire pits, unauthorized vehicles, etc. These cameras will have the ability to relay photos directly to a web-based storage drive and provide instant notification to selected patrol personnel of unauthorized presence in the area.</p>
<p>Educational Outreach:                      - IRC Citizen Science Program</p>	<p>IRC's Citizen Science program is designed to implement scientific research by trained and supervised volunteers. Citizen Science activities in the IROS included: wildlife camera trapping, butterfly counts, raptor and other bird monitoring, and vegetation monitoring.</p> <p>Citizen Science Activities:</p>	<p>Existing Citizen Science activities will continue in 2018 in the IROS.</p>

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>Total activities offered: 179                      Total activities implemented: 139                      Volunteers participating: 446                      Volunteer hours: 2,397                      Public participants: 93</p>	
<p>Educational Outreach:                      - IRC Land Steward, Farm Steward, and Community Stewardship Programs</p>	<p>Stewardship activities included invasive species control, restoration, and native seed farm maintenance. IRC conducted the following trainings: one Land Steward training, one Lead Land Steward training, four Introduction to Native Seed Farm trainings, and four Seasons on the Native Seed Farm trainings. In addition, there were individual trainings for invasive control digital data basing as well as herbicide use for lead land stewards.</p> <p>The Community Stewardship program, which consists of easily accessible activities near staging areas and geared toward large groups, was expanded in 2017 to include trail closure and staging area community stewardship plantings (recorded under Restoration).</p> <p>A native plant nursery (20 ft x 30 ft) was built in the Augustine Staging area of Limestone Canyon to support community stewardship activities in 2017 and going forward. This nursery provided plants for Dripping Springs, the staging area, and other locations in Limestone. 864 plants were successfully grown at Augustine ranging from Black Sage, Buckwheat, and White Sage to</p>	<p>The Land Steward program will continue to include invasive species removal and restoration. Nursery activities and community stewardships will continue to be offered and implemented in 2018. A Farm Steward program will continue to be operated separately.</p> <p>Community Stewardship activities will grow in 2018 with targeted outreach to past participants and corporate groups.</p> <p>Community Stewardship will increase the nursery's capacity to grow and plant over 900 of the following species in 2018: Laurel Sumac, Blue Elderberry, Toyon, California Sage Brush, White Sage, and Black Sage.</p> <p>Community Stewardship will continue to plant and water over 80 plants on the Waterworks trail, tend to and water the remaining Tecate Cypress trees in Fremont, and make plans for continued activities in Santiago Oaks and Irvine Regional Park.</p> <p>New activities and goals for Community Stewardship in 2018:</p>



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Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>California Sagebrush and Sandaster. Soil solarization was one method used for the re-use of the potting mix and pots at the native plant nursery. The pots and soil from plants that have died or whose seeds did not germinate were continuously sterilized by the sun at 115°F for 30 minutes. An additional nursery, beginning with a few tables, was started and placed at Santiago Oaks near the maintenance yard. Approximately 144 California Buckwheat plants were grown, but they burned during the Canyon 2 Fire.</p> <p>Community Stewardship activities are ongoing in Fremont. Specifically sage brush, black sage, and buckwheat were planted near the new Waterworks trail. The area burned during the Canyon 2 Fire, but plantings have already been placed along the trail and will continue into 2018.</p> <p>Tecate Cypress trees have been planted, watered, fenced, and maintained near the staging area in Fremont. A total of 60 trees were planted, and 36 have died.</p> <p>Community Stewardship activity participants planted, watered, and cared for a total of 234 plants on the Dripping Springs trail. The trail opened in June of 2017.</p> <p>Community Stewardship hosted 14 corporate groups and 6 school groups, and led 23 activities for the Youth Action Team at various locations of</p>	<ol style="list-style-type: none"> <li>1. Ox Rock/Weir – Cactus planting</li> <li>2. The Sinks – Native shrub planting</li> <li>3. Quail Hill Loop – Native shrub planting</li> <li>4. Waterworks trail enhancement</li> </ol> <p>Maintenance and plantings for Dripping Springs Trail will be adopted by Lead Land Stewards and will incorporate public participation.</p>

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>the IROS in 2017.</p> <p>Several lead land stewards conducted private solo stewardship activities with great success. A digital invasive control reporting tool continues to be utilized by Lead Land Stewards. An online map link continues to be available for land stewards to view status of invasive control across reserve areas and is available upon request. Note that all offered stewardship activities listed below include volunteer-only activities, as well as Community Stewardship and span both NCCP and non-NCCP lands.</p> <p>Invasive Control Activities:                      Total activities offered: 44                      Total activities implemented: 37                      Total volunteers: 115                      Volunteer hours: 488.5                      Total public participants: 47</p> <p>Restoration Activities:                      Total activities offered: 112                      Total activities implemented: 83                      Total Volunteers: 270                      Volunteer hours: 942.5                      Total Public participants: 310</p> <p>Native Farm Activities:                      Total activities offered: 85                      Total activities implemented: 79                      Total Volunteers: 296</p>	

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
	Volunteer hours: 142.75 Total Public participants: 489	
Educational Outreach: - IRC Trail Crew Training Activities	Conducted volunteer Trail Crew training and implemented the Adopt-A-Trail program to assist with ongoing monitoring and maintenance of trail system.  Completed Volunteer Trail Projects: 3 Trail Crew training sessions: 1 Trail maintenance projects: 4	Continue training Trail Crew volunteers, and offer advanced training in specific areas of trail work, i.e.: power equipment, rock armoring, specialty techniques.
<b>Recreation Facility Construction and Maintenance:</b>		
New Construction or Expansion (All Areas): - Signage	Continued implementation of comprehensive sign program for all managed areas, addressing regulatory, directional, and informational signs. Semi-annual UV treatment to maintain trail way-finding signage was conducted on most signs.  Implemented the use of a 3M-1160 anti-graffiti overlay laminate in lieu of fluid applied coatings. This product will be field tested for at least one year, but preliminary results have been positive in aiding quick response time for the removal of graffiti.	Continue implementation of coordinated sign program through refurbishment/replacement of damaged/outdated/missing signs in all areas of land management. Replace/add perimeter "No Trespassing" signs on existing fences/gates/armatures where needed to address vandalism and unauthorized access.  Apply semi-annual UV treatment to maintain trail way-finding signage (scope dependant on available staff resources).
New Construction or Expansion (All Areas): - Natural Barriers	Continued the maintenance of native prickly pear and cholla cactus plants for selected field application as a native barrier to limit unauthorized access.	Continue growing stock of native prickly pear cactus in 15 gallon containers and cholla for use in restoration efforts and for trail access management. Native prickly pear cactus plants

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		<p>may be installed on a limited basis, at selected perimeter fence locations or trail turn-back areas to deter unauthorized off-trail access.</p>
<p>Maintenance of Existing Facilities (All Areas):                      - Existing Ranch Roads, Trails, Private Drives, Bridges, Kiosks, and Perimeter Fencing / Gates</p>	<p>Continued maintenance of roads/trails, erosion control features, and perimeter fencing/gates to maintain authorized access. To maintain trail standards, efforts included:</p> <ul style="list-style-type: none"> <li>- clearing of fallen trees across ranch roads and trails damaged from rain, wind, and fires (materials from native trees were left in place at the roadside edge);</li> <li>- repair and grading of ranch utility roads (as needed);</li> <li>- mowing the center lines of double track trails (as needed);</li> <li>- trimming and grooming of single track trails;</li> <li>- repair of perimeter fencing and gates when damaged from use or vandalism;</li> <li>- removal of existing interior ancillary wire fencing was continued throughout on a measured basis, dependant on staff resources.</li> </ul> <p>Annual maintenance surveys were conducted of the existing engineered trail bridges.</p> <p>Trail erosion control devices, such as grade dips and reversals, check dams, rock armoring, culverts, and rock buttresses were maintained and additional ones installed to address key problem areas.</p>	<p>Conduct maintenance of roads/trails, erosion control features, and perimeter fencing/gates to maintain authorized access. To maintain trail standards, efforts will include:</p> <ul style="list-style-type: none"> <li>- clearing of fallen trees across ranch roads and trails damaged from rain, wind, and fires (materials from native trees to be left in place at the roadside edge);</li> <li>- repair and grading of ranch utility roads (if needed);</li> <li>- mowing the center lines of double track trails (if needed);</li> <li>- trimming and grooming of single track trails;</li> <li>- repair of perimeter fencing and gates when damaged from use or vandalism;</li> <li>- removal of existing interior ancillary wire fencing will be continued throughout on a measured basis, dependant on staff resources.</li> </ul> <p>Annual maintenance surveys will be conducted of the existing engineered trail bridges.</p> <p>Trail erosion control devices, such as grade dips and reversals, check dams, rock armoring, culverts, and rock buttresses will be maintained and additional ones installed to address key problem areas.</p>

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	<p>Re-painted and installed reflective safety tape to 42 gates within the IROS.</p> <p>Re-stained all interpretive kiosks throughout the IROS.</p>	<p>As noted in the Trail Implementation Master Plan of the approved Recreation and Resource Management Plan, some existing ranch roads/trails will be removed and reclaimed to native habitat or converted to single track.</p> <p>Budgeting and time-permitting, inspect existing bridge and deck structures; if warranted, replace decking with Alaskan Yellow Cedar Glu-Lam timber deck panels.</p>
<p>Maintenance of Existing Facilities (All Areas):</p> <ul style="list-style-type: none"> <li>- Trail Use Monitoring: Camera and Trail Counter</li> </ul>	<p>Monitored and maintained cameras and trail counters at key gates and trail sections to monitor level and type of activities.</p>	<p>Ongoing camera and trail counter monitoring will continue for both authorized and unauthorized activities.</p>
<p>Maintenance of Existing Facilities (All Areas):</p> <ul style="list-style-type: none"> <li>- Radio Network</li> </ul>	<p>Performed maintenance of ranch-wide radio operation.</p> <p>East Loma Repeater located at (33°43' 58.01"N / 117°41' 54.16" W @ 1,775 ft above sea level) was taken off line, and will be utilized as a back-up repeater as needed.</p> <p>The Fremont Repeater located at (33°48' 28.42"N / 117°40' 24.43"W @ 2,245 ft above sea level) was serviced and upgraded to a higher power setting to increase signal strength. The unit received a new deep cycle solar gel battery and solar controller unit.</p>	<p>Continue performing annual monitoring of existing solar radio repeaters and ongoing maintenance of radios.</p> <p>Continue active testing of the radio system for adequate system-wide coverage. Potential testing for 2018 may include re-initializing the East Loma Repeater in combination with directional antennas for the East Loma and Fremont locations.</p>
<p>New Construction or</p>	<p>Gypsum Canyon Road.</p>	<p>Continue monitoring perimeter for unauthorized</p>

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Expansion (Gypsum Cyn.): - Fencing		access and inform OC Parks rangers of need for additional enforcement activities.
New Construction or Expansion (Gypsum Cyn.): - Gates and Signs	Installed additional post and wire fencing south of entry gate 1248X. Fencing was installed post-fire to eliminate entry gaps created by the Canyon 2 Fire in October 2017.	Continue to assist OC Parks as needed with perimeter monitoring. Install additional perimeter “No Trespassing” signs on unauthorized trails leading into Gypsum Canyon from adjacent areas.  Budget permitting, install new gates/signs at 1449W and 1647X to mark entry points to OC Parks’ Nature Preserve/TNC Conservation Easement.
Maintenance of Existing Facilities (Gypsum Cyn.): - Trail Cameras, Signage, and Natural Barriers	Continued monitoring of trail cameras to determine level of unauthorized access on newly created trail from Coal Canyon Ecological Reserve. Continued to monitored unauthorized trail through Tecate forest area.  Installed natural barriers of locally sourced cacti to deter use of existing unauthorized trails.  Installed signage at the upper entrances to the unauthorized trails at the Coal Canyon Ecological Preserve boundary to further educate and deter unauthorized use.	Continue monitoring area for unauthorized access and if appropriate install additional counters and cameras to better inform OC Parks rangers of need for additional enforcement activities.
New Construction or Expansion (Weir Cyn.): - Vehicle Gates	Installed new 16’ vehicle gate with stainless steel multi-locking mechanism at location 2144W MWD.	Continue monitoring the area for unauthorized use and address maintenance conditions as needed.

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
New Construction or Expansion (Weir Cyn.): - Vehicle Pull-outs	N/A	Previously surveyed vehicle pull-outs in Weir Canyon will be marked by appropriate signage. Vehicle pull-outs will be installed/maintained as part of annual road maintenance and shown on area maps for use by authorized personnel conducting patrols and scientific research/field monitoring.
New Construction or Expansion (Weir Cyn.): - Staging Area	Replaced existing portable toilet (rental unit) with ADA compliant unit (purchased).	At Weir Staging Area (located off-site at Outdoor Education Center) install vehicle stops/restroom surround. Budget permitting, replace 2 existing picnic tables with 3 new tables, with at least one compliant with ADA requirements.
Maintenance of Existing Facilities (Weir Cyn.): - Gates	Performed routine maintenance of all gates including replacement signage, painting, and lubrication as required. Replaced existing locking mechanism on gates 2144W and 2043X with new stainless steel multi-lock units.	Replace locking mechanism on gate 1744Y with new stainless steel multi-padlock mechanism. Replace existing pedestrian gate padlock mechanism on gate 1744X with a stainless steel single lock slide bar.
Maintenance of Existing Facilities (Weir Cyn.): - Concrete Cistern and Watering Trough	Refurbished Weir Canyon Cistern. Drained and cleared debris, sealed cracks, re-plumbed, and installed new structural roofing with 14"x 14" access panel to service valve and float assembly. Replaced damaged piping between MWD meter location and Weir Cistern. Added two isolation shut off valves to independently isolate troughs #1 and #3 as needed. Re-plumbed troughs #1 and #3 with new 2" galvanized pipe, ball valve, and float assemblies. Drained and abandoned trough #2 (deemed unnecessary by the Science and Stewardship department).	Perform necessary repairs at existing water troughs #1 and #3 to eliminate seepage. Troughs to be drained, cleaned, and re-sealed. New drain cocks will be installed to assist with future maintenance.

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Project, Program, Activity	2017 Progress Report	2018 Work Plan
Maintenance of Existing Facilities (Weir Cyn.): - Oxcart Monument	Cleared non-native vegetation and performed trail maintenance to the Oxcart Monument. Installed 36" high wood post and rope barrier around the monument to contain visitors within viewing area and protect adjacent native habitat.	Perform maintenance as need to provide clear access to the Oxcart Monument.
Maintenance of Existing Facilities (Weir Cyn.): - Signage	Monitored all signage and replaced faded signs as needed.	Monitor signage and repair/refresh as needed.
Facility Replacement / Repair (Weir Cyn.):	N/A	N/A
New Construction or Expansion (Fremont Cyn): - Staging Area	Implemented a pass-through access from the newly maintained Waterworks Trail through the staging area interpretive area. The pass-through access eliminates the need for activities to utilize the paved utility service road to exit towards Irvine Regional Park.	Continue to monitor and maintain the Tecate Cypress demonstration grove.  Budget permitting, assist Community Programs with the implementation of a temporary native plant nursery adjacent to the staging area, to facilitate restoration of the adjacent areas.
Maintenance of Existing Facilities (Fremont Cyn): - Waterworks Trail	Completed the maintenance implementation of the Waterworks Trail. Received and placed approximately 620 cubic yards of Rip-Rap, and CMB within the limits of the existing concrete V-ditch, approximately 1,850 lineal feet. Performed maintenance improvements at the existing natural surface trail segments, approximately 3,450 lineal feet. Implemented a new pedestrian access gate (244X Waterworks) between the Waterworks Trailhead and Irvine Regional Park.	Budget and schedule permitting, complete the interpretive sign components for the Waterworks trail.  Continue trail side restoration efforts to restore adjacent abandoned maintenance road sections.



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	Installed 16' pedestrian/bicycle/equestrian bridge over existing armored drain culvert. Performed cleanup and restoration of the abandoned waterworks pump facilities and installed safety railing and safety grates to allow docent led access through the facilities for interpretive activities.	
Facility Replacement / Repair (Fremont Cyn):	Continued conversion of Pasture Road from a paved road to natural surface single-track trail. Implemented additional management tools to deter unauthorized access into OC Parks land from Irvine Lake, including identifying "No Access" areas of sensitive habitat and improved fencing/gates/native barriers to deter unauthorized access.	Install "No Access – Sensitive Habitat" signs and additional gates/fencing/native barriers to area adjacent to Irvine Lake to deter unauthorized access.  Survey and obtain biological review for proposed maintenance alignments of the existing Pasture Road/trail conversion connection to the existing lower lake trail adjacent to the bait shack pad.
Maintenance of Existing Facilities (Black Star): - Irvine Mesa	Performed routine maintenance of the existing Canyons Loop Trail as needed to include but not limited to tread clearing, drainage maintenance, and trailside vegetation trimming.	Continue the maintenance re-implementation of the Canyons Loop Interpretive trail to include the replacement of existing amphitheatre seating with 100% recycled lumber product, and install a 24' long puncheon bridge over existing natural surface drain to make the trail more suitable for young trail users.
New Construction or Expansion (Loma Ridge): - Vehicle Pull-outs	Performed routine mowing and maintenance.	Perform routine maintenance of vehicle pull-outs as needed.
New Construction or Expansion (Loma Ridge):	N/A	Along Santiago Road consider installation of fire hardening options at roadway edge to deter fires

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- Fire Hardening		originating from vehicles, compliant with OCFA and OC Public Works design standards.
New Construction or Expansion (Loma Ridge): - Portable Restroom	N/A	As needed, maintain berm and native planting around portable restroom to screen facility from EOC entry drive.
Maintenance of Existing Facilities (Loma Ridge): - Signage	Repaired and refreshed signage as needed.	Refresh way-finding signage at vehicle turn-outs and on existing sign posts as needed.
Maintenance of Existing Facilities (Loma Ridge): - Radio Repeater	East Loma Repeater located at (33°43' 58.01"N / 117°41' 54.16" W @ 1,775 ft above sea level) was taken off line, and will be utilized as a back-up repeater as needed.	Continue performing annual monitoring of existing solar radio repeater. Continue active testing of the radio system for adequate system-wide coverage. Potential testing for 2018 may include re-initializing the East Loma Repeater in combination with directional antennas for the East Loma and Fremont locations.
Maintenance of Existing Facilities (Loma Ridge): - West Loma Road	Performed routine maintenance on road drains and erosion control features to maintain access for restoration efforts and utility access.	Will monitor road condition and will make additional repairs if needed.
Facility Replacement / Repair (Loma Ridge):	N/A	N/A
New Construction or Expansion (Limestone Cyn.): - East Sinks Viewing Area	N/A	Perform routine maintenance inspections of the viewing deck.

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New Construction or Expansion (Limestone Cyn.): - Vehicle Gates	Installed new 16' vehicle gate with stainless steel multi-locking mechanism at location 3454W Goat	Perform routine inspections as needed.
New Construction or Expansion (Limestone Cyn.): - Augustine Staging Area	<p>Performed ongoing maintenance of staging area improvements and grounds, including mowing, weeding, trimming, and fence repairs as needed. Replaced 80 lineal feet of existing steel fence panel damaged during winter storms.</p> <p>Relocated existing waterline to accommodate the needs of the 2016 implemented native plant nursery.</p> <p>Increased the north end of the native plant nursery by an additional 8 lineal feet to accommodate growing areas for increased native plant starts.</p> <p>Implemented the approved maintenance area to accommodate maintenance materials and equipment in a secured area.</p> <p>Replaced existing locking mechanisms at gates 2648X with new stainless steel multi-padlock locking mechanism.</p>	<p>Budget permitting, implement enhancements to staging area and the existing hay barn to include shade screening and maintenance replacement of existing concrete.</p> <p>Install steel gates to existing restroom surrounds. Re-configure vehicle access road to accommodate U-turn of incoming vehicles when parking lot of adjacent staging area is full.</p>
New Construction or Expansion (Limestone Cyn.): - East Loma Ridge	N/A	Designate small overlook area at Loma Ridge East (near UCI Climate Study area) to focus public viewing to a limited area and deter unauthorized access. The overlook location will

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Overlook		be selected to avoid sensitive native habitat.
New Construction or Expansion (Limestone Cyn.): - Fire Hardening	N/A	Along Santiago Canyon Road, consider installation of fire hardening options at roadway edge to deter fires originating from vehicles, compliant with OCFA and OC Public Works design standards. Support efforts by OC Public Works to remove Eucalyptus trees along Santiago Canyon Road.
New Construction or Expansion (Limestone Cyn.): - Agua Chinon Trail Realignment	N/A	Time and resources permitting, survey and evaluate for implementation (consistent with the approved Recreation and Resource Management Plan), an alternative alignment to replace the southern end of the existing Agua Chinon ranch road. If appropriate, agency review and approval will be requested, detailing proposed alignment options and trail design features.
New Construction or Expansion (Limestone Cyn.): - Fencing	Continued maintenance monitoring and repairs of fencing at the Mustard and Bolero intersection as needed.	Continue maintenance monitoring and repairs of fencing at the Mustard and Bolero intersection as needed.
Maintenance of Existing Facilities (Limestone Cyn.): - Vehicle Gates	Re-painted and installed reflective safety tape to all vehicle gates.	Continue maintenance inspections and repairs as needed.
Maintenance of Existing Facilities (Limestone Cyn.): - Vehicle Pull-outs	Maintained vehicle pull-outs and associated signage at designated areas.	Vehicle pull-outs will be maintained as part of annual road maintenance and shown on area maps for use by authorized personnel conducting patrols and scientific research/field monitoring.

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		Additional signage will be placed on the markers to identify the location of each pull-out.
Maintenance of Existing Facilities (Limestone Cyn.): - West Sinks Viewing Deck	Monitored visitor use of viewing platform for adherence to authorized access and performed routine maintenance, including replacement of bench seating boards and the top guardrail. Maintained additional rope barriers along single track trail to viewing platform to deter off-trail use.	Budgeting and time permitting, replace decking at the viewing deck with Alaskan yellow cedar glu-lam timber deck panels. Interpretive signage, explaining the geological event creating the "Sinks", is being considered.
Maintenance of Existing Facilities (Limestone Cyn.): - Fencing	Repaired fencing at various locations along Santiago Canyon Road damaged due to vandalism or vehicle accidents.	Monitor fencing at perimeter and along Santiago Canyon Road. Repair/replace fencing as needed. Budget permitting, replace long sections of old fencing on Santiago Road with new fencing. Consider removal of barbed wire fencing on interior sections of Limestone Canyon if not needed to deter unauthorized access.
Maintenance of Existing Facilities (Limestone Cyn.): - Sinks Water Trough	Monitored existing water pipeline from Box Spring to the Sinks water trough. Line periodically fails and is carefully "spot" fixed to remove blockage or leaks.	Budget permitting, begin the replacement of the existing water line with galvanized steel pipe from the Box Springs to the Box Springs trough. Repair Box Springs trough to eliminate seepage and re-plumb with new pipe, valve and float assembly.  Remove existing equestrian ties from the Box Springs trough location to eliminate duplicate facilities with the new Sinks Viewing deck equestrian tie area.
Maintenance of Existing Facilities (Limestone Cyn.):	Performed regular maintenance trimming to maintain tread width for passive recreational	Trim branches of fallen oak tree to reopen existing foot path. Continue to monitor the east

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- Box Springs Trail	access.	terminus Box Spring Trail at the shallow drainage crossing. If deemed necessary, a short-span puncheon bridge may be added for more sustainable access to the trail.
Maintenance of Existing Facilities (Limestone Cyn.): - Raptor Trail	Performed maintenance on the Raptor Trail Bridge (sanding, staining, and tightening of all hardware).	Budgeting and time permitting, replace decking at the Raptor bridge with Alaskan yellow cedar glu-lam timber deck panels
Maintenance of Existing Facilities (Limestone Cyn.): - Hicks Haul Road (paved)	Monitored road for weed abatement. Trimmed and brushed vegetation protruding into shoulder of Hick Haul Road.	Perform weed abatement/trimming of brush within the paved area of Hicks Haul Road as needed. Efforts to convert of a portion of Hicks Haul Road to a multi-use regional bikeway and trail, between Santiago Road and Loma Ridge, may continue, dependant on future funding commitments.
Maintenance of Existing Facilities (Limestone Cyn.): - Dripping Springs Conversion	Conversion of Dripping Springs Trail to a single track continued. The Dripping Springs Trail opened to visitor activities. Trail was monitored regularly to assess impacts. Barrier fencing at the mid-point intersection of the Dripping Springs Trial and Dripping Springs Spur was removed, and out of bound fencing at trailside restoration areas was removed. Fencing was no longer needed due to the success of the passive and active restoration processes.	Continue to monitor trail use and maintain Dripping Springs trails according to their authorized trail characters. The triangularly-configured trail intersection between Dripping Springs trail and Limestone Canyon trail will be reworked, creating a single "T" intersection of trails. Conversion of the trail to a single track may include installation of several multi use bridges over existing creek crossings. Budget permitting, begin the final conversion of the upper segment from the Dripping Springs Spur to Sand Trap (Approximately .9 mile) from road to single-track.
Maintenance of Existing Facilities (Limestone Cyn.):	Performed maintenance to trail tread including improving existing bench cut and cleared	Continue to monitor trail use and maintain Dripping Springs trails according to their

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- Dripping Springs Trail Spur	overhead vegetation as needed. A pre-engineered kit wall system was installed at the final 60' approaching the Dripping Springs location. The site wall eliminated the existing trail steps and provides a level and seamless alignment to the existing trail segment accessing the springs.	authorized trail characters.
Maintenance of Existing Facilities (Limestone Cyn.): - Cactus Canyon Trail	Performed routine maintenance on erosion control features (grade-dips and drains) as required to minimize erosion.	Monitor repairs and trail conditions, taking corrective measures to minimize additional damage from future storms.
Maintenance of Existing Facilities (Limestone Cyn.): - East Loma Road Failure at Bowerman Landfill	Continued monitoring the prior repairs to the East Loma Ridge Road where it intersects with the OCTA restoration area at Bee Flat Canyon.	Condition of the roadway and repairs will be monitored, taking corrective measures to minimize additional damage from future storms.
Maintenance of Existing Facilities (Limestone Cyn.): - Loma Ridge Trail	Implemented grade dips and armored drain outs along the Loma Ridge trail from Hicks Haul Road to the intersection of East Loma/Sandtrap.	Budget permitting, additional rock armoring at the existing drain out location. Budget permitting, additional drain outs to be implemented from the intersection of East Loma/Box Springs to the Bowerman Landfill access road.
Maintenance of Existing Facilities (Limestone Cyn.): - Markel Spur Trail	Continued monitoring and maintenance of enhancement native plantings. Added native cactus pads to inside turns of trail switchbacks to solidify trail anchors and deter short-cutting by user groups.	Monitor condition of newly rerouted trail for signs of erosion. Implement repairs and corrective actions to deter future damage to trail. Additional native planting to occur in degraded areas adjacent to the trail and in the old trail footprint to restore habitat and discourage use of retired alignment. Limited trail use by the public (via docent-led activities) is planned in 2018 if sufficient vegetation growth occurs from winter

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		rains.
Maintenance of Existing Facilities (Limestone Cyn.): - Signage	Repaired and refreshed existing signage and replaced as needed.	Refresh way-finding signage at gates, vehicle turn-outs, and on existing sign posts as needed.
Maintenance of Existing Facilities (Limestone Cyn.): - Round Canyon	Performed annual mowing and trail maintenance as needed.	Continue to mow and clear vegetation to maintain Round Canyon as a 4' wide multi-use trail.
Maintenance of Existing Facilities (Limestone Cyn.): - Sand Trap	Performed annual mowing and trail maintenance as needed.	Monitor condition of newly repaired trail for signs of erosion. If needed, implement minor refinements and repairs to deter future damage to trail.
Facility Replacement / Repair (Limestone Cyn.):	N/A	N/A
<b>Infrastructure Construction and Maintenance:</b>		
Maintenance (Limestone Cyn.) by Others: - Orange County Rain Gauge	The County of Orange inspected and maintained the rain gauge facility on a regular basis. Access and inspection of the facility was coordinated by IRC.	Inspection and maintenance by County of the installation.
<b>Habitat Restoration and Enhancement:</b> (Note: Funding Sources noted in first column if other than Land Owner)		
Exotic Plant Eradication: - Program Summary	Key invasive species were removed/treated across approximately 730 acres (OCP Fig. 1). Eradication and control projects were	Eradication and control efforts are ongoing. See below for species-specific details.



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	<p>implemented by contract labor, volunteers, and staff, totaling approximately 1,825 person-hours (up from 1,640 in 2016 (corrected)). See “Educational Outreach” for volunteer participation.</p> <p>Wet conditions promoted the germination and extended the growing period of species such as Sahara mustard as well as limited access to the land. Control efforts continued to broaden to this and other emerging species with the decrease in artichoke thistle control.</p>	
<p>Exotic Plant Eradication: - Monitoring and Prioritization (NCC, in part)</p>	<ul style="list-style-type: none"> <li>• Priority species targeted for eradication (for which all populations are treated if possible): Sahara mustard, yellow star thistle, perennial pepperweed, tree of heaven, giant reed, Cape ivy, garland chrysanthemum, Spanish broom, tamarisk, stinknet, and onionweed.</li> <li>• Moderate priority species targeted for control (populations are strategically treated): artichoke thistle, castor bean, Mexican fan palm, pampas grass, fountain grass, and bull thistle.</li> <li>• Treated in key locations: milk thistle, Italian thistle, tree tobacco, and fennel.</li> <li>• Bee Flat Canyon, Agua Chinon, Lower Silverado Canyon, and West Loma subwatersheds have specific invasive control programs associated with mitigations, which include removal of the above species as well</li> </ul>	<ul style="list-style-type: none"> <li>• IRC staff, contractors, and volunteers will continue to treat previously prioritized species and populations, with special emphasis on the emerging weeds Sahara mustard, yellow star thistle, perennial pepper weed, cape ivy, tree of heaven, and stinknet.</li> <li>• IRC will continue to work with NCC and Cal-IPC to complete a coordinated region-wide prioritization and strategy for invasive species control in 2018.</li> <li>• Attention will continue to be expanded to the identification, documentation, and control of emerging invasive species in an effort to prevent larger-scale invasions and associated ecological impacts.</li> </ul>

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	<p>as a few other species.</p> <ul style="list-style-type: none"> <li>• The Weed Manager system in Calflora was adopted to track weed infestations and treatments and improve coordination with agencies and other partners. A link to an online map of work is available upon request. The map is regularly updated with new control efforts.</li> <li>• Staff assisted NCC in completing a follow-up 2016 aerial weed survey of the IROS and adjacent wildlands. The survey was completed in August.</li> <li>• Two additional coordination and planning meetings were conducted with NCC and Cal-IPC to develop a coordinated region-wide prioritization and strategy for invasive species control.</li> </ul>	
<p>Exotic Plant Eradication: - Artichoke Thistle</p>	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 196 gross acres and 1.7 net (versus 56 gross and 0.09 net in 2016)</li> <li>• Estimated 2,968 plants (4014 in 2016)</li> </ul> <p>Despite the wet conditions, overall population size of artichoke thistle decreased across NCCP land compared to previous years, and a larger area was searched and treated. Thistles were treated from 15 Feb - 20 July and again on 13 Nov with clopyralid (7.02 mL total) or glyphosate (6,835 mL). Nesting bird surveys were conducted</p>	<p>Sites will continue to be visited until three successive annual visits without thistles can be verified. Search areas will be modified based on 2017 treatment results. Aerial survey information will be used to target additional remote and isolated populations for control. IRC will again work to coordinate with Caltrans to facilitate management of adjacent right-of-ways.</p>



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<p>- Sahara Mustard</p> <p>- Bull Thistle</p> <p>- Arundo (OCTA Measure M, in part)</p>	<ul style="list-style-type: none"> <li>• Estimated 1661 plants (down from 26,795 in 2016)</li> </ul> <p>Milk and Italian thistle were primarily removed in Bee Flat Canyon, Agua Chinon, Lower Silverado, and West Loma as part of mitigation activities. Control was both manual and with glyphosate (3,010 mL total) or clopyralid (2,143 mL).</p> <p>Treatment in NCCP:</p> <ul style="list-style-type: none"> <li>• 11.6 gross acres and 0.31 net (up from 26.2 gross and 0.08 net in 2016; new populations discovered)</li> <li>• Estimated 39,286 plants</li> </ul> <p>A new, small population was discovered and treated in Weir Canyon. Populations continue to spread via vehicles, (presumably) grading, and wildlife.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• Estimated 1 (down from 83 plants in 2016)</li> </ul> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 0.02 gross acres and 0.001 net (down from 1.75 gross and 0.02 net in 2016)</li> <li>• Estimated 3 stems (down from 686 in 2016)</li> </ul> <p>Stands occurred primarily in Santiago and Silverado Creek. SAWA continued follow-up control work around Irvine Lake (data not shown)</p>	<p>contracts and key areas along Limestone and Shoestring trail.</p> <p>Monitoring and eradication efforts will continue in 2018 using staff contract and volunteer labor.</p> <p>Bull thistle will continue to be removed at known accessible locations as resources permit.</p> <p>Arundo removal will continue within Santiago and Silverado Creek. The IRC will continue to work with water districts and SAWA to support follow-up Arundo control around Irvine Lake.</p>

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<p>- Perennial Pepperweed (OCTA Measure M, in part)</p> <p>- Tree Tobacco (OC Waste and Recycling, in part, OCTA Measure, in part)</p> <p>- Castor Bean (OC Waste and Recycling, in part)</p>	<p>as part of a mitigation contract. All treatment consisted of cut-stump application of aquatic-safe glyphosate or foliar spray of regrowth (79 mL total).</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 0.003 gross acres and 0.001 net (down from 0.74 gross and 0.001 net in 2016)</li> <li>• Estimated 11 plants (down from 50)</li> </ul> <p>Perennial Pepper weed was searched for and controlled primarily within lower Silverado Canyon as part of mitigation efforts. Additional plants were targeted in nearby Santiago Canyon.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 1.49 gross acres and 0.013 net (down from 6.8 gross and 0.15 net in 2016)</li> <li>• 208 plants (down from 437 in 2016)</li> </ul> <p>Tree tobacco was searched for and removed manually or by stump cut with glyphosate (783 mL total). Control work is opportunistic and largely based on mitigation requirements and volunteer interest. Focus areas continue to be Limestone, lower Fremont, Hicks, Bee Flat, Silverado, and Agua Chinon Canyons.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 46.5 gross acres and 0.02 net (compared to from 5.6 gross and 0.05 n in 2016)</li> </ul>	<p>Pepper weed will continue to be controlled where it is found. Restoration funding for Silverado Creek will help to fund intensified efforts to control this species. OC Parks control efforts will focus on the new population found at the mouth of Silverado Creek.</p> <p>Tree tobacco removal will continue within the areas targeted previously and with special emphasis in Agua Chinon, supported by mitigation funding from OC Waste and Recycling.</p> <p>Castor bean removal will continue within the areas targeted previously and in any new areas that it is found if resources permit. Special emphasis will be put on Agua Chinon and will be</p>

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<p>- Tamarisk (OC Waste and Recycling, in part; OCTA Measure M, in part)</p> <p>- Pampas Grass (OC Waste and Recycling, in part)</p> <p>- Fountain Grass</p> <p>- Mexican Fan Palm</p>	<ul style="list-style-type: none"> <li>Estimated 229 plants (down from 1384)</li> </ul> <p>Mature castor bean was primarily removed by stump cut with glyphosate (284 mL total) or clopyralid (174 mL). Focus areas continue to be Agua Chinon, Santiago, and Silverado Canyon.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>0.02 gross acres and 0.004 net (down from 1.15 gross and 0.08 net in 2016)</li> <li>Estimated 18 plants (down from 152 in 2016)</li> </ul> <p>Tamarisk was searched for and treated with stump cut and triclopyr (128 mL total) and/or glyphosate (43 mL). Search and control efforts have increased with riparian mitigation funding.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>No plants were treated</li> </ul> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>18.68 gross acres and 0.014 net (compared to 1.50 gross and 0.02 net in 2016)</li> <li>Estimated 202 plants (up from 556 in 2016)</li> </ul> <p>Fountain grass was treated with fluazifop-p-butyl (59 mL).</p> <p>Three Mexican fan palms (which were exposed in</p>	<p>supported by mitigation funding.</p> <p>Tamarisk will continue to be targeted for removal and search efforts will expand further in lower Silverado Canyon and Agua Chinon with supplemental funding.</p> <p>Pampas grass will continue to be targeted for removal. Efforts will focus in Agua Chinon with supplemental mitigation funding and with potential helicopter assistance.</p> <p>Select fountain grass sites will be treated/re-treated, primarily near the Emergency Operations Center (EOC) on Loma ridge, along Santiago Canyon, and in more remote areas using helicopter access.</p> <p>Mexican fan palm will continue to be treated</p>

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<p>- Tree of Heaven</p> <p>- Onionweed</p> <p>- Stinknet</p> <p>- Miscellaneous</p>	<p>Weir Canyon after the Canyon 2 fire) were removed within NCCP (treated with 82.5 mL glyphosate total).</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 28 plants were treated in 2017 (compared to 0 in 2016) with 7.15 mL trichlopyr total.</li> </ul> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• No plants were treated in 2017.</li> </ul> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• No plants were treated in 2017.</li> </ul> <p>150 horehound and 1 Siberian elm removed in NCCP.</p>	<p>opportunistically.</p> <p>Tree of Heaven continue to be treated as new populations are discovered. Existing sites will be revisited annually.</p> <p>Onion weed will continue to be treated as new populations are discovered. Existing sites will be revisited annually.</p> <p>Stinknet will continue to be treated as new populations are discovered. Existing sites will be revisited annually.</p> <p>Miscellaneous species will continue to be treated opportunistically or with external mitigation contract funding.</p>
<p>Exotic Animal Control:</p> <p>- Goldspotted Oak Borer Monitoring</p>	<p>Goldspotted Oak Borer (GSOB) beetle was discovered in Weir Canyon in December 2014, and the infestation has been continuously monitored and managed for three years. In Winter/Spring 2017, post-flight monitoring surveys by trained staff and volunteers that were begun in October 2016 were completed, and the infestation was treated (OCP Fig. 1). An online GIS story map describing the first three years of the infestation. It was shared with partners.</p> <ul style="list-style-type: none"> <li>• A total of 1,208 trees surveyed during the</li> </ul>	<p>Monitoring, topical treatment of previously infested and newly discovered infested trees as well as removal of heavily infested trees will continue. A report of treatment results will be completed and provided to NCC and OC Parks. An oak restoration project began in November to mitigate the impacts tree removal (see Miscellaneous Activities).</p>

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	<p>2016-2017 post-flight season.</p> <ul style="list-style-type: none"> <li>• 297 were found to be infested, which included 3 whose status was uncertain.</li> <li>• Numerous dead adult GSOB were found in new exit holes, suggesting that surface treatment was effective.</li> <li>• 27 oaks considered to be highly infested (&gt;10 new holes in 2016-2017) as well as 5 trees that presented safety hazards that were felled by OCFA.</li> <li>• 1,672 oaks were sprayed with carbaryl in May.</li> <li>• 3 infested trees were found outside the survey area. These trees and all neighboring trees within a 100-meter buffer were sprayed, and one heavily infested oak was debarked and removed.</li> <li>• Additional monitoring has not detected any other infested trees in Weir Canyon or neighboring Blind Canyon.</li> <li>• To date, 268 previously infested trees have been surveyed in the 2017-2018 post-flight season. Of those, 18 have been found to be severely infested.</li> </ul>	
<p>Exotic Animal Control: - Polyphagous Shothole Borer Monitoring</p>	<p>In early October, an IRC employee detected a sycamore in Weir Canyon that is possibly infested with Polyphagous Shothole Borer (PSHB). Confirmation of the identification is pending (OCP Fig. 1).</p>	<p>Monitoring for PSHB is currently being conducted throughout the NCCP Reserve by researchers from UC Riverside and UC Santa Cruz through a California Department of Fish and Wildlife (CDFW) Local Assistance Grant (LAG). The IRC will support this research and conduct targeted</p>



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		monitoring on IRC-managed OC Parks lands in collaboration with OC Parks staff.
<p>Exotic Animal Control: - Exotic and Domestic Animal Monitoring</p>	<p>Access cameras captured 222 incidents of unauthorized dogs in OC Parks land. Problem areas are at Black Star Staging Area and Hidden Canyon in Weir. Weir Canyon continues to be a hotspot for unauthorized users and dogs (OCP Fig. 3).</p>	<p>IRC will continue to collect data on exotic animals from existing wildlife cameras. Access cameras may also provide new monitoring locations for exotic animal monitoring. Incidental observations from animal releases will be reported.</p>
<p>Exotic Animal Control: - Argentine Ant Monitoring (OC Waste)</p>	<p>Bait card surveys of Argentine ants (<i>Linepithema humile</i>) were conducted in September 2017 at Agua Chinon to monitor the presence of <i>L. humile</i> in relation to the irrigated OCWR restoration polygons. Argentine ants appear restricted to a small area at the downstream end of the wash; none were detected in the irrigated restoration polygons. The localized population does not appear to be expanding in range (OCP Fig. 3).</p>	<p>Irrigation at Agua Chinon is being phased out in 2018, so there is no immediate need for ant control.</p>
<p>Exotic Animal Control: - Red Imported Fire Ant (OCTA II, in part)</p>	<p>Red imported fire ants were again detected in Lower Silverado Canyon during restoration arthropod monitoring (OCP Fig. 3). OC Vector Control treated an estimated 10-15 colonies within the restoration footprint with Siesta fire ant bait on November 29.</p>	<p>The site will continue to be monitored for further activity.</p>
<p>Habitat Restoration: - Post-Burn Restoration of Nesting Habitat for the Coastal Cactus Wren</p>	<ul style="list-style-type: none"> <li>Forty 15 m-diameter patches of cactus pads were planted in 2009 in groups of 2-10 in 5 locations in the Central Reserve (Figure 3).</li> </ul>	<p>No planned activity.</p>

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	<p>Five-gallon potted cactus were planted in some sites as well. The restoration is complete and in its monitoring phase (OCP Fig. 2).</p> <ul style="list-style-type: none"> <li>• <i>Cactus Wren Restoration Assessment</i>. UCSB Bren School Graduate student Kalli Kilmer surveyed existing cactus wren restoration sites and reference occupied islands of intact cactus scrub occupied by cactus wren to compare site conditions.</li> <li>• Mean height of restored cactus was 0.65 m (SE=0.015), suggesting an average growth rate of 8 cm/year. The height and width of the cactus differs significantly among restoration sites (<math>F_{(df)}=7.526</math>; <math>p&lt;0.001</math>). Differences among sites appear to be the result of both biotic and abiotic factors; cactus height was negatively correlated with weed cover and positively correlated with steeper and more southerly facing terrain.</li> <li>• Habitat quality between restoration sites and sites occupied by cactus wren remains dissimilar; occupied sites have more cacti above 1 m in height and greater cover of California buckwheat than do restoration sites.</li> <li>• A final report of this activity is available upon request.</li> </ul>	
Habitat Restoration: - West Loma I	West Loma I/Hangman's Tree Canyon (OCP Fig. 2):	Approximately 1,500 container plants will be installed in January 2018.

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	<ul style="list-style-type: none"> <li>• Approximately 53 total acres</li> <li>• 25 polygons/restoration subunits based on desired habitat, aspect, slope, and restoration approach (Fig. 3)</li> <li>• Most of the project is in the maintenance phase.</li> <li>• Desired states: CSS, native grassland</li> <li>• Initiated in 2009 with multiple years of site preparation.</li> <li>• Depending on polygon: hand seeding, drill seeding, and container planting; hand weeding, wicking, and selective herbicide.</li> <li>• 270 acorns were planted on lower north-facing slopes in November 2017.</li> </ul>	Site preparation and maintenance will continue as needed throughout restoration polygons.
Portola Springs (PA6) Cactus Salvage: West Loma site (NCC, TNC)	<ul style="list-style-type: none"> <li>• On November 11, 2014, <i>Opuntia littoralis</i> and <i>Cylindropuntia prolifera</i> were transplanted as whole plant clumps at 6 locations selected for their potential suitability for the Coastal Cactus Wren. Each location had 4 clumps for a total of 24 whole plant clumps. 1,000 pads and 100 branches were planted around these clumps at two locations (OCP Fig. 2).</li> <li>• Additionally, TNC funded the planting of 14 cactus clumps on easement lands and the delivery of 2 dump trucks of bulldozed cactus segments. These segments were planted to supplement restoration activities at West Loma (OCP Fig. 2).</li> </ul>	Planted cactus will continue to be monitored and maintained as needed by IRC staff, including periodic checks and possible weed removal.
Orchard Hills Cactus and	<ul style="list-style-type: none"> <li>• 150 mature cacti and more than 1,500 cactus</li> </ul>	Planted cactus will continue to be monitored and

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Soil Salvage (NCC, TNC)	<p>pads were transplanted from the Orchard Hills salvage site to six sites throughout the IROS (two of which are on OC Parks land) in October, 2015 (OCP Fig. 2).</p> <ul style="list-style-type: none"> <li>• Transplanted cacti have established well at all sites.</li> <li>• In December 2015, nearly 4,000 cubic yards of soil were transferred from the Orchard Hills donor site and spread across three recipient sites at West Loma (2.2 acres), Hicks Haul (2.1 acres), and near the Portola Staging Area (2.85 acres) to expand CSS habitats.</li> <li>• Cover of native vegetation and non-native weeds expanded significantly due to wet winter conditions. IRC maintenance activities increased this year relative to 2016.</li> <li>• All sites were maintained by spraying annual grasses and hand-pulling, cutting, and spot-spraying broadleaf weeds.</li> <li>• Vegetation monitoring was conducted in April, and results were included in a September 2017 report to NCC. Included in this report were results from a UC Irvine study comparing different soil depth treatments.</li> <li>• All sites have high levels of native cover but remain dominated by early successional-stage species such as deerweed (<i>Acmispon glaber</i>), cliff aster (<i>Malacothrix saxatillis</i>), and tarweed (<i>Deinandra fasciculatus</i>).</li> <li>• A status report was completed and provided to NCC (available upon request).</li> </ul>	<p>maintained as needed by IRC staff, including periodic checks and possible weed removal.</p> <p>Soil salvage sites will continue to be maintained by IRC on at least a quarterly basis. Supplemental seeding will be conducted in portions of all three recipient sites to increase stand diversity. Monitoring results will be reported to NCC.</p>

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<p>Habitat Restoration: - Agua Chinon Subwatershed Restoration (OC Waste and Recycling)</p>	<p>Agua Chinon Subwatershed Restoration (OCP Fig. 2):</p> <ul style="list-style-type: none"> <li>• 21 restoration polygons totaling 17 acres.</li> <li>• 287 acres of target invasive species control buffer within sub-watershed.</li> <li>• Target vegetation communities: mulefat scrub, mulefat scrub/sage scrub, elderberry shrubland, oak riparian, CSS</li> <li>• Approximately 230 acres of invasive buffer were visited and treated at least once in 2017.</li> <li>• Restoration timeline: site preparation 2013-2015; implementation/active management/monitoring 2015-2020; anticipated sign-off in 2020; ongoing maintenance through 2023.</li> <li>• Maintenance included mule fat and oak plantings, minor re-seeding and planting, ongoing weed control.</li> <li>• Extensive monitoring in 2017: photo points, vegetation transects and quadrats, arthropod pitfall traps, yellow pan traps (bees), Argentine ants, invasive species, nesting and sensitive birds, horticultural monitoring, California Rapid Assessment Method (CRAM).</li> <li>• Current status: 2017 monitoring indicates that all sites meet Year 5 success criteria for native cover.</li> </ul>	<ul style="list-style-type: none"> <li>• Further work needed to reduce non-native cover at two polygons. Further oak plantings are needed.</li> <li>• Irrigation will be discontinued in 2018</li> <li>• 2018 monitoring limited to collection of photo points, surveys for nesting and sensitive birds, six point count bird surveys, and horticultural monitoring</li> <li>• Ongoing non-native weed control in restoration polygons. Targeted invasive control in sub-watershed.</li> </ul>
<p>Habitat Restoration:</p>	<p>Agua Chinon Restoration (OCP Fig. 2):</p>	<ul style="list-style-type: none"> <li>• Ongoing maintenance to remove non-native</li> </ul>

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<p>- Agua Chinon Mitigation OCTA Project I (OCTA)</p>	<ul style="list-style-type: none"> <li>• 13 restoration polygons totaling 6 acres of riparian habitats.</li> <li>• Target vegetation communities: elderberry shrubland/sage scrub, mulefat scrub/herbaceous riparian, oak riparian</li> <li>• Restoration timeline: site preparation 2013-2015; implementation/active management/monitoring 2015-2020.</li> <li>• Maintenance included spraying annual grasses and hand-pulling broadleaf weeds. Additional mulefat pole cuttings were installed and spot watered through summer.</li> <li>• Minor re-seeding of shrub and forb species was conducted.</li> <li>• Limited monitoring in 2017 included: photo points, Argentine ants, horticultural monitoring</li> <li>• Horticultural monitoring indicates very successful expansion of native shrub and forb vegetation in 2017.</li> </ul>	<p>weeds. No further planting or seeding anticipated.</p> <ul style="list-style-type: none"> <li>• Irrigation was discontinued in 2017.</li> <li>• Extensive monitoring in 2018: photo points, vegetation transects and quadrats, arthropod pitfall traps, yellow pan traps (bees), Argentine ants, invasive species, nesting and sensitive birds, horticultural monitoring, CRAM.</li> <li>• IRC will pursue possible early sign-off in 2019.</li> </ul>
<p>Habitat Restoration: - Bee Flat Canyon Subwatershed Mitigation OCTA Project I (OCTA)</p>	<p>Bee Flat Canyon Sub-watershed Restoration (OCP Fig. 2):</p> <ul style="list-style-type: none"> <li>• 78 polygons totaling 84 acres of restored upland habitats.</li> <li>• Target habitats include: CSS, perennial grassland, chaparral, oak woodland</li> <li>• Targeted invasive species control in entire Bee Flat Canyon sub-watershed</li> <li>• Restoration timeline: site preparation 2011-2013; implementation/active management/monitoring 2013-2019</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing weed removal activities will focus on grassland and passive restoration sites that are not yet fully successful.</li> <li>• Limited monitoring in 2018 will include: photo stations, nesting and sensitive bird surveys, and horticultural monitoring.</li> <li>• Anticipated sign-off: 2019.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Maintenance in 2017 involved extensive hand weeding and cutting of non-natives, minor spot spraying, minor irrigation of oak plantings, and fall season dethatching of grasslands followed by supplemental seeding. Seed mixes of forbs and shrubs used to increase native cover and diversity. Minor container planting conducted in two polygons.</li> <li>• Initiated a grassland management study in cooperation with UC-Irvine Center for Environmental Biology, which will involve comparing vegetation response to goat grazing vs. mowing and raking.</li> <li>• Targeted invasive activities conducted in April and May</li> <li>• Extensive monitoring in 2017: photo points, vegetation transects and quadrats, arthropod pitfall traps, nesting and sensitive birds, horticultural monitoring</li> <li>• Most CSS sites now meet Year 5 success criteria for native vegetation cover. However, many grassland and passive restoration sites are not yet meeting these standards.</li> </ul>	
<p>Habitat Restoration: - Lower Silverado Canyon OCTA Project II Mitigation (OCTA)</p>	<p>Lower Silverado Canyon (OCP Fig. 2):</p> <ul style="list-style-type: none"> <li>• 31 restoration polygons</li> <li>• Approximately 40% complete</li> <li>• 28.4 total acres, all active</li> <li>• Target vegetation communities: mulefat scrub, alluvial scrub, mulefat/willow ecotone, mulefat/sycamore ecotone, mulefat/CSS</li> </ul>	<p>Maintenance: 28.4 acres: hand weeding, hand watering</p> <p>Seeding and planting: supplemental planting and seeding as needed.</p> <p>Monitoring: photo points, yellow pan traps (bees),</p>

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	<p>ecotone</p> <ul style="list-style-type: none"> <li>• Year initiated: 2014; anticipated completion: 2022</li> <li>• Approximately 11,000 plants were installed in January 2017, including more than 300 willow cuttings.</li> <li>• A seed mix including 16 species of perennial and annual plants was then applied to planting basins (total of 46 bulk lbs).</li> <li>• A drip irrigation system was installed on the lower 3/4 of the project area.</li> <li>• Monitoring for Year 1 of planting and seeding was completed and included vegetation, arthropod, and pollinator monitoring.</li> <li>• Pre-disturbance survey for nesting birds was completed in March 2017.</li> </ul>	<p>invasive species, nesting and sensitive birds, and horticultural monitoring.</p>
<p>Habitat Restoration: - West Loma II, OCTA Project III Mitigation (OCTA)</p>	<p>West Loma II and OCTA Project III Project (OCP Fig. 2):</p> <ul style="list-style-type: none"> <li>• 26 restoration polygons</li> <li>• Approximately 30% complete</li> <li>• 62.47 total acres</li> <li>• Approximately 58 acres currently active</li> <li>• Target vegetation communities: CSS, elderberry shrubland, mulefat shrubland, native grassland, red willow woodland</li> <li>• Year initiated: 2014; anticipated completion: 2022</li> <li>• Approximately 120 willow cuttings were installed in red willow woodland polygons in January 2017.</li> </ul>	<p>Seeding and planting: container plant and live stake installation, seeding</p> <p>Site preparation: approximately 4 acres of grassland polygons.</p> <p>Maintenance: approximately 58 acres of seeded polygons</p> <p>Monitoring: photo points, yellow pan traps (bees), invasive species, nesting and sensitive birds, horticultural monitoring, vegetation transects, quadrats, and large shrub/tree density</p>



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	<ul style="list-style-type: none"> <li>• Site preparation: mowing, two-year grow/kill with herbicide</li> <li>• Planting/seeding: hand seeding, imprinting, drill seeding, hydroseeding, container planting, live stakes</li> <li>• Site maintenance: hand weeding, spot spraying, selective and wick herbicide, supplemental watering by hand</li> <li>• Monitoring for Year 1 of planting and seeding (Phase I polygons) was completed and included vegetation, arthropod, and pollinator monitoring.</li> <li>• Pre-disturbance survey for nesting birds was completed in February 2017.</li> <li>• 7 wildlife monitoring cameras were installed as part of the Coal Canyon wildlife connectivity plan approved by the OCTA Environmental Oversight Committee in November 2016.</li> <li>• Factors most influencing success: rainfall/weather</li> </ul>	
<p>Tecate Cypress Restoration Phase I and II (OC Parks, in part; FWS Partners Program, in part; NCC, in part)</p>	<p>Tecate Cypress Restoration (OCP Fig. 2):</p> <ul style="list-style-type: none"> <li>• Initiated in January 2011</li> <li>• 10.3 acres (5 polygons)</li> <li>• During summer monitoring, 157 Phase I, 96 Phase II, and 108 Phase III trees and 22 container plants survived</li> <li>• Three Phase II trees produced seed cones, six years after planting.</li> <li>• Monitoring: seedling survival, height, health,</li> </ul>	<p>Survival will be monitored in Summer 2018.</p>

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	surrounding vegetation. <ul style="list-style-type: none"> <li>Maintenance as needed.</li> </ul>	
Habitat Restoration: - Pilot Cactus Scrub Restoration Study	Two of four pilot cactus restoration study sites, initiated in the winter of 2008/2009, are in OC Parks land (OCP Fig. 2). Plants are permanently tagged to be measured at 3-4 year intervals. Plants were not monitored in 2017.	A more detailed summary of results will be compiled as time permits and cacti will be measured again in 2018 if time permits.
Habitat Restoration: - Native Seed Farm (Additional funding for part of the infrastructure improvement plan provided by Orange County Parks Foundation)	<ul style="list-style-type: none"> <li>Approximately 8 acres of growing area were maintained at the native seed farm in 2017.</li> <li>12 native shrubs, 27 native forbs, and 4 native grasses were maintained. 3 new species were planted, including 20 mature <i>O. littoralis</i> (courtesy of NCC), resulting in a total of 47 native species.</li> <li>The seed collected from the farm will serve as a source of seed for current and future restoration occurring primarily in the Central Reserve.</li> <li>Plants were started, maintained, and harvested using staff, volunteer, and contract labor.</li> <li>Harvests from the 2017 crop included: California sagebrush, coast buckwheat, bush sunflower, arroyo lupine, purple owl's clover, slender buckwheat, strigos lotus, brickell bush, tarragon, and cliff aster.</li> <li>Farm-harvested seed totaled more than 1,300 lbs. and served as the primary source for restoration seeding.</li> </ul>	<ul style="list-style-type: none"> <li>8 acres of growing area with 47 native species will be maintained at the seed farm in 2018.</li> <li>Species composition will vary slightly from 2017, with winecup clarkia and whispering bells replacing bird's beak and native tobacco.</li> <li>Planned improvements to the infrastructure include marked parking stalls, privacy surrounds for the volunteer meeting area, and storage bins for nursery materials.</li> <li>Plans will be developed (in collaboration with Orange County Fire Authority) for an educational demonstration garden intended to educate the public on defensible space planting with native plants.</li> <li>Additional educational programming targeting youth will be developed, subject matter TBD.</li> </ul>

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	<ul style="list-style-type: none"> <li>Development of infrastructure within a 2.5-acre dedicated area included: installation of an ADA-accessible volunteer meeting area with a restroom, cement sidewalks to access the nursery, picnic tables and umbrellas for the meeting area, and structures for equipment storage.</li> </ul>	
Oak Restoration in GSOB-Infested Zone (CDFW-LAG, in part)	IRC was awarded a CDFW LAG to begin an oak restoration study in Weir Canyon to mitigate the effects of oak removal for Goldspotted Oak Borer management. Acorn planting began in November.	Seedling survivorship and rodent predation pressure will be monitored through the end of the project in the spring of 2020.
<b>Fire Management Activities:</b>		
Fire Prevention: - IRC Fire Watch Program	<p>Trained and outfitted approximately 79 new volunteers, bringing the program total to 284 volunteers ready to monitor “high risk” areas on the border of the wild lands. There were 18 “high risk” days in 2017 that necessitated Fire Watch deployment on OC Park’s IROS. The Fire Watch program is conducted in conjunction with the Greater Laguna Canyon Fire Safe Council, Inter-Canyon League Fire Safe Council, Trabuco Canyon Defense Against Wildfire, Modjeska Canyon Fire Watch, the Orange County Fire Authority, OC Parks, and Crystal Cove State Park to create a network of Fire Watch programs.</p> <p>In addition, the Fire Watch program participated</p>	<p>Continue the Orange County Fire Watch Program. This program was conducted in conjunction with the Greater Laguna Canyon Fire Safe Council, Inter-Canyon League Fire Safe Council, Trabuco Canyon Defense Against Wildfire, Modjeska Canyon Fire Watch, the Orange County Fire Authority, OC Parks, and Crystal Cove State Park to create a network of Fire Watch programs. IRC will work with NCC to support completion of the Fire Management Plan.</p> <p>Conversations will continue in 2018 about expanding the Fire Watch program into other Orange County wilderness areas. In addition, the Fire Watch Coordinator will continue working on</p>

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	<p>in 18 public outreach events to educate the public on wildland/urban interface risks, including a July 4<sup>th</sup> Fire Watch deployment at three OC Parks facilities. The 2017 Fire Watch Symposium was attended by 89 volunteers, partners, and members of the public. The Fire Watch Annual Exercise was conducted in June encompassing all fire watch locations with the inaugural activation of the Fire Watch Operations Center. In 2017, the Fire Watch Team Leader volunteer position was initiated with 8 volunteers participating in the training program.</p>	<p>increasing the number of trained volunteers and continue to partner and engage the services of other volunteer agencies and organizations.</p>
<p>Post-Fire Management: - General Approach</p>	<p>IRC and OC Parks consistently collaborate to ensure that the perimeters of small fires are digitized and that fire severity and wildlife mortality are recorded in a consistent manner. Each fire is surveyed, assessed for resource damage, and recommendations for repair are made.</p>	<p>Survey forms will continue to be used for fires as guides for data collection, and an assessment report will be written for each fire. The perimeters of small fires and dozer lines will be digitized, and larger fire perimeters will be obtained from OCFA. New dozer lines and roads that are widened to contain large fires will be monitored to mitigate any spread of invasive plants.</p>
<p>Post-Fire Management: - Specific fires</p>	<p>Three small wildfires occurred on or directly adjacent to IRC-managed OC Parks land. Two large fires (the Canyon Fires) entirely burned three canyons within the IROS (Blind, Gypsum, and Weir) as well as adjacent open space.</p> <ul style="list-style-type: none"> <li>• The Mountain Park Fire occurred on 6 July adjacent to the 91/241 toll road interchange on the OC Parks Mountain Park Easement.</li> <li>• The Black Star Fire occurred on 16 July by the Black Star gate; it burned less than one</li> </ul>	<p>Small Fires</p> <ul style="list-style-type: none"> <li>• The small fires will not warrant special attention in 2018.</li> </ul> <p>Canyon 2 Fire</p> <ul style="list-style-type: none"> <li>• For the area impacted by the Canyon 2 fire, all dozer and hand lines were rehabilitated by CALFIRE and OCFA crews; berms were installed; and water bars were placed in areas with significant slopes. In some locations,</li> </ul>

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	<p>acre and may have been caused by fireworks.</p> <ul style="list-style-type: none"> <li>• The “Farm Fire” occurred on 19 August on Irvine Company property adjacent to the IRC-managed native seed farm and spanned 11.6 acres.</li> <li>• The Canyon 1 fire started on 25 September, likely due to an ignition from the 91 freeway, and was declared fully contained on 4 October, having burned approximately 2,600 acres including a small portion of IRC-managed OC Parks land in Gypsum Canyon.</li> <li>• On 9 October, high winds carried embers from the Canyon 1 fire and started the Canyon 2 fire, which burned 9,217 acres before being declared fully contained on 17 October.</li> <li>• Of the total area burned, 3,099 acres were NCCP land.</li> <li>• IRC obtained the fire perimeter and dozer and hand lines from OCFA and fire severity data from OC Parks.</li> <li>• IRC staff surveyed and assessed wildlife mortality, the threats to all known archeological sites, and sites with plant species of special concern including the impacts to the GSOB-infested oak woodland.</li> <li>• The intensity of the fire was determined to be moderate to severe and largely even.</li> <li>• All habitat types were affected including sensitive cactus scrub, CSS, oak woodland,</li> </ul>	<p>vegetation cut by hand crews was placed back in the hand lines.</p> <ul style="list-style-type: none"> <li>• IRC staff will continuously monitor impacted areas, including oak and cactus survival, and control the spread of invasive plant species, which may have been aggravated by fire control efforts. Additionally, an oak restoration project has been initiated in Weir Canyon to mitigate the effects of the GSOB infestations as well as the Canyon 2 fire (see Miscellaneous Activities). Fire assessment reports have been written for all fires in 2017 and are available upon request.</li> </ul>

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	<p>and perennial grassland habitats, but most areas are expected to recover.</p> <ul style="list-style-type: none"> <li>• Trap-door spider burrows were observed in Weir and Blind canyons, and their locations were recorded. Some small mammal carcasses were discovered throughout the burned area that were difficult to identify but likely rabbits, mice, and/or rats, and a small number of lizards and snakes were also discovered.</li> <li>• A series of known archeological sites within Weir Canyon were burned over, but no obvious above-ground materials or artifacts were detected.</li> <li>• One known vernal pool was not severely impacted.</li> </ul>	
Maintenance of Fuel Breaks / Modification Zones:	Currently there are no fuel breaks or fuel modification zones on IROS. Utility roads informally serve as fuel breaks and Santa Ana wind-driven wildfires are primarily defended at the urban edge.	To be determined.
<b>Miscellaneous Activities and Management Programs - IRC:</b>		
Unhealthy Oak Survey	Surveys for unhealthy oaks were conducted opportunistically. No GSOB or PSHB/KSHB have been detected as yet outside of Weir Canyon. UCI monitored oaks again for TNC in Easements.	Surveys for unhealthy oaks will continue to be conducted opportunistically.
Monitoring Habitat Stability	IRC has been conducting long-term vegetation	The draft report will be finalized. All other work is

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<p>and Resilience through Long-term Vegetation Transects (TNC/UCI/NCC, part)</p>	<p>monitoring for CSS approximately every three years since 2009. TNC and NCC have long-term vegetation monitoring transects. TNC and NCC monitoring focuses on describing the overall status of the vegetation over space and time.</p> <p>IRC vegetation monitoring focuses on a series of transects across a gradient of invasive species cover. IRC sites were last monitored in 2016. A draft report has been completed on long-term trends associated with vegetation cover and rainfall.</p> <p>IRC has continued to compile annual aerial imagery for long-term digital analysis.</p>	<p>ongoing.</p>
<p>Passive Restoration Trial UCI (in part)</p>	<p>Initiated in 2010, the purpose is to assess the efficacy of using a passive restoration approach to restoring degraded CSS communities. The following data continue to be collected annually: cover and density in smaller germination quadrats. In 2017, plots were maintained for their sixth year by IRC and monitored by the Huxman lab into their fifth year. Data have been summarized. Significant treatment effects were found over time with respect to native and non-native cover, richness, and germination, with generally greater effects in the coastal reserve sites vs. the central. Treatment effects do not appear to be compounding over time.</p>	<p>In 2018, passive weed control treatments will continue with spring hand weeding/mechanical control. Monitoring will continue as well by UCI.</p>
<p>Seeding Techniques Trial</p>	<p>Within the West Loma I (Hangman's Tree</p>	<p>Publication: Tamura et al., 2018. Effectiveness of</p>

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(IRC/CEB collaboration)	Canyon) restoration area, drill seed, imprint seed, hand seed, hand seed plus jute netting, and hydroseed were compared across an approximately 1.2-acre area in 2016. In addition, plots were split for a comparison of hand vs. wick weeding. The treatments occurred on a range of slopes. Germination and density were measured at the end of the 2016 growing season. Data were analyzed in 2017 and a manuscript was drafted.	seed sowing techniques for sloped restoration sites. Restoration Ecology, in press.
Restoration Seeding Rates and Effects of Initial Conditions	UCSB Bren student Justin Heyerdahl analyzed existing restoration vegetation data and baseline environmental and site conditions as well as seeding rates. He concluded that restoration sites were highly variable, potentially over-seeded, and most impacted by existing non-native cover as well as local moisture availability (to a negative degree). Results were presented at an IRC Science Friday presentation.	A final student report is in preparation. Seeding rate trials may be initiated in Bee Flat Canyon, West Loma, and at the native seed farm if weather conditions are favorable. Trials will look at the final cover of full, 75%, and 50% seeding rates.
Soil Characteristics of Restored Grassland Sites UCI (part)	A soil analysis of 45 sites differing substantially in <i>S. pulchra</i> cover was continued in collaboration with UCI. An initial analysis by UCI suggested no significant correlation between measured soil characteristics, non-native cover, and native grass cover.	If collaborator time permits, data will be analyzed further and summarized.
Trail Condition Monitoring	Twenty-two trail transects are installed on OC Parks-owned land. Monitoring for this program was initiated by IRC staff in November 2017 and was completed in January 2018 (OCP Fig. 3).	The 2017 data will be analyzed, and the condition of trails and trail-side vegetation will continue to be monitored in 2018.



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Raptor Nest Surveys (including an expanded volunteer survey area)	<ul style="list-style-type: none"> <li>• Since 2009, IRC has organized a citizen science-based raptor nest monitoring program to document the breeding activity of raptors across the historic Irvine Ranch including the OC Parks-owned portions of the IROS (OCP Fig. 3). The IRC again contracted with Bloom Biological Inc. (BBI) to conduct most of the initial raptor nest surveys and to provide training to volunteer monitors.</li> <li>• Of the 102 historically active territories surveyed within the IROS, 53 were identified as active (52%).</li> <li>• 39 of the 53 active territories (74%) successfully produced offspring in 2017.</li> <li>• These data were presented as a poster at the International Urban Wildlife Conference held from June 4 – 7, 2017 in San Diego, CA. The title was “What we’ve learned from over 10 years of monitoring nesting raptors in Orange County, CA.”</li> </ul>	Raptor surveys will continue across the Irvine Ranch National Landmarks in 2018. A copy of the 2017 report on “Nesting Raptors of the Irvine Ranch Wildlands and Associated Environs” (Bloom 2017) is available upon request.
Cactus Wren Artificial Nest Box Structures	The 13 cactus wren artificial nest boxes in place across the IROS were surveyed in the spring of 2017, but no occupancy was observed (OCP Fig. 3). Two nest boxes were within the area affected by the Canyon 2 fire, but only one (in Weir Canyon) burned.	The remaining 12 nest boxes will be monitored again for nesting activity in the spring of 2018.
Wildlife Monitoring	Wildlife activity in the central and coastal reserve has been monitored since 2007 using remote	Camera trapping will continue as a tool for monitoring wildlife and human activity in 2018.

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	<p>infra-red-triggered cameras, which are operated and maintained by IRC staff and volunteer citizen scientists (OCP Fig. 3).</p> <p>Fifty remote cameras are currently in operation, 35 of which occur on OC Parks land. Data from photographs are entered manually, and the database currently contains more than 144,190 entries. Eight cameras were damaged in the Canyon 2 fire and have been replaced with new cameras. Two of the memory cards were completely destroyed while the remaining six captured photos of the fire as it passed through.</p> <p>Quarterly data (March, June, September, and December) are analyzed for species trends on an annual basis.</p> <p>A collaborative CDFW LAG led by NCC to further investigate human activity/wildlife relationships was completed in March 2017. Lead author Dr. Michael Patten presented results at the Urban Wildlife Conference in San Diego. A manuscript from an earlier LAG-funded study was published in Biological Conservation (Patten and Burger 2018). Another manuscript describing diel shifts in response to human activity is in preparation.</p> <p><b>Trends in Wildlife Activity by Species</b></p> <p>Analysis of camera data from June 2007 through September 2017 indicate (OCP Fig. 4):</p>	<p>Additional cameras may be installed if deemed necessary.</p> <p>All wildlife cameras will be tested in 2018 for proper function using a protocol developed in 2013 by IRC staff and volunteers.</p> <p>Post-fire wildlife activity will be monitored and compared to pre-fire wildlife activity.</p> <p>A manuscript on CDFW LAG results from 2017 will be submitted for publication.</p>

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	<p><u>Deer:</u></p> <ul style="list-style-type: none"> <li>• Activity dropped significantly after the 2007 Santiago Fire but has remained steady.</li> <li>• Activity typically strongly peaks during late summer (September) and drops in winter and spring.</li> </ul> <p><u>Coyote:</u></p> <ul style="list-style-type: none"> <li>• Annual activity has slightly increased since 2013.</li> <li>• Activity is typically greatest in winter (December) and lowest in summer (September) but fluctuates widely.</li> </ul> <p><u>Gray fox:</u></p> <ul style="list-style-type: none"> <li>• Activity significantly decreased following the 2007 Santiago fire and has not recovered. A total of 30 gray fox images were captured in March, June, and September of 2017.</li> <li>• The Overlook Trail camera had the highest gray fox activity.</li> <li>• No seasonal pattern of activity has been detected.</li> </ul> <p><u>Bobcat:</u></p> <ul style="list-style-type: none"> <li>• Annual activity has remained consistent since 2011, the year after the most significant rain on record.</li> <li>• No seasonal pattern of activity has been detected.</li> </ul>	

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	<p><u>Mountain lion:</u></p> <ul style="list-style-type: none"> <li>• Annual activity continues to fluctuate but has increased since 2013, when the lowest activity was recorded.</li> <li>• No seasonal pattern of activity has been detected.</li> <li>• Mountain lion activity was high in 2017, similar to that before the Santiago fire, which was likely due to a high number of female mountain lions having offspring. A mother mountain lion with a juvenile were captured in Limestone Canyon, a mother with two juveniles in Weir, a mother with a cub in Gypsum, and a tagged mother with a cub in Fremont. The tagged mother was identified as F121. There were also two cubs captured in Fremont that were not seen with their mother.</li> </ul>	
Additional Wildlife Monitoring	IRC staff assisted USGS researchers with golden eagle occupancy monitoring in Fremont Canyon and NCC with a herptile rapid assessment in Limestone and Weir Canyons. Results are pending.	IRC will continue to support the efforts of other agencies to monitor wildlife.
Trap-door Spiders	Three marked trap-door spider colonies were again monitored (OCP Fig. 3). Several burrows were abandoned and/or collapsed. Colony size estimates (=questionable/live burrows) were: Hicks Hall=0, Limestone=31, and MWD=0 burrows, all of which were significantly reduced	Monitoring of trapdoor colony demography will continue in 2018. Recently discovered burrows found in Weir Canyon will be visited and included in the study if colonies are sufficiently large (>10 burrows) to warrant monitoring.

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<p>Pollinator and Butterfly Monitoring and Conservation</p>	<p>from 2016.</p> <p><u>Citizen Science Butterfly Count.</u> Purpose is to track long-term changes in butterfly community in relation to habitat condition, restoration activities, seasonality, and climate change (OCP Fig. 3).</p> <ul style="list-style-type: none"> <li>• Staff-led, including IRC volunteers and trained public</li> <li>• 11.5 mi. transects surveyed monthly</li> <li>• <b>47</b> butterfly species and <b>21,270</b> individuals since survey began in 2012</li> <li>• 35 species and 5,185 individuals observed in 2017.</li> <li>• Survey cancelled in January due to rain.</li> <li>• Observed species included: Acmon blue, anise swallowtail, Behr’s metalmark, Bernardino blue, bramble hairstreak brown elfin, buckeye, cabbage white, California ringlet, California sister, Ceraunus blue, Chalcedon checkerspot (new), checkered skipper, gray hairstreak, common white, dainty dwarf sulfur, funereal duskywing, northern white skipper, Lorquin’s admiral, marine blue, monarch, mournful duskywing, mourning cloak, orange sulfur, painted lady, pale swallowtail, Propertius duskywing, rural skipper, Sara orange-tip, Silvan wood nymph, tiger swallowtail, umber skipper, west coast lady, western pygmy blue, and woodland skipper.</li> <li>• Goldhunter’s hairstreak observed incidentally.</li> </ul>	<p>All activities are ongoing.</p>

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	<ul style="list-style-type: none"> <li>• All survey data submitted to the Butterflies and Moths of North America butterfly monitoring online database (PollardBase) as part of the Orange County Butterfly Monitoring Network.</li> <li>• IRC continues to support monthly butterfly counts by partner organizations at Dilley Preserve and Crystal Cove State Park that were initiated in 2016.</li> </ul> <p><u>IRC Native Seed Farming.</u> The seed farm continued to target seed multiplication of native plant species that are valuable as pollinator magnets and as host plants for butterfly larvae. These species will be planted in wildland restoration sites.</p> <p><u>Bee monitoring.</u> Bee surveys are being conducted at riparian restoration sites (Silverado and Agua Chinon) using yellow pan traps. Surveys identify current native bee diversity and future trends with restoration. A summary of bee monitoring is available in the OCTA II, OCTA III, and OC Waste annual reports.</p>	
Other Arthropod Monitoring/Inventory	<p><u>Citizen Science Blacklighting.</u> Purpose is to establish an inventory of species observed in the IROS to support understanding of species distributions, site conditions, and long-term change in species assemblages.</p> <ul style="list-style-type: none"> <li>• Six IRC-led blacklighting events</li> </ul>	Blacklighting activities will continue in Summer 2018 if volunteer leads remain available,

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	<ul style="list-style-type: none"> <li>• Utilized two black lights with white observation sheet</li> <li>• Observations recorded via photographs</li> <li>• Sampled April through September 2017</li> <li>• Photo-documented species</li> <li>• Most observations have been uploaded to inaturalist.org</li> <li>• Over 150 taxa identified at least to genus</li> </ul>	
Wildlife Corridors and Connectivity	IRC's habitat mitigation plan for West Loma II funded by OCTA (see West Loma II above under habitat restoration) was approved to include connectivity enhancements at Coal Canyon. Cameras were installed and permits were secured to conduct work. This work is occurring outside of the boundaries of the NCCP.	Ongoing.
Alternative Pest Management	No activity.	No activity.
Christmas Bird Count and Partners in Flight Count	Sea and Sage Audubon conducted its Spring Bird Count in April and May, and the Christmas Bird Count (CBC) was scheduled for 17 December. However, CBC counts on IROS were prevented due to a red flag warning. Quarterly PIF Point Count bird surveys were conducted by Sea and Sage Audubon as well as through the IRC's Citizen Science program. As of 2008, Audubon is providing IRC with CBC and PIF data specifically for Reserve areas.	IRC will continue supporting these counts and is expanding efforts to analyze these long-term data sets. The Limestone PIF data are being analyzed for trends in diversity and abundance by an IRC volunteer through the Citizen Science Program.

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Restoration Database : - OC RESTORE	NCC prepared IRC restoration data for upload to OC Restore and is currently determining the fate of the database.	IRC will continue to work with NCC on finding a regional system to collect and maintain restoration data.
Development of Biological Database	IRC maintained and updated the geodatabase for IRC-managed areas.	Both fauna and flora databases will continue to be updated.
Climate Change	IRC continues to stay abreast and supportive of climate change research relevant to local habitats.	Ongoing.
Conservation Capacity	<p>Conservation capacity is being maintained on the IROS as outlined below:</p> <ol style="list-style-type: none"> <li>1. <b>Implementing landscape-scale restoration.</b> The purpose of restoration efforts is to increase habitat resilience to disturbance, enhance diversity, and support wildlife and ecosystem processes. Since 2012, implementation has been funded largely by external mitigation contracts, but also includes landowner-funded restoration.</li> <li>2. <b>Implementing landscape-scale invasive control.</b> The purpose of targeted invasive control is to remove the threat of future habitat degradation by highly invasive pests. Implementation is primarily funded by land management agreement as well as by external mitigation funding and NCC funding for emerging invasives. It is informed by current monitoring and collaborative prioritization. Efforts have expanded and will</li> </ol>	Ongoing.



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	<p>continue to expand to the evaluation of new threats, such as GSOB and PSHB. Capacity was expanded somewhat in 2017 by the creation of an online reporting tool through CalFlora WeedManager.</p> <p>3. <b>Expand and enhance wildlife conservation actions.</b> Raptor surveys, camera monitoring, point counts, and arthropod surveys continued in 2017. Projects were strategically reviewed to expand capacity to monitor and manage positively for wildlife.</p> <p>4. <b>Maintain current geospatial database for sensitive species and habitats.</b> The purpose of maintaining and adding to the geodatabase is to inform conservation priorities and management actions with the purpose of maintaining and enhancing these resources. Activities include developing long-term and regional monitoring programs and expanding the use of smartphone technology and applications to encourage field-based incidental data collection.</p> <p>5. <b>Partner with other organizations to achieve landscape-wide conservation goals.</b> In 2017, activities included: (1) participating in the NCC TAC and several regional working groups; (2) providing regional expertise on regional conservation and land management issues where</p>	

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	<p>appropriate; (3) working closely with OCFA to minimize fire risk, implement fire response consistent with protection of sensitive natural resources, and support organization; (4) collaborating on a regional prioritization of invasive weeds through Cal-IPC and NCC; (5) extensive partnering and leadership associated with tree pest control; (6) facilitating training for both in-house staff and partners for herbicide application, weed treatment reporting, and continuing education through Science Friday; and (7) maintaining four externally funded landscape-level subwatershed restoration projects.</p> <p>6. <b>Providing opportunities for collaboration, internships, scholarship, and research on the Reserve.</b> Research partnerships continued with UC Irvine and UC Riverside. Several student interns completed work supporting conservation efforts including two summer UCSB Bren School graduate student interns and UCI students.</p> <p>7. <b>Working with collaborators to obtain funding for important conservation actions.</b> Applied for and received CDFW-LAG funding for GSOB-impacted oak woodland recovery. Partnered with TNC, OC Parks, and IRC Field Operations Staff to recontour and restore spadefoot ponds in Easements.</p>	

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	<p>8. <b>Engaging volunteers in resource management.</b> Stewardship and citizen science activities continued to be offered, which increased conservation capacity and enriched the volunteer experience through direct interaction with staff.</p>	
<b>Miscellaneous Activities and Management Programs - Non-IRC Research:</b>		
Erin Boydston, USGS	<p>Purpose: Landscape genetics of mule deer in Southern California; initiated 2015. Fecal samples were collected to evaluate genetic structure and gene flow from the inland areas to coastal areas, which are divided by I-5 and I-405. The focal study region centers on wildlife habitat in Chino Hills State Park, Prado Basin, and Santa Ana Mountains along the Santa Ana River. An interim report was completed and is available upon request.</p>	Ongoing. Project is due to be completed in 2018.
Dr. Jennifer Funk, Chapman University	<p>Title: Limiting similarity as a tool for native plant restoration.</p> <ul style="list-style-type: none"> <li>• Experiment tested the hypothesis that native plant species that are functionally similar to invasive species will decrease the growth of invaders and resistance to subsequent invasion.</li> <li>• The experiment was set up in November 2009 as part of an undergraduate Restoration Ecology (BIOL 441) course at Chapman University.</li> </ul>	Complete. Infrastructure will be removed in 2018 with IRC escort.

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	<ul style="list-style-type: none"> <li>• 60 1 x 1-m<sup>2</sup> plots focusing on two invaders (<i>Brassica nigra</i> and <i>Avena barbata</i>) and four groups of native species (goldenbush, bunchgrass, scrub, and early season annuals). At three time points (1, 4, and 7 years following plot establishment), species richness and percent cover were assessed in the plots to determine how the different native species groups resisted invasion.</li> <li>• No effect of native functional groups on native or invasive species richness or cover was detected at any of the three time points. It had been assumed that invasive grasses would be functionally similar to native bunchgrasses and early season forbs, but an analysis of trait data collected after the experiment was established suggested that invasive plants were functionally distinct from all native species groups. Future experiments in this area should use trait data to identify individual native species that are functionally similar to focal invasive species and assess their competitive impacts in pairwise growth trials.</li> </ul>	
Dr. Winston Vickers, University of California, Davis	Purpose: Mountain lion monitoring and movement. Movement patterns continue to be monitored with radio collars. No mountain lions were collared in 2017. IRC continues to share mountain lion observations with UC Davis.	Ongoing.
Dr. Michael Goulden, University of California,	Purpose: Long-term monitoring of CO <sub>2</sub> eddy covariance on Loma Ridge. Data are used to	Ongoing.

## Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
Irvine Eddy Covariance Flux Towers	correlate seasonal and vegetation-type specific CO <sub>2</sub> flux long-term.	
Drs. Michael Goulden, S. Allison, J. Martiny, University of California, Irvine Climate Change Experiment	Purpose: Understand changes in vegetation due to changing rainfall and nitrogen deposition patterns. Data are available at: <a href="https://drive.google.com/drive/folders/0B_Oi0PK93yBcnc1NIRJS3N0Rkk">https://drive.google.com/drive/folders/0B_Oi0PK93yBcnc1NIRJS3N0Rkk</a>	UCI will be altering the experimental set up to allow for better characterization of vegetation response and also to much better tie the observations to remote sensing images, which, in turn, will allow findings to be extrapolated to other areas. This addition involves the installation of an imaging system that simulates the Landsat remote sensing satellite: a series of cameras will be installed that will observe the experiment and treatment effects and that have the same wavelength sensitivity Landsat imagery.
Dr. Steve Allison, J. Martiny, A. Martiny, K. Treseder, University of California, Irvine Controls Over Decomposition by Microbial Communities Under Climate Change	Purpose: To test the response and resilience of microbial communities to climate change across a rainfall gradient. Litter microbial communities were transplanted across a climate gradient in Southern California, and Loma Ridge was an intermediate site along the gradient. Bags were collected in Spring, and data are currently being analyzed. Microbes transplanted into Loma Ridge from the desert and sub-alpine systems retained a signature of their original community composition but were still able to carry out decomposition at comparable rates to local microbes. Data suggest resilience in the decomposer community in the face of climatic changes.	The project will be completed in 2018 and submitted for publication. A publication from an earlier phase of this project was published this year (Baker and Allison 2017).

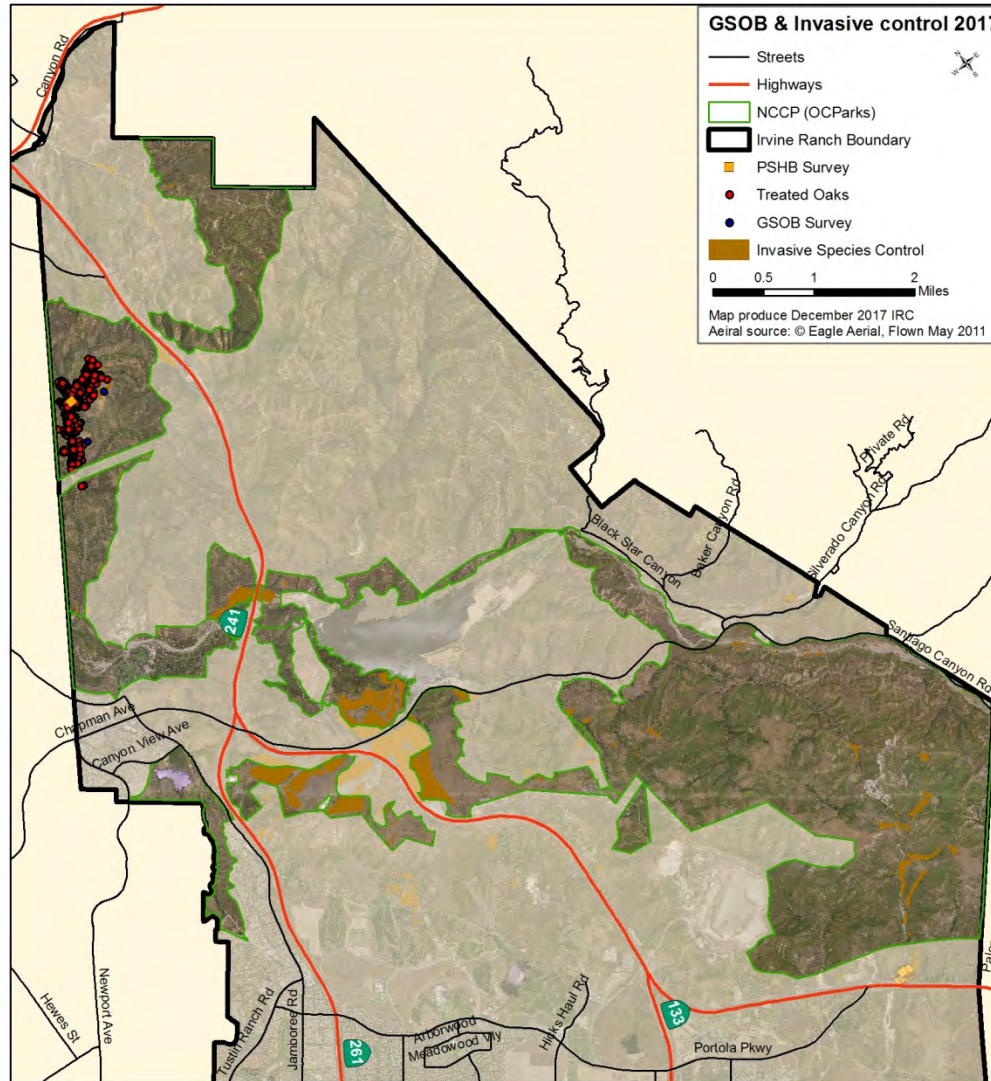
## Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<p>Dr. Steve Allison, J. Martiny, A. Martiny, K. Treseder, M. Goulden, University of California, Irvine A Trait-based Framework for Linking Microbial Communities with Carbon Transformations under Precipitation Change</p>	<p>Purpose: To identify the mechanisms by which microbial communities and functioning respond to drought. This study is in the footprint of the Climate Change Experiment and monitors decomposition rates over time. Work includes efforts to isolate key microbial species from the site to analyze their physiological strategies. This project has implications for the temporal dynamics of litter biomass, which is important because standing litter contributes to fuel loads and wildfire risk. Therefore, microbes may play a role in ecosystem vulnerability to fire.</p>	<p>In 2018, litter samples will be collected to study microbial physiology. In collaboration with Mike Goulden, further instruments will be added to the study site to gain a detailed understanding of the physical environment over time and space and to better interpret microbial responses. Physical and biological measurements over the next year will be compared to better understand how microbes contend with drought and heat stress.</p>
<p>Dr. Michael Goulden, S. Kimball, T. Huxman, CEB, University of California, Irvine Weather Station Gradient</p>	<p>Purpose: To quantify the Orange County weather gradient with a focus on a north-south transect that spans the original Irvine Ranch from Crystal Cove State Park to Gypsum Canyon, including the City of Irvine Open Space Preserve. CEB continues to maintain stations. Data are available at (<a href="http://128.200.14.200/index.html">http://128.200.14.200/index.html</a>) and shared with regional weather websites, such as Mesowest. The inland weather stations generally report more extreme temperatures (higher highs and lower lows). Rainfall data are currently being analyzed for differences.</p>	<p>Pending available funding, CEB will update our website to include new weather stations that have been placed at sites in the UC Natural Reserve System, including the Steele Burnand Anza-Borrego Desert Research Center. CEB is applying for funding that would allow staff to be hired to develop a website that would include summary statistics for weather at Orange County sites and beyond.</p>
<p>Dr. Megan Lulow, S. Kimball, M. Goulden, K. Mooney, T. Huxman, University of California, Irvine DroughtNet</p>	<p>Purpose: To determine whether seed source determines drought tolerance in restored CSS communities. Seed will be collected per entry permit specifications to be used for a common garden experiment at the UCI Ecological Preserve. Inland and coastal populations as well</p>	<p>Seed will be collected in 2018.</p>

## Irvine Ranch Open Space - Central/Coastal Orange County Wildlands

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	as dry and mesic microsite collections of several species will be compared.	
Dr. Diane Campbell, University of California, Irvine Impacts of water availability on pollination in a native wildflower	Purpose: To investigate the influences of water availability and invasive plants on pollination of native species. Research pending.	Researchers plan to examine how pollen deposition and seed production change with soil water availability. <i>Phacelia parryi</i> flowers will be collected across wet and dry areas as measured by a soil moisture probe. Pollen grains deposited on stigmas will be counted and correlated with seed set under varying water conditions.
Dr. Peter Bloom, Bloom Biological	Purpose: To determine raptor nesting activity among several canyons and how they vary over time, as well as possible factors driving activity numbers. Data were partially reported in a final report to IRC in 2017 which is available upon request.	Ongoing
Stankowich and Collins, California State University, Long Beach Permit # P2016-01557	Urban wildlife monitoring – Coyotes. Camera traps were set up along an urban-wildland gradient focused around Santiago Canyon Road. <ul style="list-style-type: none"> <li>• Initiated late 2016 as a long-term study</li> <li>• Six cameras installed in/adjacent to IROS</li> <li>• Four additional cameras installed in wildland/urban interface beyond IROS</li> </ul>	Ongoing. Videos will be scored using methodology from the Urban Wildlife Institute Network
Dr. Tracy Brown, California State University, San Marcos	Horned lizard demography. Reconnaissance was planned for 2017 but did not occur.	Study will be initiated in 2018 pending research application and entry permit approval.

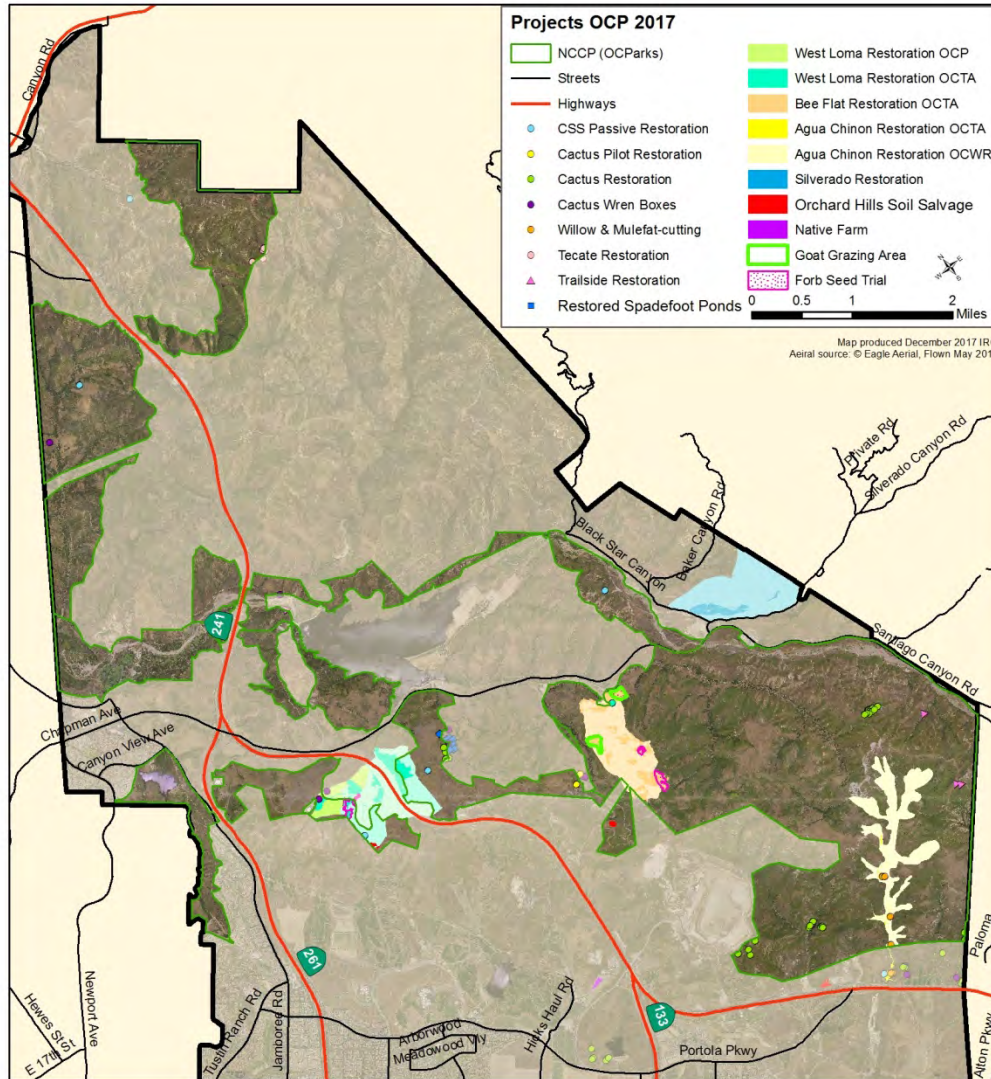
# Irvine Ranch Open Space - Central/Coastal Orange County Wildlands



OCP Fig. 1: Invasive Control, GSOB Survey and Treatment, and PSHB Survey

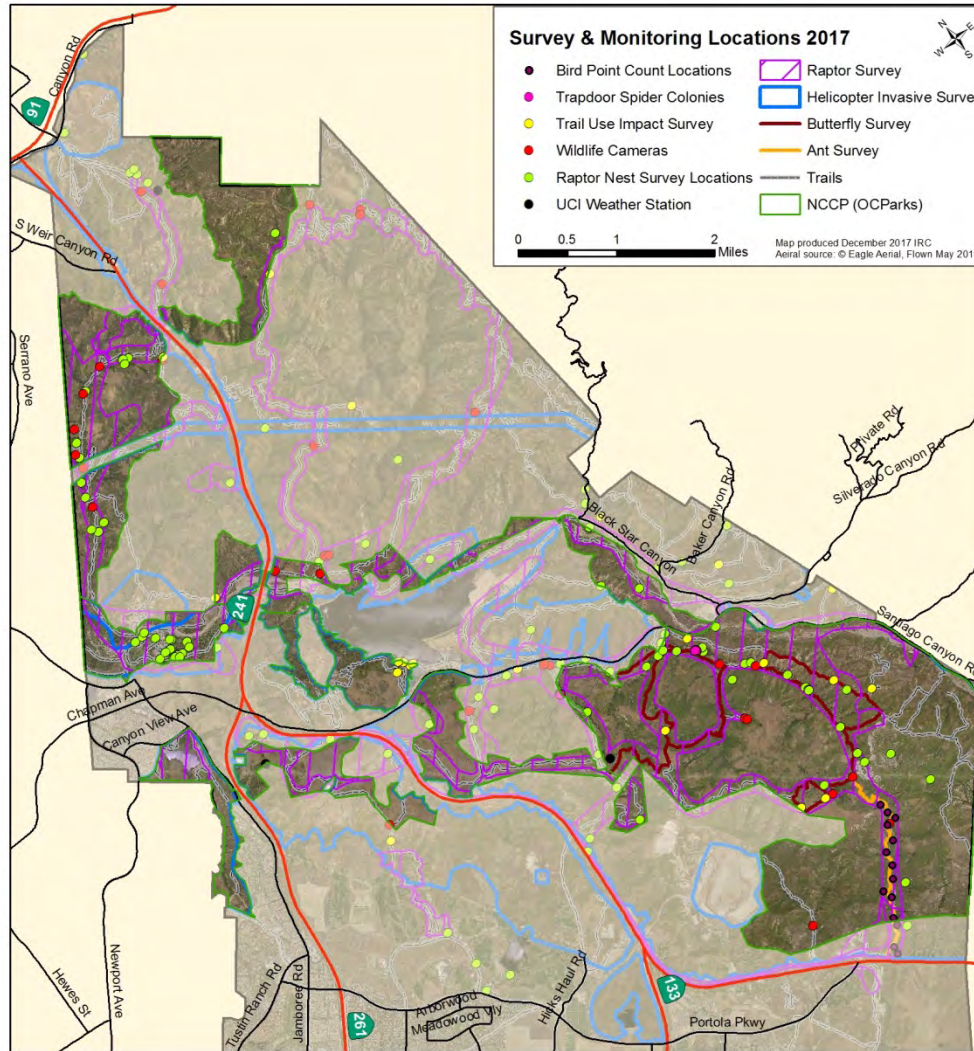


# Irvine Ranch Open Space - Central/Coastal Orange County Wildlands



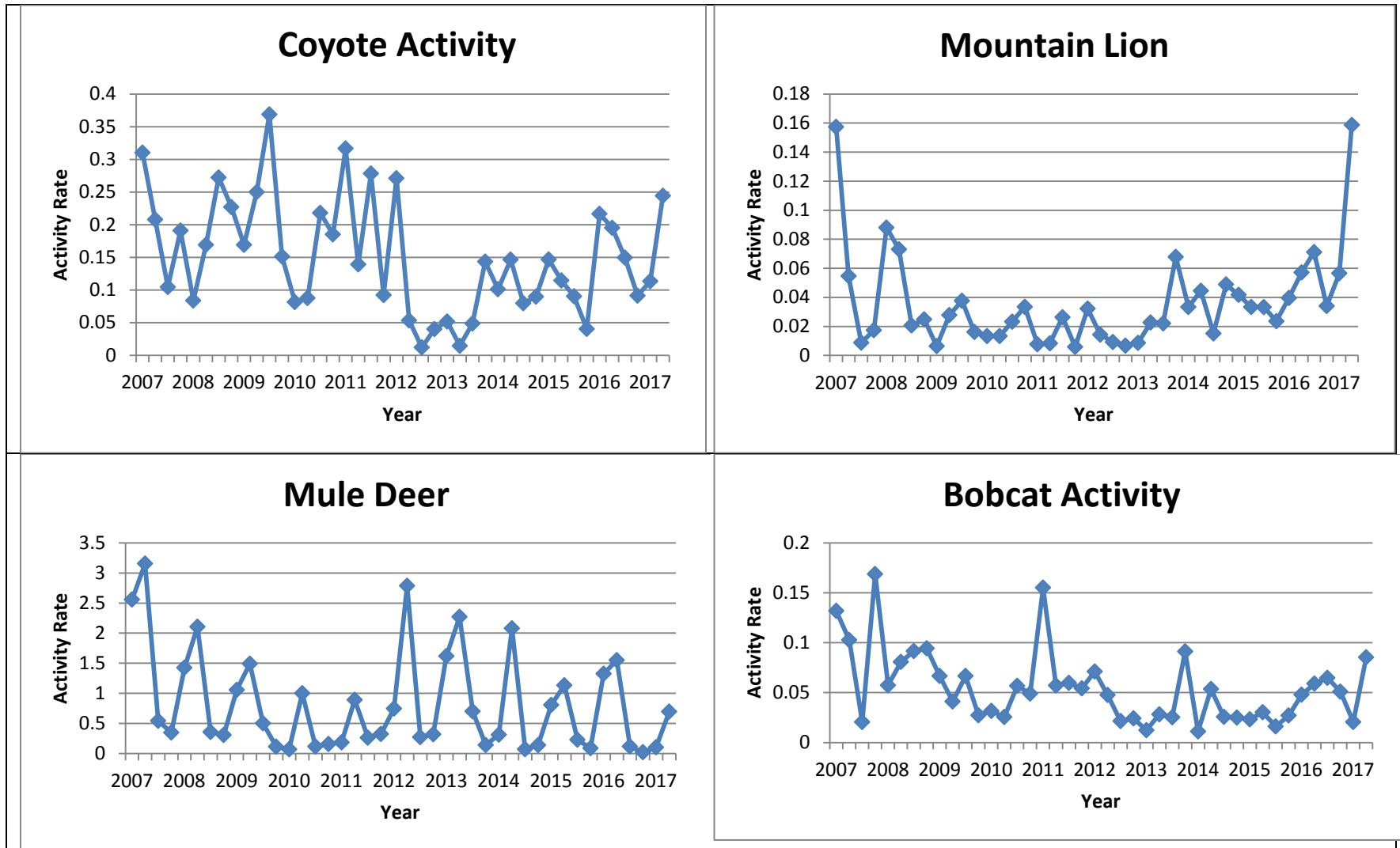
OCP Fig. 2: Projects

# Irvine Ranch Open Space - Central/Coastal Orange County Wildlands



OCP Fig. 3: Surveys and Monitoring Locations

Irvine Ranch Open Space - Central/Coastal Orange County Wildlands



OCP Fig. 4: Wildlife Activity Patterns 2007 - 2017

### City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
<b>Recreational Use Monitoring and Management:</b>		
<p>Current Use Policies:</p>	<p>Self-guided access seven days per week from 7:00 am to sunset on the Bommer Meadows Trail, Nature Loop Trail, Bommer Pass Trail, West Fork Trail, and Turtle Ridge Trail beginning from the new Bommer Canyon Trailhead to the current seven-day trailhead at Ridge Park and Turtle Ridge. Quail Hill Loop Trail and Quail Trail also have self guided access seven days per week from 7:00 am to sunset beginning from the Quail Hill Trailhead. The Quail Trail connects to the seven day per week access configuration on Serrano Ridge in Laguna Coast Wilderness Park.</p> <p>Docent-led hiking, mountain biking, trail running, and equestrian tours from April to November 1, for the public with once per month managed wilderness access days is the current access configuration for all other trails not mentioned above. The maximum limit for docent-led activities is 25 participants, except for Hicks Haul Road hikes, which get 35 participants, with a minimum of 2 "IRC-Certified" volunteers. IRC- led activities include the south portion of the Preserve (Bommer, Shady Canyon, and Quail) as well as activities held in Portola, Round Canyon, Orchard Hills, Hicks Haul Road, and the Native Seed Farm. The Orchard staging area has been popular for hiking activities.</p>	<p>IRC plans to continue to offer the same recreational access configurations throughout the COI-OSP as long as compliance with the NCCP/HCP can be rigorously maintained.</p> <p>Sensitive areas or areas experiencing impacts from recreational use will be fenced off or planted with native plants including shrubs and cactus to assist in managing self guided access over time. Irvine Open Space Patrol and volunteer patrols will be deployed to monitor the public user groups.</p>

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>Public access days in the south portion of the preserve (Bommer Canyon, Shady Canyon) are managed with IRC staff and “IRC-Certified” volunteers. These are offered once per month.</p> <p>In October 2016, a self-guided Exploration Day for 70 hikers and bikers was implemented. This activity is supported by IRC staff and volunteers, along with OC Parks Open Space ranger assistance. This activity begins in the COI Portola Staging area and continues into OC Parks’ Limestone Canyon Preserve to the Sinks and Markle Spur.</p> <p>The public notice procedure for rain and wildfire closure was updated to include use of permanent signage, phone line, and web-based information to improve public compliance to weather closures.</p> <p>Public access on all Irvine Open Space Preserve trails is cancelled during red flag warning conditions and/or strong Santa Ana winds as determined by the Orange County Fire Authority and the National Weather Service. In addition, IRC recommends City staff cancel public access for a minimum of 72 hours following a rainfall event greater than half an inch. Multi-day wind events, prolonged rainfall periods, or major rainfall events in excess of one inch can cancel access for extended periods of time.</p>	

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>The Irvine Police Open Space Patrol is a group of non-sworn officers that patrol the open space during scheduled activities and other times of need (when possible).</p> <p>Note: In the following sections, the term “activities offered” refers to the number of activities publicized for public participation, and the term “activities implemented” refers to the number of activities that took place on the land. Offered activities includes any activities that may have been cancelled due to conditions such as wet conditions or red flag warnings.</p>	
<p>Recreational Monitoring: - Use and Access</p>	<p>IRC offers an array of activities on the COI OSP. The following totals include recreation, education, trail maintenance, restoration, citizen science, volunteer-only activity, and more.</p> <p>Total activities offered: 850                      Total activities implemented: 718                      Total volunteers: 3,956                      Total volunteer hours: 11,920                      Actual participants: 6,390                      Public participant volunteer stewardship/trail crew hours: 1,389</p> <p>The following totals are for public recreation, fitness, and interpretive activities.                      Total recreation activities offered: 487                      Total recreation activities implemented: 398</p>	<p>Access policies shall remain the same for 2018. Volunteer activities are likely to expand to meet demand.</p> <p>Hiking and mountain biking on the Hicks Haul Road will continue in 2018.</p> <p>The Nature Garden will be open to the public on Wilderness Access Days. It will continue to be used for guided-only activities.</p> <p>Construction on Cattle Camp is expected, but will not impede the activities. There are plans to have activities depart from the Turtle Rock Nature Center.</p>

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>Total volunteers: 2,201                      Total volunteer hours: 6,880                      Actual participants: 5,836</p> <p>Total trail crew public activities offered: 13                      Total trail crew public activities implemented: 10                      Total volunteers: 65                      Total volunteer hours: 278                      Public participants: 19                      (Note: The trail crew program trains volunteers to lead or assist in managing trail/habitat maintenance and restoration projects.)</p> <p>Trail crew-only training activities: 1                      Total trail crew public activities offered: 11                      Total trail crew implemented: 9                      Total volunteers: 48                      Total volunteer hours: 208.5                      Total public participants: 13</p> <p>Estimated Annual 7 Day Access of Trails (COI Fig. 1):</p> <ul style="list-style-type: none"> <li>• Bommer Meadow: 62,769 (based on average use from an infrared trail counter)</li> <li>• Bommer Pass: 62,769 (based on average use from cameras with 4 second delay)</li> <li>• Turtle Ridge: 31,140 (minimum use based on average use from cameras with one minute delay)</li> <li>• West Fork: 62,769 (based on average monthly use from infrared trail counter at</li> </ul>	

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>Bommer Meadow). The counter at West Fork malfunctioned in June and was replaced before the end of the year.</p> <ul style="list-style-type: none"> <li>Quail Trail: 21,900 is the average annual count from January and December of 2017, which is consistent with last year’s count. The counts from February through May were extraordinarily high, and the counts from June through November were extraordinarily low (based on average monthly use from infrared trail counter. Note trail requires a minimum 6 mile round trip for most users.)</li> </ul>	
<p>Recreational Monitoring: - Volunteer-only Activities, Outreach Activities, and Patrols</p>	<p>Volunteer-Only Activities, Outreach Activities, and Patrols have been integrated into the Use and Access numbers identified above.</p>	<p>IRC will continue to offer volunteer-only activities, outreach activities, and volunteer patrols upon request.</p> <p>Work has begun to develop expanded programming with an educational focus.</p>
<p>Recreational Monitoring: - City of Irvine Community Services Activities</p>	<p>The City’s Community Services department offers activities to the public including classes, summer camps, badge activities, family campouts (Cattle Camp), and outreach.</p> <p>2017 youth day camps provided themed activity weeks such as “Journey Through Time”, “Geology Rocks!”, “Science of You”, and “Birds of a Feather”.</p> <p>Activities offered: 18 weeks of camp Activities implemented: 18 weeks of camp</p>	<p>The City will continue to offer activities in and around the Cattle Camp area.</p>



City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
<p>User Compliance Programs: - Access Monitoring</p>	<p>Actual participants: 239</p> <p>Camera sites, video surveillance, trail counters, and patrols were conducted to identify and monitor levels of unauthorized access and unauthorized trail use. This allowed IRC to establish unauthorized use patterns and focus resources to manage the issue.</p> <p>IRC continued its human access monitoring. Data monitoring volunteers collected and processed access camera data bi-weekly throughout the year. Total days scheduled: 25 Total days implemented: 23 Access monitoring volunteers: 43 Volunteer hours: 90.5</p> <p>In an effort to reduce unauthorized public access, targeted enforcements were implemented based on use patterns of unauthorized public access. Enforcement activities included patrols, visual deterrence, and warnings issued by the Irvine Open Space Patrol.</p> <p>Data was compiled into a matrix and distributed to the City’s Open Space Patrol personnel and IPD personnel via a secure cloud-based document website. Authorized personnel have direct access to data matrix spreadsheets and photographs of unauthorized uses of the Open Space Preserve.</p>	<p>Continue use of camera sites, video surveillance, trail counters, and patrols to identify and monitor levels of authorized and unauthorized access and trail use.</p> <p>Aggressively deter unauthorized access through a number of means. These include closures of unauthorized trails, gate and fence management, signage, increased patrols, citation, and other enforcement activities.</p> <p>Additional trail counters may be implemented and rotated throughout the Irvine Open Space to compile user pattern data for unauthorized use of both the sanctioned and non-sanctioned trails. Some of these counters may be placed at camera trap sites to obtain the most accurate possible data about unauthorized use.</p> <p>Data will continue to be compiled into a matrix to be distributed to the City’s Open Space Patrol personnel to help keep them informed of use patterns in the NCCP areas outside of the scheduled docent led activities, the operating hours of the area, the use of any non-authorized trails, and entry of dogs into the area.</p> <p>The City’s Police Department and Animal Control Services will continue to issue citations when deemed necessary for unauthorized use and dog</p>

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>The following Irvine Police enforcement activities were conducted:                      Total hours details assigned: 1,903                      Number officers assigned: 1 Open Space ranger, 1 sergeant, 5-10 officers who assist periodically on bike patrol, and 4 mounted detail                      Educational Policing Contacts: 5,015 (emphasized an education first mentality)                      Citations issued: 32                      Warning issued: 923                      Arrests: 0</p> <p>City of Irvine's <b>5.8.3 Public Access and Recreation Policies</b> state, in part:</p> <p><i>6. Because of the importance of appropriately managing recreational use within the reserve in order to protect habitat areas from intrusions, reserve managers shall take the following steps to increase enforcement capabilities and thereby minimize impacts of recreational use on reserve habitat values:</i></p> <ul style="list-style-type: none"> <li>• <i>Trail user groups shall be encouraged to participate in "self monitoring and policing" programs to minimize instances of off-trail activities and other abuses to habitat resources within the reserve;</i></li> <li>• <i>If allowed by state and local regulations, park rangers shall be given the authority to issue citations for misuse of trail or other park facilities;</i></li> </ul>	<p>infractions. The enforcement step is necessary to address problems created from a change in the human access configuration. This step also aligns with the guidelines identified in the NCCP document.</p>

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<ul style="list-style-type: none"> <li><i>Fines levied for abuse of park facilities resulting in harm to species or sensitive habitat shall be sufficient to discourage repeat occurrences;</i></li> </ul> <p><i>Repeated offenses by multiple users shall provide the grounds for temporary closure of trail segments and, where necessary, entire parks as a means of avoiding unacceptable adverse impacts to habitats/species within the reserve. Such temporary closures also will serve to educate users concerning the need to obey park and reserve rules and regulations, thereby reducing future recreational impacts on the biological resource of the Reserve System.</i></p>	
<p>User Compliance Programs: - Monitoring and Human Access Management</p>	<p>Nine remote wildlife cameras are currently being maintained to concurrently monitor wildlife and human activity. Two permanent trail counters continue to be operated at West Fork and Quail Trail to more accurately estimate 7-day access patterns.</p> <p>Thirteen trail transects installed in the COI-OSP South are monitored annually to track trail condition and document trail use impacts across the Coastal Reserve. Monitoring for 2017 was initiated in November and completed in early 2018. Trail use is recorded digitally via post program reports for managed access and, in part, using remote cameras. Seven day access areas are monitored primarily using trail counters and remote cameras.</p>	<p>Scoutguard wildlife cameras will continue to be operated. Wildlife response will be closely monitored to identify long-term changes in usage patterns relative to human activity.</p> <p>Trail transects will be surveyed again in 2018.</p> <p>Management hypotheses developed in 2012 and further refined in 2017 will be evaluated through 2020 in an effort to understand and manage for wildlife as well as for human activity.</p> <p>Budget permitting, implement live-feed still-photo camera locations targeted at known areas of high-risk activities, such as areas of extensive nighttime use, fire pits, unauthorized vehicles, etc. These cameras will have the ability to relay</p>

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>An estimate of 2017 COI-OSP South trail use is provided in COI Fig. 1. Data are typically comprised of public program records for all restricted trails and trail counter or remote camera data for 7-day access trails. In 2017, public program records could not be accurately associated with trail segments; estimated public access is presented for 7-day access trails.</p> <p>CDFW LAG funding was received by NCC in collaboration with IRC to study recreation and its effects on wildlife. Funding totaled \$75,000 and included a supplemental in-kind match from NCC, IRC, and OC Parks. Project title: Assessing effectiveness of adaptive recreation management strategies and evaluation of core NCCP habitat areas. A final report was completed by NCC and is available upon request. A manuscript was published from an earlier LAG grant to IRC in Biological Conservation and is available upon request (Patten and Burger, 2018).</p> <p>Continued implementation of a web-based photo database for all human access camera locations. IRC management and field patrol personnel (Open Space Patrol Officers and IPD Officers) will have direct encrypted access to human access photos as well as a database spreadsheet of unauthorized access. This photo database will provide more effective means for field patrol personnel to target specific days,</p>	<p>photos directly to a web-based storage drive and provide instant notification to selected patrol personnel of unauthorized presence in the area.</p>

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
<p>Educational Outreach: - IRC Citizen Science Program</p>	<p>times, and locations for their patrols.</p> <p>IRC’s Citizen Science program is designed to implement scientific research by trained and supervised volunteers. Citizen Science activities in the Irvine Open Space Preserve in 2017 included: wildlife camera trapping, both public and volunteer-only invasive and restoration monitoring, and select research projects.</p> <p>Total citizen science activities offered: 55 Total citizen science activities implemented: 38 Citizen science volunteers: 117 Volunteer hours: 504 Public participants: 6 Total public hours: 30</p>	<p>Citizen scientists will continue to collect camera trap data to monitor wildlife activity in relation to human access, assess the type and level of unauthorized access, and track trends in wildlife diversity and abundance over time and space. The program will continue to include invasive species and restoration monitoring in the COI OSP.</p>
<p>Educational Outreach: - IRC Land Steward Steward Program</p>	<p>IRC conducted two land steward trainings, three native farm steward trainings, and several individual trainings for documenting and mapping invasive control efforts, monitoring raptor nests, and herbicide use for lead land stewards.</p> <p>Stewardship activities included invasive species control, restoration, native seed farm, and native plant nursery maintenance. This program was expanded to include native cactus planting to block unauthorized/social trails and staging area community stewardship plantings (recorded under Restoration). Several lead land stewards conducted private solo stewardship activities with great success. A digital invasive control reporting</p>	<p>The land steward program will continue to offer invasive species removal and restoration opportunities. Nursery activities and community stewardships will continue to be public program opportunities in 2018.</p> <p>Farm steward quarterly trainings will continue to be operated separately.</p> <p>Lead land stewards will continue to conduct the majority of invasive control work within COI-OSP South in areas where NCC has retired its weed control program. More restoration activities will become available with the initiation of cactus scrub restoration work at Mule Deer.</p>

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>tool continues to be utilized by lead land stewards. An online map link continues to be available for land stewards to view status of invasive control across reserve areas, which is available upon request. A small native plant nursery has been established at the Quail Loop Trailhead maintenance facility, supporting community stewardship activities with locally sourced plants. Note that activities offered and implemented include individual private activities and span both NCCP and non-NCCP.</p> <p>Invasive Control Activities:                      Total activities offered: 25                      Total activities implemented: 21                      Volunteers participating: 65                      Volunteer hours: 272.5                      Public participants: 11</p> <p>Restoration Activities:                      Total activities offered: 65                      Total activities implemented: 54                      Volunteers participating: 96                      Volunteer hours: 296                      Public participants: 208</p> <p>Native Farm Activities:                      Total activities offered: 54                      Total activities implemented: 49                      Volunteers participating: 284                      Volunteer hours: 1,080.75                      Public participants: 298</p>	

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
<p>Educational Outreach: - IRC Trail Crew Training Activities</p>	<p>Conducted volunteer trail crew training and implemented an adopt-a-trail program to assist with ongoing monitoring and maintenance of trail system.</p> <p>Completed volunteer and public trail Projects: 9 Volunteer-only Trail Crew training sessions: 1 Public and Volunteer-only Trail maintenance projects: 9</p>	<p>Continue training trail crew volunteers and offer advanced training in specific areas of trail work such as power equipment, rock armoring, and other specialty techniques.</p>
<p><b>Recreation Facility Construction and Maintenance</b></p>		
<p>Maintenance of Existing Facilities (Loma Ridge): - Signage</p>	<p>Signage was monitored and maintained.</p>	<p>Signage will be monitored and maintained as necessary.</p>
<p>Maintenance of Existing Facilities (Loma Ridge): - Orchard Hills Loop Trails and Changala's Pass</p>	<p>Continued human access monitoring with existing Upper Loop including replacing the vandalized upper loop camera. Added a new camera to the Trailhead.</p> <p>Continued closure of social trail off Changala's Pass by planting 50 additional cactus pieces, adding native seed and repairing wire fence at top of social trail.</p> <p>Performed regular vegetation trimming.</p>	<p>Make small alignment adjustments to Changala's Pass to increase its sustainability despite increased use.</p> <p>Continue vegetation management when necessary.</p> <p>Monitor and perform repairs on existing trail as needed.</p> <p>With concurrence of City staff, remove dead eucalyptus trees adjacent to the trail system as needed. Also remove newly planted eucalyptus trees that fall within NCCP area.</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
		<p>Monitor closure of Changala's Pass social trail.</p> <p>Possibly install additional cameras to monitor unauthorized access.</p>
Facility Replacement / Repair (Loma Ridge): Radio Repeater	Repeater was tested and serviced to address radio reception issues.	Repeater may be removed or modified to improve radio reception.
New Construction or Expansion (Bonita Cyn.):	N/A	N/A
Maintenance of Existing Facilities (Bonita Cyn.):	Monitored area for unauthorized activities and trails.	Continue to monitor area for unauthorized activities and trails.
Facility Replacement / Repair (Bonita Cyn.):	N/A	N/A
Maintenance of Existing Facilities (Bommer Cyn.): - Nature Garden	<p>Continued to manage and maintain the Nature Garden including weeding, watering, planting grasses and shrubs, trimming vegetation, adding mulch, and maintaining drains and cable fences.</p> <p>Applied maintenance coating of resin stabilizer to decomposed granite trail surfaces.</p> <p>Removed chicken wire herbivore fencing as plants matured and no longer required it.</p>	<p>Continue to weed and plant in bare spots in the garden. Monitor and maintain cable fencing.</p> <p>Coordinate with City staff on maintenance and repairs of adjacent facilities in Cattle Camp.</p> <p>Monitor signs and repair/replace as needed.</p> <p>Install interpretive signage and benches.</p>
Maintenance of Existing	Planted cactus pads to close gaps in landscaping	Continue to coordinate with City staff when



City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
Facilities (Bommer Cyn.): - Bommer Trailhead	and eliminate social trails connecting trailhead with Bommer Meadow trail.	necessary regarding trailhead maintenance.
Maintenance of Existing Facilities (Bommer Cyn.): - Bommer Meadow, Nature Loop, Ridge Route, Turtle Ridge, Bommer Pass, West Fork, Cattle Camp	<p>All Trails – Performed routine trimming, mowing, and tread maintenance to keep trails open and control erosion.</p> <p>Bommer Meadow - Monitored and repaired fences closing shortcut trails. Repaired and re-installed bridge at AZ crossing after storm damage.</p> <p>Nature Loop – Re-surfaced existing decomposed granite trail and compacted.</p> <p>Ridge Route - Monitored for creation of social trails connecting Ridge Route with Bommer Pass. Cleared drains.</p> <p>Turtle Ridge – Built 39 new drains, re-shaped 3 linked turns, and removed 670’ of rut. Planted 6 shrubs to anchor turns.</p> <p>Bommer Pass - Performed routine maintenance repairs to the trail tread to improve drainage. Added 2 new drains. Monitored and maintained 11 social trails closed in 2013 including maintaining fences.</p> <p>West Fork - Performed vegetation trimming at the upper and lower connections of the trail to maintain vehicle width for emergency access.</p>	<p>All Trails - Continue vegetation management when necessary. Monitor and perform repairs on existing trails as needed, especially clearing and improving drainage features.</p> <p>Bommer Meadow - Continue to monitor and close any additional unauthorized social trails that appear. Resurface to restore tread shape and improve drainage.</p> <p>Nature Loop - Repair decomposed granite trail surface where necessary. Plant shrubs and cacti to anchor turns and discourage social trail creation.</p> <p>Ridge Route - Continue to monitor and close social trails connecting Bommer Pass and Ridge Route. Improve drainage.</p> <p>Turtle Ridge – Continue to monitor for social trail creation. Re-shape turns where necessary.</p> <p>Bommer Pass - Continue to water social trail restoration plantings as needed. Re-build trail tread to original width. Plant additional shrubs to discourage off trail use.</p> <p>West Fork - Monitor and perform repairs on existing trail as needed. Upon City approval,</p>

## City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
		<p>relocate the existing upper West Fork gate to the upper terminus trail connection at Pacific Ridge/Laguna Coast Wilderness Park.</p> <p>Cattle Camp Area - A small radio repeater is planned for the Cattle Camp area (near the existing staff trailer) to further enhance program and emergency radio coverage within the Open Space Preserve.</p>
<p>Maintenance of Existing Facilities (Bommer Cyn.):</p> <ul style="list-style-type: none"> <li>- Gates</li> </ul>	<p>Painted and serviced vehicle and recreation gates.</p>	<p>Monitor locks on gates to ensure only authorized parties have access.</p> <p>Install locks on vehicle gate at entrance to Cattle Camp to reduce trespassing in Cattle Camp.</p>
<p>Maintenance of Existing Facilities (Bommer Cyn.):</p> <ul style="list-style-type: none"> <li>- Radio Repeater</li> </ul>	<p>Replaced solar controller and performed tests to improve reception.</p> <p>Planted shrubs to screen repeater cabinet.</p>	<p>Continue performing semiannual monitoring of existing solar radio repeater.</p> <p>Work with new vendor to improve radio performance.</p>
<p>Maintenance of Existing Facilities (Bommer Cyn.):</p> <ul style="list-style-type: none"> <li>- Signage</li> </ul>	<p>Monitored signage and replaced/updated signs as needed.</p>	<p>Continue to monitor sign condition and replace as needed.</p>
<p>Maintenance of Existing Facilities (Bommer Cyn.):</p> <ul style="list-style-type: none"> <li>- Bridges</li> </ul>	<p>Performed semi-annual maintenance checks and improvements (ie: tightening and staining) on existing bridges.</p>	<p>Continue semi-annual maintenance checks and improvements.</p>
<p>Maintenance of Existing Facilities (Bommer Cyn.):</p>	<p>Installed and repaired existing fencing where needed.</p>	<p>Fence will be monitored and repaired as needed.</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
- Fencing		
Facility Replacement/ Repair (Bommer Cyn.):	N/A	N/A
New Construction or Expansion (Shady Cyn.):	N/A	N/A
Maintenance of Existing Facilities (Shady Cyn.): - Quail Trail, Rabbit Run, Cattle Crest, Fox Run and Shady Oaks, West Cyn, East Cyn, Serrano Ridge, Shady Oaks Road, Butterfly Valley, Bobcat Spur, Monkeyflower Mesa	<p>All Trails - Performed routine trimming, mowing, and tread maintenance to keep trails open and control erosion.</p> <p>Quail Trail – Planted 10, 15-gallon native shrubs and additional cactus, maintained existing plantings and added native chaff to anchor “S” turns. Coordinated with Shady Canyon HOA to ensure that future maintenance of this fuel mod avoids these plants. Removed 5+ gallons of glass pieces from 70’ section of trail. Worked with City staff to ensure consistent Open Space messaging at new Quail Hill Community Center.</p> <p>Rabbit Run – Monitored section of trail rerouted in 2014 to ensure restoration to natural habitat.</p> <p>Cattle Crest - Monitored section of trail rerouted in 2013 to ensure restoration to natural habitat.</p> <p>Shady Oaks Road Closure – Monitored.</p> <p>Shady Oaks Single Track – Completed drainage overhaul started in December 2016 by building 5</p>	<p>All Trails - Continue to monitor and perform repairs on existing trails as needed. Install enhancements to trail tread such as rock armoring, drainage features, and berms</p> <p>Quail Trail - Continue restoration planting in abandoned road bed and in between turns.</p> <p>Monitor drains and tread and repair as necessary.</p> <p>Rabbit Run - Monitor and reinforce closed section to ensure restoration to natural habitat. Clear drainage dips.</p> <p>Cattle Crest - Clear drainage dips. Continue to monitor and reinforce closed section to ensure restoration to natural habitat.</p> <p>Shady Oaks Road Closure – Continue to monitor.</p> <p>Fox Run – Reroute trail where unsustainable.</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>new drains at the north end of the trail.</p> <p>Fox Run – Completed drainage overhaul started in December 2016 by building 2 new drains and removing 150' of rut.</p> <p>All SCE Roads – OCFA performed grading and brushing on behalf of SCE per specs in MOU. Ruts were removed and drains added to roads to increase sustainability and accessibility. Steep berms were re-shaped to lower angles to improve ease of future vegetation maintenance and mitigate road channelization. Trimmed vegetation was chipped and broadcast off trail or left whole to be used by OC Parks staff for social trail mitigation on Serrano Ridge.</p>	<p>All SCE Roads: OCFA will complete roadside brushing on behalf of SCE. IRC staff will make small drainage improvements where possible.</p>
<p>Maintenance of Existing Facilities (Shady Cyn.):</p> <ul style="list-style-type: none"> <li>- Bridges</li> </ul>	<p>Performed semi-annual maintenance checks on existing bridges.</p> <p>Cleaned and performed application of stain to all bridge surfaces with Valspar chestnut stain to match existing wood components in the area.</p>	<p>Continue semi-annual maintenance checks.</p>
<p>Maintenance of Existing Facilities (Shady Cyn.):</p> <ul style="list-style-type: none"> <li>- Shady Oaks restoration</li> </ul>	<p>Performed a semiannual maintenance check of the closed restoration site.</p>	<p>Monitor signage at all trail intersections with closed Shady Oaks Road Restoration Site.</p>
<p>Maintenance of Existing Facilities (Shady Cyn.):</p> <ul style="list-style-type: none"> <li>- Signage</li> </ul>	<p>Monitored signage and updated and replaced where necessary.</p>	<p>Monitor signage and kiosks and replace as necessary. Replace 18" tall "utility only" markers with more visible 40" tall markers. Replace all signage impacted by SCE road maintenance</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
		work.
Facility Replacement / Repair (Shady Cyn.):	N/A	N/A
Maintenance of Existing Facilities (City of Irvine parcels in City of Newport Beach):	Performed periodic patrols to inspect fences and monitor condition of the land. Report dumping and graffiti to City.	Continue to patrol parcels. Report unusual conditions to City and make minor repairs where appropriate.
<b>Infrastructure Construction and Maintenance:</b>		
Removal of Inactive Field Research Materials	<p>Removed several hundred rebar and PVC markers from old mitigation site between Bommer Meadow and Nature Loop (Bommer Canyon).</p> <p>Removed wire fence enclosure at intersection of Shady Oaks Rd and singletrack (Shady Cyn).</p>	IRC will evaluate all active and inactive field studies and mitigation sites and remove field markers no longer deemed active or necessary.
<b>Habitat Restoration and Enhancement:</b> (Note: Funding Sources noted in first column if other than Land Owner)		
Exotic Plant Eradication: - Program Summary (NCC, in part)	Priority invasive species were removed/treated across approximately 405 acres, of which 275 were within NCCP boundaries. A total of 1,827 person hours were spent on control (compared to a corrected estimate of 1,170 hours in 2016). Artichoke thistle continued to be a major target species due to past effort invested and the ability of this species to rebound without control. Efforts	<p>Eradication and control efforts are ongoing. See below for species-specific details.</p> <p>A regional annual coordination meeting is planned to update neighboring land owners and managers on control efforts and prioritization.</p>

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>continued to expand to include other species, such as Sahara mustard, garland chrysanthemum, stinknet, and fountain grass. Invasive control activities were conducted by staff, contractors, and volunteers.</p> <p>Since 2016, the City has implemented an Integrated Pest Management (IPM) policy for all its lands that has functionally prohibited the use of synthetic herbicides on all City property including the Open Space Preserve. IRC has fully complied with the City’s IPM policy during that period. No synthetic pesticides were used to control invasive species in 2017 due to IPM restrictions: only manual methods and non-synthetic pesticides were utilized.</p> <p>IRC conducted field experiments with the non-synthetic herbicide Suppress® for various annual and perennial weeds. Summaries of results are available in quarterly and summary reports to the City. IRC staff determined that Suppress® was not an effective tool for treatment of perennial and pernicious annual weeds and therefore reverted to manual methods in most cases.</p> <p>2017 marked the first year that the joint Invasive Plant Management Plan for the Coastal NCCP was implemented. The Plan prioritized control of more widespread species to be focused in core areas within Shady Canyon. Early detection/rapid response was successfully implemented through</p>	

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>NCC-funded surveys of all trails.</p> <p>The City augmented its funding of invasive control efforts in 2017 to partially cover the increased cost associated with manual and non-synthetic herbicides. Effort was reduced for certain areas and certain species consistent with funding limitations. Supplemental funds from the City were primarily focused on control of artichoke thistle in Shady and Bommer Canyons, and Quail Hill management areas. Several species and populations were not treated because currently available tools and funding under the City’s IPM policy implementation were inadequate to effectively control them. These include, but are not limited to: pampas grass, tamarisk, larger remote stands of fountain grass, and perennial pepperweed (if discovered). Sahara mustard continued to absorb the majority of control efforts in COI-OSP North.</p> <p>This approach reduced the overall effectiveness of invasive species control activities in the Open Space Preserve in 2017.</p>	
<p>Exotic Plant Eradication: - Monitoring and Prioritization (NCC, in part)</p>	<p>Control efforts within COI-OSP were based on the 2014 Coastal and 2016/2017 Central aerial weed survey, prioritizations from the Coastal Invasive Plant Management Plan, and new observations of emergent weeds. More focus has been placed on incipient populations of newer invasive to the County that could spread more</p>	<p>IRC is implementing the draft Invasive Plant Management Plan for the Coastal reserve in its invasive control planning for 2018. Control efforts will include monitoring and treatment of previously treated areas to the degree possible without use of synthetic herbicides as per City request under the current IPM policy.</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>existing permitted tools but are continuing to be monitored for. A new population of garland chrysanthemum was treated unsuccessfully with Suppress® in Shady Canyon. A new population of Sahara mustard was discovered and pulled near Mule Deer for a second year. A new population of Stinknet was found in Bommer Canyon and removed. A first county record of long-flowered veldtgrass was discovered in Bonita Canyon but could not be re-found.</p> <ul style="list-style-type: none"> <li>• IRC transitioned to using the CalFlora WeedManager tool to document assessments and treatments of invasive weeds.</li> <li>• Volunteer-led control efforts for invasive plants were conducted in Bommer Canyon, Turtle Ridge, and along Ridge Route, Quail Trail, Quail Hill, Serrano Ridge, and Mule Deer.</li> </ul>	
<p>Exotic Plant Eradication: - Artichoke Thistle</p>	<p>Reductions in acreage treated are primarily the result of reduced capacity due to methodological constraints.</p> <p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 248 gross acres and 1.91 net (compared to 376 gross and 0.5 net in 2016)</li> <li>• Estimated 22,633 plants (4,593 in 2016)</li> </ul>	<p>Artichoke thistle control will continue as funds permit via manual control or other methods permitted by the City given lack of control efficacy of organic herbicides.</p>



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Program, Project, Activity	2017 Progress Report	2018 Work Plan
- Sahara Mustard	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 35.05 gross acres and 1.53 net (compared to 87.9 gross and 0.56 net in 2016)</li> <li>• Estimated 189,685 plants (up from 77,317 in 2016)</li> </ul> <p>A total of 10 sites now occur on COI-OSP and COI-dedicated wildlands, several of which were newly discovered in orchards. Individual populations that have been pulled/treated for years have lower net cover but new satellite populations are emerging and full control looks doubtful.</p>	<p>Year 9 of Sahara mustard eradication efforts in Orchard Hills and Area R will continue in 2018.</p>
- Garland Chrysanthemum	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 0.45 gross acres and 0.01 net in 2017 (up from 0.02 gross and &lt;0.001 net in 2016).</li> <li>• Controlled using 681 mL of Suppress® (concentrate)</li> </ul>	<p>Garland Chrysanthemum will continue to be treated where it has been found.</p>
- Fennel	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 0.32 gross acres and 0.01 net (compared to none in 2016)</li> <li>• 210 plants</li> </ul>	<p>Fennel control will continue opportunistically.</p>
- Fountain Grass	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>• 7.71 gross acres and &lt;0.001 net (compared to 2.47 gross and 0.006 net in 2016)</li> <li>• Estimated 11 plants (down from 100 in 2016)</li> </ul>	<p>Fountain grass control will be opportunistic and prioritized if sufficient resources and appropriate tools are available.</p>
- Milk and Italian Thistle	<p>Treatment within NCCP:</p>	<p>Milk and Italian thistle control will continue</p>

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- Bull Thistle	<ul style="list-style-type: none"> <li>None in 2017 (compared to 0.36 gross acres and 0.146 net and 800 plants in 2016)</li> </ul>	<p>opportunistically as a lower priority.</p>
- Bull Thistle	<p>Bull thistle was not found in the Preserve in 2017.</p>	<p>Bull thistle control will continue where it is observed.</p>
- Tree Tobacco	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>1.06 gross acres and 0.02 net (down from 9.62 gross and 0.25 net in 2016)</li> <li>Estimated 222 plants (up from 159 plants in 2016)</li> </ul>	<p>Tree tobacco control will be opportunistic and continue in areas previously identified and as resources and available methods permit.</p>
- Castor Bean	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>0.015 gross acres and &lt;0.001 net (down from 2.93 gross and 5.29 net in 2016)</li> <li>Estimated 4 plants (down from 3,080 plants in 2016)</li> </ul>	<p>Castor bean control will continue in areas they have been identified as resources permit.</p>
- Stinknet	<p>Treatment within NCCP:</p> <ul style="list-style-type: none"> <li>A single population consisting of two plants was found and removed in Bommer Canyon along the access road by Ridge Route.</li> </ul>	
- Pampas Grass	<p>No pampas grass was treated within the COI-OSP in 2017.</p>	<p>Pampas grass will not be treated until non-organic herbicides are permitted or another effective control measure is found.</p>
- Tamarisk	<p>No tamarisk was treated within the COI-OSP in 2017.</p>	<p>Tamarisk identified in coastal weed survey will not be treated until non-organic herbicides are permitted or another effective control measure is found.</p>

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<p>Exotic Animal Control: - Exotic Animal Monitoring</p>	<p>Wildlife cameras: 36 domestic dogs were observed in the months of March, June, and September on trails where dogs are prohibited. Most occurred on the Turtle Ridge in Bommer Canyon and Quail Trail, bordering the Shady Canyon and Turtle Ridge neighborhoods.</p> <p>Access cameras: 60 domestic dogs were observed in the COI-OSP South land on the Bommer Pass camera and on Serrano Ridge at Cattle Crest.</p>	<p>Enforcement of 'no dog' policy will continue within the Preserve.</p> <p>Invasive amphibians will again be removed from the Turtle pond.</p>
<p>Exotic Animal Control: - Polyphagous and Kuroshio Shot hole Borer (NCC, part)</p>	<p>IRC continued to monitor for the emergent tree pests Polyphagous Shothole Borer (PSHB) and Kuroshio Shothole Borer (KSHB) (collectively invasive shot hole borer (ISHB)).</p> <p>107 trees were surveyed. 28 trees were found to be infested as follows: 3 sycamores in Shady Canyon; 3 red willows in Butterfly Valley; 4 red willows and 1 sycamore in Buck Gully; and 10 red willows, 6 sycamores, and 1 arroyo willow in Bommer Canyon.</p> <p>To date, there are 47 trees on COI-OSP with confirmed <i>Fusarium</i> dieback.</p>	<p>At this stage, IRC does not have a feasible treatment or management strategy but will continue to monitor for these tree pests. The locations of all surveyed trees will be recorded and maintained in a database. Infested trees will be verified by UC Riverside specialists, and the data will be made available to land managers and researchers tracking and managing infected trees. Any plans to treat trees, preventively or otherwise, will be reviewed by specialists because information on the complex and its treatment is developing rapidly.</p> <p>Monitoring for PSHB is currently being conducted throughout the NCCP Reserve by researchers from UC Riverside and UC Santa Cruz through a Local Assistance Grant to NCC. IRC will support this research and conduct targeted monitoring on IRC-managed OC Parks lands in collaboration</p>

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		with OC Parks staff.
Habitat Restoration: - Program and Prioritization	Completed a draft habitat restoration plan for Bommer Canyon. See the Restoration Planning section below for more details. As described below, IRC also maintained and managed several active and ongoing restoration sites in the COI-OSP.	A final habitat restoration plan for Bommer Canyon will be completed in January 2018 and provided to the TAC.
Habitat Restoration and Revegetation: - Bommer Canyon	Completed a draft habitat restoration plan for Bommer Canyon. The plan summarizes the goals, strategies, and methods to be used to restore up to 14 acres of habitat over the next seven years in the Bommer Canyon Management Unit.	In 2018, IRC staff will review the Bommer Habitat Restoration Plan and update as appropriate. Any major proposed changes will be discussed first with NCC.
Habitat Restoration and Revegetation: - Stewardship Work Days	<ul style="list-style-type: none"> <li>• In total, 16 stewardship work days were held in 2017. Of these, 9 occurred in the Quail Hill area: 3 were for habitat restoration activities and another 6 were devoted to artichoke thistle control. Four events took place in Bommer Canyon. The remaining 3 stewardships took place at the mule deer restoration area. Another 4 scheduled events were cancelled due to rain/unsafe conditions.</li> <li>• Several additional days were dedicated to invasive species control within the Preserve by lead land stewards, primarily in the Bommer Canyon area (COI Fig. 2). Stewardship activities along the Turtle Ridge</li> </ul>	A similar number of stewardship work days at these same locations are planned for 2018.

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>trail were continued, as well as trailside planting events to curtail unauthorized trail use.</p>	
<p>Habitat Restoration and Revegetation: - Cactus Wren Habitat Linkage Restoration-East Canyon Sites</p>	<p>Cactus Wren Habitat Linkage Restoration:</p> <ul style="list-style-type: none"> <li>• Goal: Extend the area of NCC’s cactus linkage project by adding two additional cactus patches. These sites are the northern-most linkages which connect patches of cactus in a line-of sight arrangement in an effort to enhance movement opportunities for the Cactus Wren.</li> <li>• See Figure 3</li> <li>• 2 polygons</li> <li>• 100% complete as of 2017</li> <li>• Total project area: 0.63 acres</li> <li>• Goal vegetation types: Cactus (<i>Opuntia littoralis - sensu lato</i>)</li> <li>• Year started: 2010</li> <li>• Restoration methods: Sites evaluated in 2010, patches planted in 2010 and 2011 with salvaged pads from Siphon Reservoir area. Low-dose Fusillade (grass-specific herbicide) has been used from 2011 to the 2016 implementation of the City IPM program to control non-native grasses around plantings.</li> <li>• Management in 2017 consisted of monitoring all cactus restoration sites and estimating cactus height and health as well as native vegetation cover. Cactus on average remain below 1 m in height, the minimum height</li> </ul>	<p>The east canyon sites will be monitored in 2018 but no activities are planned.</p>

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	<p>considered suitable for cactus wren nesting. A broader “Cactus Wren Restoration Assessment” report that include an evaluation of this site is available upon request.</p>	
<p>Habitat Restoration and Revegetation:                      - Native Seed Farm                      (Additional funding for part of the infrastructure improvement plan provided by Orange County Parks Foundation)</p>	<ul style="list-style-type: none"> <li>• Approximately 8 acres of growing area were maintained at the native seed farm in 2017.</li> <li>• 12 native shrubs, 27 native forbs, and 4 native grasses were maintained, 3 new species were planted, including 20 mature <i>Opuntia littoralis</i> (courtesy of NCC), resulting in a total of 47 native species.</li> <li>• The seed collected from the farm will serve as a source of seed for current and future restorations</li> <li>• Plants were started, maintained, and harvested using staff, volunteer, and contract labor.</li> <li>• Harvests from the 2017 crop included: California sagebrush, Coast buckwheat, Bush sunflower, Arroyo lupine, Purple owl’s clover, Slender buckwheat, Strigos lotus, Brickell bush, Tarragon, and Cliff aster).</li> <li>• Farm harvested seed totaled over 1,300 lbs. and served as the primary source for restoration seeding.</li> <li>• Development of infrastructure within a 2.5-acre dedicated area included: installation of an ADA-accessible volunteer meeting area with restroom, cement sidewalks to access the nursery, picnic tables and umbrellas for</li> </ul>	<ul style="list-style-type: none"> <li>• 8 acres of growing area will be maintained at the seed farm in 2018, with 47 native species being maintained.</li> <li>• Species composition will vary slightly from 2017, with <i>Clarkia purpurea</i> (Winecup clarkia) and <i>Emmenanthe penduliflora</i> (Whispering bells) taking the place of <i>Cordylanthus rigidus</i> (Birds beak) and <i>Nicotiana quadrivalvus</i> (native tobacco).</li> <li>• Planned improvements to the infrastructure include marked parking stalls, privacy surrounds for the volunteer meeting area, and storage bins for nursery materials.</li> <li>• Plans will be developed (in collaboration with Orange County Fire Authority) for an educational demonstration garden intended to educate the public on defensible space planting with native plants.</li> <li>• Additional educational programming targeting youth will be developed, subject matter TBD.</li> </ul>

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	the meeting area, and structures for equipment storage.	
Habitat Restoration and Revegetation: - Dudleya Restoration	Complete. The site was not surveyed in 2017. In 2016, 22 plants were observed, up from zero in 2015 (Fred Roberts pers comm).	Planted <i>Dudleya</i> will be checked in the spring of 2018. Reference sites will also be visited to compare phenology such as the time of blooming.
Habitat Restoration and Revegetation: - Stewardship Restoration Trial	This small enclosed area is currently being utilized for community stewardship events by the Community Programs department.	Community Programs will continue nursery activities, planting, and site maintenance with the help of IRC-certified volunteers in 2018.
Habitat Restoration and Revegetation: - Cactus Restoration Pilot	<ul style="list-style-type: none"> <li>• Two of four pilot cactus restoration study sites, initiated in the winter of 2008/2009, occur in COI-OSP South.</li> <li>• Cactus transplant size and vigor have been monitored annually from planting until 2014 and then again in 2017, in order to determine the effect of microsite on establishment and growth of prickly pear pads and transplants and the speed of transplant growth of cholla and prickly pear.</li> <li>• After 9 years, mean height of prickly-pear cactus planted as single pads was 0.65m (SE=0.015), suggesting an average growth rate of 8 cm/ year. Height and width of cactus differed significantly among restoration sites (F(df)=7.526; p&lt;0.001).</li> <li>• Differences among sites appear to be the result of both biotic and abiotic factors; cactus</li> </ul>	A more detailed summary of results will be compiled if time permits. Cacti will be measured again in 2017.

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	<p>height was negatively correlated with weed cover (-0.008) and positively correlated with steeper and more southerly facing terrain (0.065).</p> <ul style="list-style-type: none"> <li>Habitat quality between restoration sites and sites occupied by cactus wren remains dissimilar; occupied sites have more cacti above 1 m in height and greater cover of California buckwheat than do restoration sites.</li> <li>A final report of this activity in the context of a larger study is available upon request.</li> </ul>	
<p>Habitat Restoration and Revegetation: - Portola Springs Salvage Cactus to Mule Deer Restoration Site: (NCC, in part)</p>	<ul style="list-style-type: none"> <li>In November of 2014, 12 prickly pear and cholla were planted at the Mule Deer Restoration Site (Shady Canyon). To date, all transplants have survived and appear healthy.</li> <li>For the first time at the Mule Deer project site, cactus wren were observed foraging and nesting in transplanted cactus, suggesting large transplants are of particularly high value to cactus wren.</li> </ul>	<p>IRC will maintain and photograph salvaged cactus along with other restoration activities at Mule Deer.</p>
<p>Habitat Restoration and Revegetation: - Orchard Hills Cactus and Soil Salvage (NCC, in part)</p>	<ul style="list-style-type: none"> <li>150 mature cacti and more than 1,500 cactus pads were transplanted from the Orchard Hills salvage site to six sites throughout the Irvine Ranch Open Space (two of which are on OC Parks land and one of which is in Area R) in October, 2015.</li> <li>Transplanted cacti have established well at</li> </ul>	<p>Planted cactus will continue to be monitored and maintained as needed by IRC staff, including periodic checks and possible weed removal.</p> <p>Soil salvage sites will continue to be maintained by IRC on at least a quarterly basis. Supplemental seeding will be conducted in</p>



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	<p>all sites.</p> <ul style="list-style-type: none"> <li>• In December 2015, nearly 4,000 cubic yards of soil were transferred from the Orchard Hills donor site and spread across three recipient sites at West Loma (2.2 acres), Hicks Haul (2.1 acres), and near the Portola Staging Area (Area R: 2.85 acres) to expand CSS habitats.</li> <li>• Cover of native vegetation and non-native weeds expanded significantly due to wet winter conditions. IRC maintenance activities increased this year relative to 2016.</li> <li>• All sites were maintained by spraying annual grasses and hand-pulling, cutting, and spot-spraying broadleaf weeds.</li> <li>• Vegetation monitoring was conducted in April, and results were included in a September 2017 report to NCC. Included in this report were results from a UC Irvine study comparing different soil depth treatments.</li> <li>• All sites have high levels of native cover but remain dominated by early successional-stage species such as deerweed, cliff aster, and tarweed.</li> <li>• A status report was completed and provided to NCC (available upon request).</li> </ul>	<p>portions of all three recipient sites to increase stand diversity. Monitoring results will be reported to NCC.</p>
<p>Habitat Restoration and Revegetation: - Cactus Wren Linkage Restoration Mule Deer</p>	<ul style="list-style-type: none"> <li>• 8 restoration polygons</li> <li>• Approximately 90% complete</li> <li>• 2.32 total acres</li> <li>• 0.7 acres were seeded and planted with CSS;</li> </ul>	<p>Site maintenance (mostly weed removal) will continue to occur in 2018 through monthly stewardship activities and through as-needed contact labor (e.g. every 6-8 weeks during the</p>

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Site	<p>1.41 acres were seeded with native grasses and forbs; 0.21 acres of grassland being passively restored through weed removal only.</p> <ul style="list-style-type: none"> <li>• Target vegetation communities: cactus scrub, CSS, and native grassland</li> <li>• Year started: 2012; anticipated completion: 2018</li> <li>• For the first time at the project site, cactus wrens were observed foraging and nesting in transplanted cactus.</li> <li>• Restoration methods: Site preparation for all areas included initial site mowing in fall 2012 followed by a one-to-two year grow &amp; kill cycle using both glyphosate and Fusillade®.</li> <li>• Active cactus scrub: Ten, 15x15 m patches of cactus were planted in 2013. Each patch contained 4500 single pads, 4 large salvaged cacti, and 2 Mexican elderberry plantings.</li> <li>• In 2014, 12 large (2 m tall) salvaged chollas from a planned development site were planted in 3 patches on site.</li> <li>• Active CSS polygons: planted in strips with shrub containers in 2013 and hand seeded in strips in 2014.</li> <li>• Active grassland polygons: A second grow &amp; kill cycle was used in 2013 followed by drill and hand-seeding of <i>Stipa pulchra</i> in late 2014. Establishment was fair and patchy across the site.</li> <li>• Weeding activity occurred every 6-8 weeks in</li> </ul>	spring).

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>2015 through 2017 by staff, volunteers and contractors.</p> <ul style="list-style-type: none"> <li>• Native forb species were seeded in the 1.41 acre grassland polygon in November of 2015.</li> <li>• Site was monitored in 2017 and currently has over 50% native cover.</li> </ul>	
<p>Habitat Restoration and Revegetation: - Quail Hill Pilot Plantings</p>	<ul style="list-style-type: none"> <li>• 2 restoration polygons</li> <li>• Approximately 80% complete</li> <li>• 1.8 total acres; 0.4 acres actively being seeded and planted with CSS; 1.2 acres actively being seeded and planted with native grasses and forbs</li> <li>• Target vegetation communities: native grassland and CSS</li> <li>• Year started: 2014, Anticipated completion: 2018</li> <li>• Restoration methods: Site preparation included the eradication of dense stand of artichoke thistle and mustard using primarily herbicide application (glyphosate) prior to implementation of COI IPM policy.</li> <li>• Container plants were installed across about 0.7 acres of the site, many by IRC volunteers and UC Irvine students.</li> <li>• Seed of native bunchgrass and forbs were sown by hand across 1.4 acres of land in late November 2015. The native forbs established well during the 2016 growing season, but native grass cover was disappointing.</li> <li>• An additional 1-acre area was drill-seeded in</li> </ul>	<p>In 2018, only as-needed weed control via hand-weeding and/or pre-approved organic herbicide application by trained staff is planned.</p>

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>mid-December 2016 to increase native grass cover of the site. This was followed by hand-seeding of annual wildflowers in late December by staff and volunteers to increase overall plant diversity and structure.</p> <ul style="list-style-type: none"> <li>• Approximately 500 more container plants were installed and maintained in 2017.</li> <li>• Site maintenance activities in 2017 included as-needed weed control via hand-weeding and some organic herbicide application with Suppress® by trained staff (pre-approved by the City). More detailed information on application results are available as quarterly reports to the City.</li> </ul>	
<p>Habitat Restoration: - Passive Restoration Trial (UC Irvine, part)</p>	<p>Initiated 2010. Purpose: Assess the efficacy of using a passive restoration approach to restoring degraded CSS communities. Cover and density were monitored in smaller germination quadrats.</p> <p>In 2017, plots were maintained for their seventh year by IRC and monitored by the Huxman lab members at UCI summarized data thus far and found significant treatment effects over time with respect to native and non-native cover, richness, and germination, with generally greater effects in the coastal reserve sites vs. the central.</p> <ul style="list-style-type: none"> <li>• Weed control methods included early-season low-dose herbicide application and late season manual control (primarily clipping).</li> </ul>	<p>In 2018, passive weed control treatments will continue to be jointly managed by IRC and UCI utilizing a single spring hand weeding event as treatment in weeded plots. Monitoring will continue by UCI as well.</p>

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<ul style="list-style-type: none"> <li>• Low-dose control was disbanded in 2017 after COI-IPM policy was implemented.</li> <li>• Weeded sites showed significantly more native cover and seedling emergence than non-weeded sites.</li> <li>• Differences did not vary by initial native cover.</li> <li>• Differences did not appear to be cumulative over time.</li> <li>• UCI is preparing a manuscript for submission for publication.</li> </ul>	
<p>Habitat Restoration and Revegetation: - Shady Canyon Turtle Pond Mitigation Site Maintenance</p>	<ul style="list-style-type: none"> <li>• IRC continued to manage the Shady Canyon Turtle Pond for the maintenance of southwestern pond turtles. In 2017, maintenance activities focused on controlling noxious weeds growing next to the pond. Species targeted include Italian thistle, black mustard, poison hemlock, tree tobacco, and brome grasses.</li> <li>• The main sediment deposition area seeded in 2016 (following pond sediment removal activities) is progressing well with promising native cover (about 40%) and few weeds (about 5%). Weeds were removed by hand on multiple occasions.</li> <li>• A relatively wet winter kept the pond level full through May; supplemental water was not added to the pond until summer and supplied every 2-3 weeks thereafter.</li> <li>• Two individual bull frogs were detected this</li> </ul>	<p>In 2018, IRC will continue to:</p> <ul style="list-style-type: none"> <li>• Maintain adequate water supply to the pond</li> <li>• Manage invasive frogs via fall trapping and removal of captured individuals</li> <li>• Trim vegetation as needed</li> <li>• Remove weeds from areas seeded in 2016.</li> </ul>

**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>summer. Attempts were made to remove these two individuals but these efforts were unsuccessful. Additional trapping will take place this year to remove this species.</p>	
<p><b>Fire Management Activities</b></p>		
<p>Fire Prevention: - IRC Fire Watch Program</p>	<p>Trained and outfitted approximately 79 new volunteers, bringing the program total to 284 volunteers ready to monitor “high risk” areas on the border of the wild lands. There were 12 “high risk” days in 2017 that necessitated Fire Watch deployment on COI OSP lands. The Fire Watch program is conducted in conjunction with the Greater Laguna Coast Fire Safe Council, Inter-Canyon League Fire Safe Council, Trabuco Canyon Defense Against Wildfire, Modjeska Canyon Fire Watch, OC Parks, State Parks, Orange County Fire Authority and more.</p> <p>In addition, the Fire Watch program participated in 18 public outreach events to educate the public on wildland/urban interface risks, including a July 4<sup>th</sup> Fire Watch deployment. The 2017 Fire Watch Symposium was attended by 89 volunteers, partners, and members of the public. The Fire Watch Annual Exercise was conducted in June encompassing all fire watch locations with the inaugural activation of the Fire Watch Operations Center. In 2017, the Fire Watch Team Leader volunteer position was initiated with</p>	<p>Deployment of volunteers and staff on Red Flag Warning days and/or during Santa Ana wind events to deter fire ignition will continue.</p> <p>Continued expansion of the Fire Watch program by increasing the number of trained volunteers and continue to partner and engage the services of other volunteer agencies and organizations.</p>

## City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	8 volunteers participating in the training program.	
Post-Fire Management: - Specific fires	No active wildfires occurred on the COI-OSP.	Any wildfires occurring on the Open Space Preserve will be surveyed, mapped, and documented.
Maintenance of Fuel Breaks / Modification Zones:	See Maintenance of Existing Facilities (Shady Cyn.).	See Maintenance of Existing Facilities (Shady Cyn.).
<b>Miscellaneous Activities and Management Programs:</b>		
Sensitive Plant Monitoring	<ul style="list-style-type: none"> <li>• Fred Roberts Jr. completed supplemental rare plant and targeted invasive weed surveys in 2017 at several open space management units within the City, including Bommer Canyon, Shady Canyon, Bonita Canyon, the Newport Beach Parcels, and Veeh Creek.</li> <li>• Final reports are available upon request.</li> </ul>	No surveys planned in 2018.
Restoration Seeding Rates and Effects of Initial Conditions	UCSB Bren student Justin Heyerdahl analyzed existing restoration vegetation data and baseline environmental and site conditions as well as seeding rates. He concluded that restoration sites were highly variable, potentially over-seeded, and most impacted by existing non-native cover as well as local moisture availability (to a negative degree). Results were presented at an IRC Science Friday presentation.	A final student report is in preparation. Seeding trials comparing restoration success under 100%, 75%, and 50% seeding rates are being developed.
Trail Condition Monitoring	Trail condition monitoring was initiated in	The condition of trails and trail-side vegetation

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	November and was completed in early 2018.	will be evaluated from 2017 data and monitored again in the summer of 2018 if resources permit.
Wildlife Monitoring	<p>Wildlife activity in the City has been monitored since 2007 using remote infra-red-triggered cameras, operated by IRC staff and volunteer citizen scientists:</p> <ul style="list-style-type: none"> <li>• Fifty remote cameras are currently operating on IRC managed lands, 9 of which occur on COI OSP. Data from photographs are entered manually. The database currently contains more than 144,190 entries.</li> <li>• Activity level for five common wildlife species- mule deer, mountain lion, coyote, bobcat, and grey fox are estimated on a quarterly basis (March, June, September, and December). This data is used to test for changes in wildlife activity seasonally, annually, and regionally (Central versus Coastal Reserve).</li> <li>• Analyses from a LAG-funded project in 2012 suggest large mammals avoid humans and the number of trail users affects the activity of wildlife in the short term. Long-term effects on wildlife activity and population viability remain unclear. Results were published in Biological Conservation (Patten and Burger 2018) and are available upon request.</li> <li>• Analysis from a LAG-funded follow-up project completed in 2017 suggested wildlife shift to night-time activity in the presence of humans, several wildlife species use the urban/</li> </ul>	<p>The wildlife camera trapping program will continue to operate in 2018.</p> <p>Additional cameras may be installed if deemed necessary.</p> <p>A manuscript describing results from the most recent DFW-LAG grant to NCC completed in 2017 is in preparation. It will describe diel shifts in wildlife in the presence of human activity and will model thresholds in human activity and wildlife response.</p> <p>All wildlife cameras will be tested in 2018 for proper function using a protocol developed in 2013 by IRC staff and volunteers.</p>



**City of Irvine - Open Space Preserve**

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>wildland interface and adjacent urban areas extensively, and pulses of activity have acute behavioral effects on wildlife. Results were shared as an oral presentation at the International Urban Wildlife Conference in June 2017. A copy of the presentation is available upon request.</p> <p><b>Trends in Wildlife Activity by Species from 2007 to 2017</b></p> <p>Long-term wildlife trends for COI-OSP and other reserve areas were presented as a poster at the International Urban Wildlife Conference in June 2017. A copy of the presentation is available upon request. Results from this long-term study in the Coastal Reserve indicate:</p> <p><u>Deer:</u></p> <ul style="list-style-type: none"> <li>• Mule deer activity is slightly higher compared to previous years. On average, deer activity in the Coastal Reserve has not changed since the programs initiation in 2007.</li> <li>• Highest deer activity is found at the Shady Canyon Turtle Pond possibly due to the constant water source.</li> <li>• Strong peak in activity during late summer (September) and drop in winter and spring.</li> </ul> <p><u>Coyote:</u></p> <ul style="list-style-type: none"> <li>• Average coyote activity dropped sharply from</li> </ul>	

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>2007 to 2010 and has remained consistently low through 2017.</p> <ul style="list-style-type: none"> <li>• Coyotes have the highest presence at Mule Deer at Shady Canyon and the Turtle Pond at Bommer Canyon.</li> <li>• Activity is greatest in winter (December) and lowest in summer (June).</li> </ul> <p><u>Gray Fox:</u></p> <ul style="list-style-type: none"> <li>• No gray fox were observed in the COI-OSP South.</li> </ul> <p><u>Bobcat:</u></p> <ul style="list-style-type: none"> <li>• Average bobcat activity in the Coastal Reserve decreased from 2009 to 2013 and has remained relatively low. Bobcat activity this year is slightly higher than previous recent years.</li> <li>• No specific location preference has been identified from the data.</li> <li>• No seasonal pattern of activity detected from camera traps.</li> <li>• Highest number of bobcat photos was at Serrano Ridge at Shady Canyon and the Turtle Pond at Bommer Canyon.</li> </ul> <p><u>Mountain lion:</u></p> <ul style="list-style-type: none"> <li>• There remain no confirmed reports of mountain lions within the COI-OSP South.</li> </ul>	
Raptor Nest Surveys	<ul style="list-style-type: none"> <li>• Since 2009, IRC has organized a citizen</li> </ul>	Raptor breeding surveys in the OPS are planned

## City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>science-based raptor nest monitoring program to document the breeding activity of raptors across the historic Irvine Ranch including the COI-owned portions. IRC contracted with Bloom Biological Inc. (BBI) and Kidd Biological Inc. to conduct most of the initial raptor nest surveys and to provide training to volunteer monitors.</p> <ul style="list-style-type: none"> <li>• Only 5 active nests—all belonging to red-tailed hawks were discovered in the COI-OSP in 2017; 2 successfully fledged young while 3 nests failed. Two historic red-tailed hawk nesting territories in Bommer Canyon near Cattle Camp were inactive again in 2017.</li> <li>• These data were presented as a poster at the International Urban Wildlife Conference held from June 4 – 7, 2017 in San Diego, CA. The title was “What we’ve learned from over 10 years of monitoring nesting raptors in Orange County, CA.”</li> <li>• The full draft report, including data for individual raptor species, can be made available upon request.</li> </ul>	to take place again in 2018.
Cactus Wren Foraging Analysis (UCI, in part, and NCC, in part)	<p>Project goal:</p> <ul style="list-style-type: none"> <li>• To assess the importance of arthropod abundance, community composition, and habitat structure as determinants of habitat quality for Cactus Wren.</li> </ul> <p>Completed in 2017</p>	A final report will be written if time permits.

## City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<ul style="list-style-type: none"> <li>• Arthropod community analysis of barcoded diet data</li> </ul> <p>Preliminary results show that:</p> <ul style="list-style-type: none"> <li>• Arthropod communities differ among common habitat elements (i.e. plant species).</li> <li>• The abundance of large spiders and caterpillars are positively correlated with wren reproductive output.</li> <li>• Percent cover of native bunch grasses within territories is also strongly correlated with wren reproductive output.</li> </ul>	
Cactus Wren Artificial Nest Box Structures	A total of 8 cactus wren artificial nest boxes remain in place across the COI OSP. Nest boxes were surveyed in 2017, but no nesting activity was observed.	Nest boxes will be surveyed in Spring of 2018.
Turtle Rock RRMP	IRC staff worked with subcontractors to complete a fuels management assessment in 2017. An assessment of existing and potential recreational resources was also initiated this year.	At the discretion of the City, IRC will assist the City in hosting two public meetings to share study findings and solicit responses and input from local residents concerning the future of these City-owned parcels. Following the public meetings, IRC will compile separate assessments into a cohesive Resource and Recreation Management Plan (RRMP).
Restoration Database: - OC RESTORE	NCC prepared IRC restoration data for upload to OC Restore and is currently determining the fate of the database.	IRC will continue to work with NCC on finding a regional system to collect and maintain restoration data.

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Program, Project, Activity	2017 Progress Report	2018 Work Plan
Development of Biological Database	The geodatabase will continue to be maintained and updated for IRC-managed areas.	Both fauna and flora databases will continue to be updated.
Climate Change	IRC staff are cooperating with UCI and its EcoAdapt restoration trials at UCI Research Station property for the USFS and CA Landscape Conservation Cooperative. The process will provide an assessment and modified management strategies for identified habitats and species based on their sensitivities, exposures, and adaptive capacities.	IRC will continue to incorporate results from the scientific community that are relevant to management as they are made public. IRC is incorporating climate change resilience in its restoration prioritizations.
Conservation Capacity	<p>Conservation capacity was increased as noted below:</p> <ol style="list-style-type: none"> <li>1. <b>Build Capacity.</b> Supplemental funding for alternative weed control methods to synthetic herbicides allowed IRC to maintain much, but not all, of its invasive plant management program. Complementary Early Detection /Rapid Response surveys funded by NCC further supported the program. Volunteer support for all aspects of natural resource management strengthened the program. The development of a CalFlora WeedManager tool for invasive control work improved work flow.</li> <li>2. <b>Expand restoration.</b> The purpose of restoration efforts is to increase habitat resilience to disturbance, enhance diversity, and support wildlife and ecosystem</li> </ol>	Ongoing.

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>processes. Several restoration projects have been initiated. Use of IRC's standard grow-and-kill methodology and emphasis on seeding has been constrained by the current IPM policy and associated restrictions on the use of synthetic herbicides.</p> <p>3. <b>Implement landscape-scale invasive control.</b> The purpose of targeted invasive control is to remove the threat of future habitat degradation by highly invasive pests. Implementation is funded primarily by land management agreement and, more recently informed by collaborative prioritization and EDRR. Efforts to coordinate efforts regionally are ongoing and now facilitated by Cal-IPC. As new threats emerge, such as Sahara mustard and the polyphagous and other shot-hole borers, increasing effort must be placed on early detection and rapid response. Control methods for some species are currently constrained by limitations on chemical control methods.</p> <p>4. <b>Collect sensitive species occurrence data and maintain geospatial data for sensitive species and habitats.</b> The purpose of maintaining and adding to the geodatabase is to inform conservation priorities and management actions with the purpose of maintaining and enhancing these resources. Activities include developing long-term and</p>	

City of Irvine - Open Space Preserve

Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>regional monitoring programs.</p> <p>5. <b>Partner with other organizations to achieve landscape-wide conservation goals.</b> In 2017, activities included: (i) participating in the NCC TAC, several regional working groups, and participating in monthly update meetings with the City, (ii) providing regional expertise on regional conservation and land management issues where appropriate, (iii) working closely with OCFA to minimize fire risk, implement fire response consistent with protection of sensitive natural resources, and support organization, (iv) collaborating on implementing a Coastal Invasive Plant Management Plan with partner organizations, (v) collaborating with NCC on a LAG-funded study of recreation and wildlife response, and (vi) partnering with the Eskalen lab (UCR) to support PSHB and KSHB surveys supported by DFW (LAG) and NCC.</p> <p>6. <b>Provide opportunities for collaboration, internships, scholarship, and research on the Reserve.</b> Several interns completed work supporting conservation efforts. These included three summer UCSB Bren School graduate student interns, several undergraduate interns managed primarily by UCI, and IRC volunteers. Research projects primarily by UCI were facilitated, advised, and</p>	

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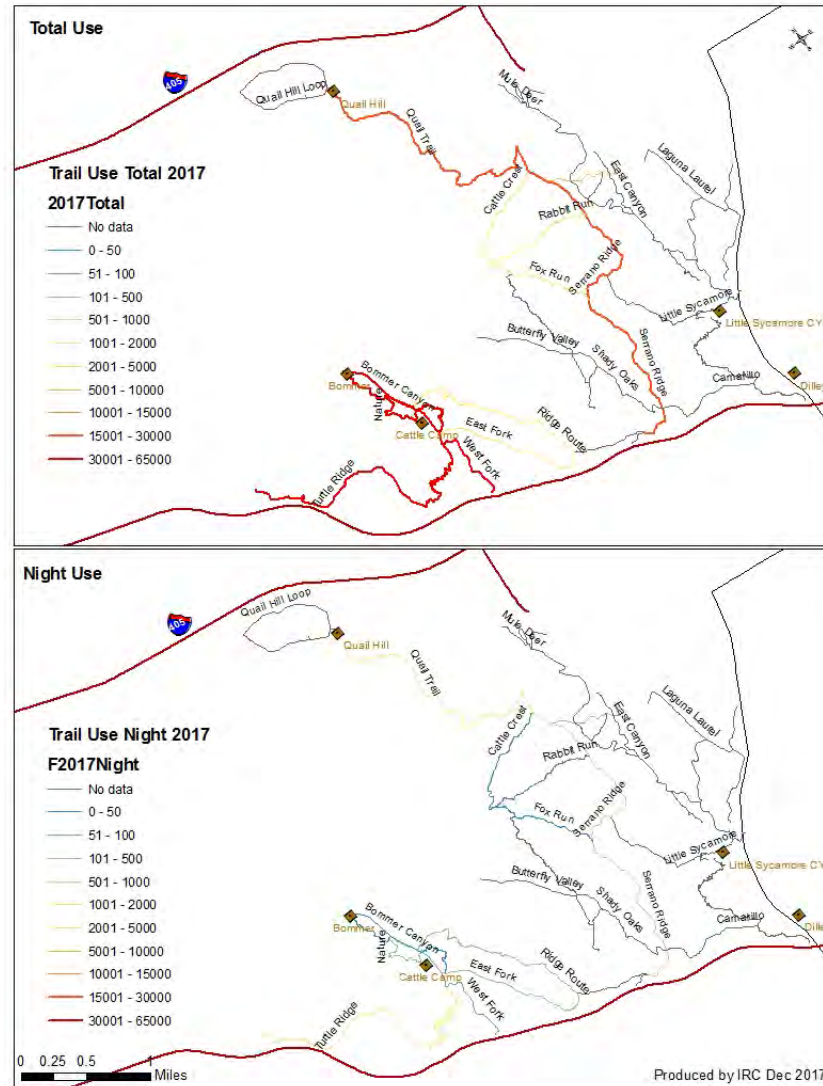
Program, Project, Activity	2017 Progress Report	2018 Work Plan
	<p>in some cases collaborated on.</p> <p>7. <b>Work with collaborators to obtain funding for important conservation actions.</b> IRC completed two separate externally funded projects benefiting the Preserve: State LAG funding for study of the interaction of recreation and wildlife and its facilitation and coordination of both soil and cactus salvage, funded by NCC and made available by the Irvine Company. IRC also assisted in obtaining and is currently collaborating with a LAG grant to NCC to identify tree endophytes that may confer resistance to Fusarium dieback (vectored through PSHB and KSHB).</p> <p>8. <b>Engage volunteers in resource management.</b> Stewardship and citizen science activities continued to be offered, which increased conservation capacity and enriched the volunteer experience through direct interaction with staff.</p>	
Orchard Hills Minor Amendment (MA-17-01)	<p>In May, the Irvine Company proposed an amendment to the boundaries of the Nature Reserve of Orange County (Reserve) through a Minor Amendment. The purpose was to remove a parcel from the Reserve (“Deleted Parcel”) and add an adjacent parcel (“Added Parcel”). The Deleted Parcel (0.35 ac) was mistakenly graded during construction activities associated with the Orchard Hills development. The Added Parcel</p>	



## City of Irvine - Open Space Preserve

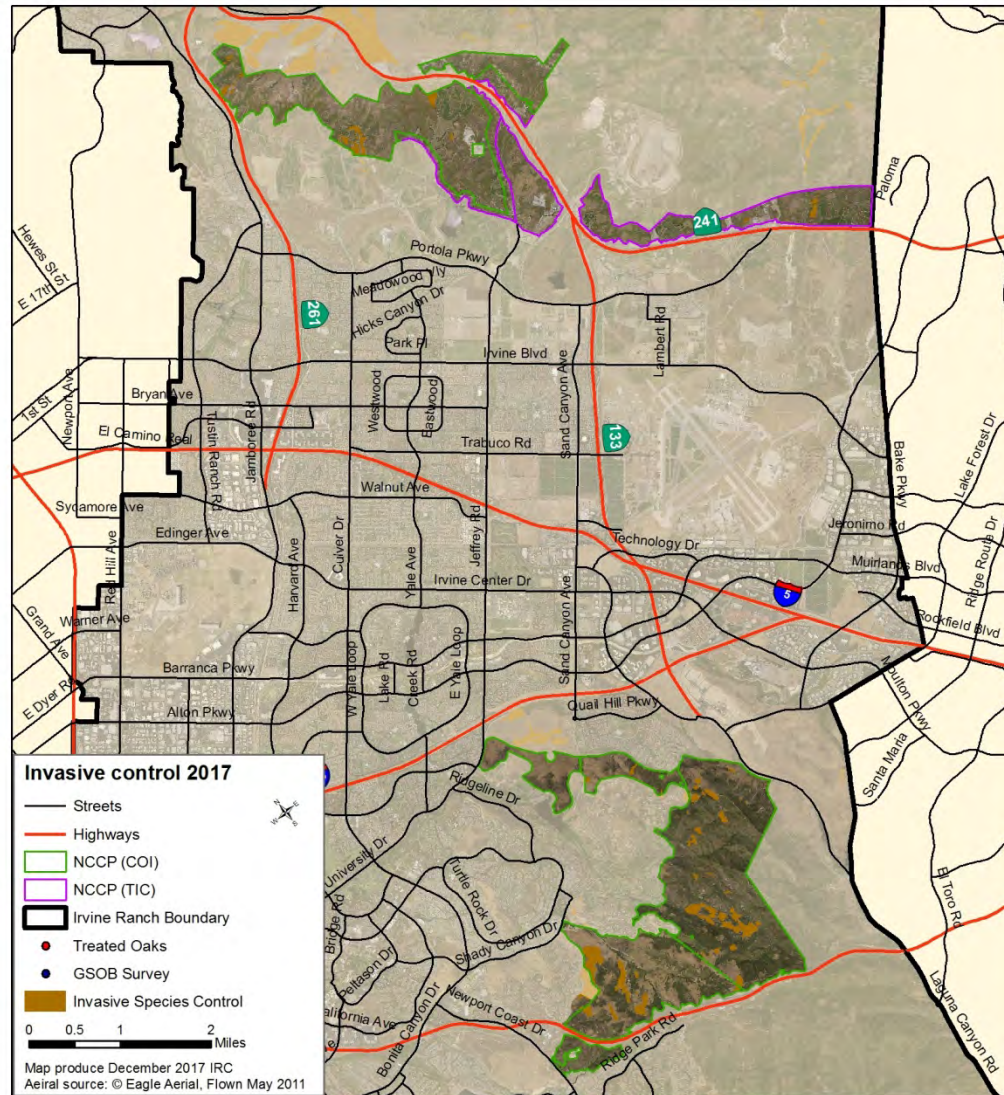
Program, Project, Activity	2017 Progress Report	2018 Work Plan
	(1.83 ac) is located to the immediate west of the Deleted Parcel. The Minor Amendment was approved by CDFW and USFWS in June and by the NCC in September. See Attachments.	
<b>Miscellaneous Activities and Management Programs - Non-IRC Research:</b>		
Dr. Sarah Kimball, Dr. Mike Goulden, University of California, Irvine, CEB	Purpose: Use observational weather stations to quantify Orange County's weather gradient, focusing on a north-south transect that spans the original Irvine Ranch from Crystal Cove State Park to Gypsum Canyon. CEB is continuing to maintain the weather stations and the data it generates. The data are uploaded to the internet ( <a href="http://128.200.14.200/index.html">http://128.200.14.200/index.html</a> ), and shared with regional weather websites, such as Mesowest. The inland weather stations generally report more extreme temperatures (higher highs and lower lows). Currently compiling the rainfall data to determine whether there are differences in precipitation across the transect.	Planning update to UC website to include new weather stations that have been placed at the UC Natural Reserve System sites, including the Steele Burn and Anza-Borrego Desert Research Center. Currently applying for funding that would fund someone who could develop a website that would include summary statistics for weather at our Orange County sites
Dr. Peter Bloom, Bloom Biological	Purpose: Raptor monitoring and movement.	Ongoing
Dr. Erin Boydston, Devaughn Lee Fraser, USGS	Landscape Genetics of Mule Deer in Southern California. Mule Deer pellet samples were collected and analyzed for 15 microsatellites to describe genetic composition of Mule Deer in southern California.	Final report expected in 2018.

### City of Irvine - Open Space Preserve



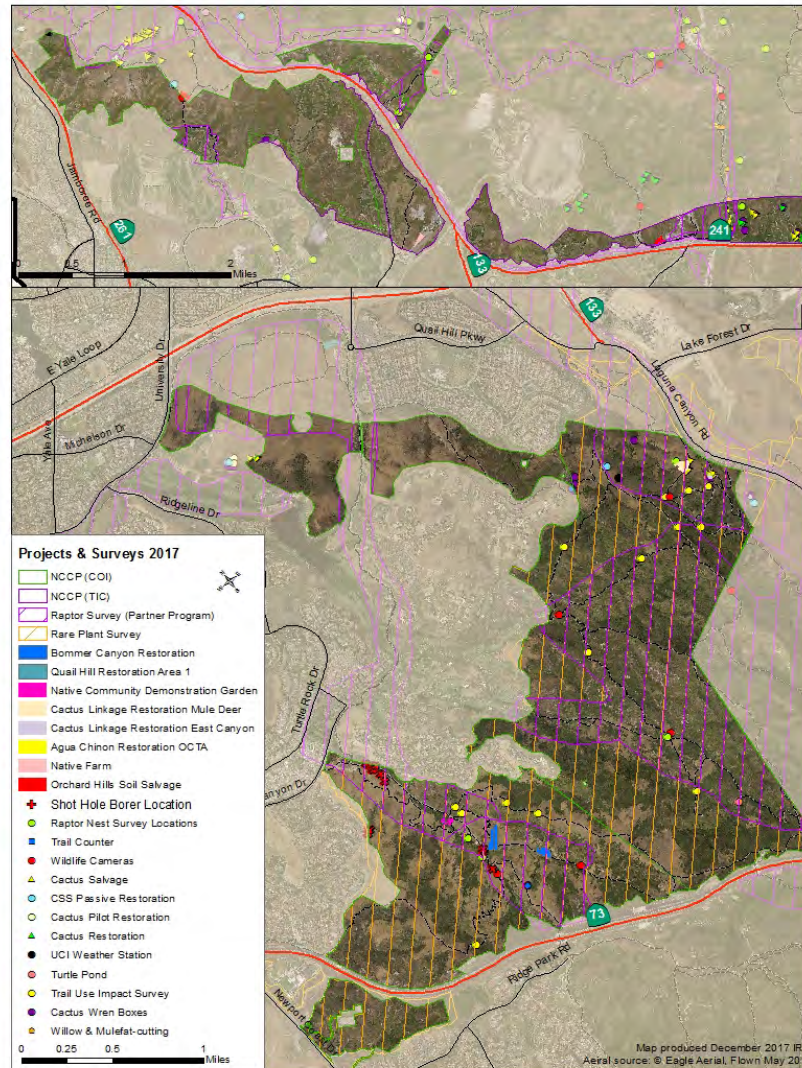
COI Fig. 1: Estimated Annual 7 Day Access of Trails on COI-OSP South

### City of Irvine - Open Space Preserve



COI Fig. 2: Invasive Control in COI-OSP in 2017.

### City of Irvine - Open Space Preserve



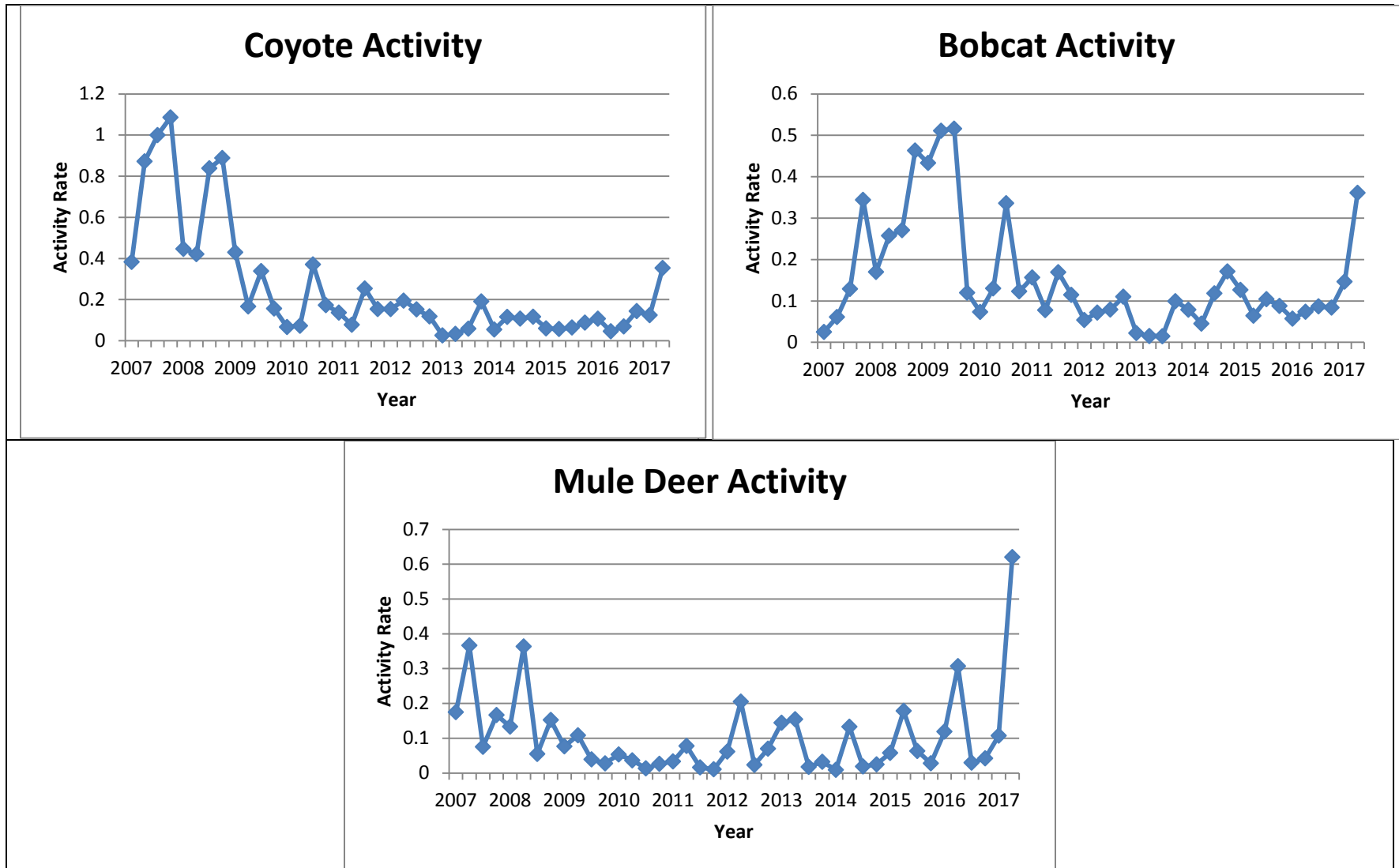
COI Fig. 3: Projects and Surveys in COI-OSP in 2017.

### City of Irvine - Open Space Preserve

Name	Status	Habitat Type	Acreage
Grassland Restoration	Completed	Grassland	1.84
Rabbit Run Restoration	Completed	CSS	0.02
Turtle Ridge Trailside Restoration	Completed	CSS	0.46
Ridge Route CSS Restoration	Completed	CSS	5.02
USDA/IRC/NROC Cactus Scrub Restoration	Completed	CSS	0.70
USDA/IRC/NROC Cactus Scrub Restoration	Completed	Grassland	1.62
Quail Hill Area 1	Completed	CSS	0.85
Cactus restoration Mule Deer	In Progress	CSS	0.37
CSS Passive Restoration	In Progress	CSS	0.02
Quail Hill Area 1	In Progress	Grassland	1.00
Bommer Canyon Area 2017	In Progress	CSS	2.00
Bommer Canyon Area 2018-2023	Planned	CSS	9.00
Bommer Canyon Area 2018-2023	Planned	Grassland	3.00
CSS restoration	Planned	CSS	0.28
Grassland Restoration	Planned	Grassland	5.39
<b>Grand Total</b>			<b>31.58</b>
- Completed			10.52
- In Progress			3.39
<b>Sub Total (Existing Restoration Acreage)</b>			<b>13.91</b>
- Planned			17.67
<b>Total (Existing + Planned)</b>			<b>31.58</b>
<b>CSS</b>			
- Completed			7.05
- In Progress			2.39
- Planned			9.28
<b>Sub Total</b>			<b>18.72</b>
<b>Grassland</b>			
- Completed			3.46
- In Progress			1.00
- Planned			8.39
<b>Sub Total</b>			<b>12.86</b>

COI Fig. 4: COI-OSP South - Restoration Habitat Acreage 2016

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COI Fig. 5: COI-OSP South – Wildlife Activity Patterns 2007 – 2017

**City of Newport Beach – Buck Gully**

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<b>Recreation Use, Monitoring, and Management:</b>		
Current Use Policies:	<p>7 day dawn to dusk public hiking and mountain biking is the current access configuration.</p> <p>Supplemental docent led activities were conducted as outreach opportunities. The maximum limit for docent-led activities is 25 participants with a minimum of 2 “IRC-Certified” volunteers.</p>	<p>7 day dawn to dusk public hiking and mountain biking will continue to be the access configuration.</p> <p>Supplemental docent-led activities will also be used as outreach opportunities.</p>
Recreational Monitoring: - Use and Access	<p>The following totals include recreation / interpretive, trail crew, invasive removal, and citizen science activities. The time frame is from January 1 through December 31, 2017.</p> <p>Total activities offered: 198                      Total activities implemented: 179                      Total volunteers: 1,229                      Total volunteer hours: 2,654                      Actual public participants: 172                      Public participant stewardship/trail hours: 84                      All public use was managed according to the policies noted in the approved RRMP.</p> <p>The following public recreation/interpretive and trail crew activities were offered from January 1 through December 31, 2017. When necessary, activities are cancelled due to red flag warning conditions, rain closure, and Santa Ana wind</p>	<p>Docent-led activities for the public will continue to be offered in 2018. The maximum limit for docent-led activities is 25 participants with a minimum of 2 “IRC-Certified” volunteers.</p> <p>Activities include public interpretive, recreational, trail work, or stewardship. New contract areas and possible activities may be listed for 2018.</p>

City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>events.</p> <p>Total recreation activities offered: 22                      Total recreation activities implemented: 16                      Total volunteers: 191                      Total volunteer hours: 278                      Actual public participants: 117</p> <p>Total trail crew activities offered: 0                      Total trail crew activities implemented: 0                      Total volunteers: 0                      Total volunteer hours: 0                      Actual public participants: 0</p>	
<p>Recreational Monitoring:                      - Volunteer-only Activities, Outreach Activities, and Patrols</p>	<p>Public outreach of the Buck Gully activities are integrated into the Irvine Ranch Natural Landmarks website and quarterly activity guide (distributed countywide), and the City website and Navigator magazine. Content about Buck Gully activities are also posted on the Irvine Ranch Natural Landmarks social media sites. The new IRC website (irconservancy.org) was launched.</p>	<p>Volunteer-only activities and patrols may occur in preparation and development of public activities for Buck Gully, Big Canyon, and possibly the Back Bay Science Center.</p> <p>Patrols may also be used to monitor human access and deter non approved uses.</p> <p>Public outreach via the referenced outlets will continue.</p>
<p>Recreational Monitoring:                      - Volunteer Wildlife Activity and Human Access Monitoring</p>	<p>Citizen science volunteers spent approximately 40 hours maintaining wildlife cameras throughout Buck Gully.</p>	<p>IRC’s citizen scientists will continue to collect camera trap data to monitor human access, assess the type and level of unauthorized access, track trends in wildlife diversity and abundance over time and space, and further develop activity and disturbance profiles for wildlife species in Buck Gully.</p>



**City of Newport Beach – Buck Gully**

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<p>User Compliance Programs: - Access Monitoring</p>	<p>Trail counter data indicate 25,551 people visited Buck Gully in 2017, about 77 persons per day. The counter is located at the 5th Street and Poppy trailhead in the southwest corner of the Reserve. It therefore captures any person(s) who access at least a few feet along the start of the trail. Estimated Annual 7 Day Access of Trails in Buck Gully is depicted in NPB Fig. 1.</p> <p>Based on photographs taken from a single trailside camera in the more remote, northeast corner of the Reserve, 5,472 people visited that area of Buck Gully in 2017.</p> <p>The large discrepancy in visitation estimated by trail counter versus camera has two sources. First, the camera has a longer time-delay between capture events; 1 minute for camera versus 1.5 seconds for trail counter. So large groups of people are often under-captured by the camera. The other difference is that the trail counter captures access in the most heavily used section of Buck Gully, whereas the camera is located in a remote part of the Reserve. Hence, while about 25,500 people step foot into the Reserve each year, only about 5,400 access remote areas or cover large sections of trail.</p> <p>About 161 photographs of dogs were captured by three separate trail cameras in Buck Gully. Dogs are not permitted in Buck Gully Reserve.</p>	<p>Wildlife and human access monitoring will continue using remote cameras and trail counters.</p> <p>Work with City on activities to increase awareness and compliance with the no-dog policy in Buck Gully.</p>

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<p>User Compliance Programs: - Monitoring and Human Access Management</p>	<p>N/A</p>	<p>Budget permitting, implement a web-based photo database for all trailhead human access camera locations. IRC management and field patrol personnel (Park Patrol); will have direct encrypted access to human access photos as well as a database spreadsheet of unauthorized access. This photo data will provide more effective means for field patrol personnel to target specific days, times, and locations for their patrols.</p> <p>Budget permitting, implement live-feed still-photo camera locations targeted at known areas of high-risk activities, specifically areas of extensive nighttime use, fire pits, unauthorized vehicles, etc. These cameras will have the ability to relay photos directly to a web-based storage drive and provide instant notification to selected patrol personnel of unauthorized presence in the area.</p>
<p>Educational Outreach: - IRC Citizen Science Program</p>	<p>IRC continued to operate wildlife camera monitoring activities using citizen scientists, and occasionally employed volunteer help to assist in other monitoring activities. The following public and volunteer-only activities were offered January 1 to December 31, 2017. Note that activities offered and implemented include some individual private activities.</p> <p>Total citizen science activities offered: 26 Total citizen science activities implemented: 16</p>	<p>Wildlife camera trapping and raptor monitoring will continue. If resources permit, a monthly citizen science butterfly survey will be initiated.</p> <p>IRC and the City staff will work closely together to coordinate activities offered throughout the City's natural areas, addressing programming, monitoring, and restoration when appropriate.</p>

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	Citizen science volunteers: 52 Volunteer hours: 205.5 Public participants: 0	
Educational Outreach: - IRC Land Steward Program	IRC conducted land steward training sessions and herbicide training workshops for land stewards. Note that all offered stewardship activities listed below include volunteer-only activities, as well as community stewardship and span both NCCP and non-NCCP lands.  <b>Restoration and Invasive Control:</b> Total stewardship activities offered: 13 Total activities implemented: 12 Volunteers: 31 Volunteer hours: 107.5 Public participants: 29	IRC will maintain and work to increase stewardship activities through continued regular offerings.
Educational Outreach: - IRC Trail Crew Training Activities	Conducted volunteer trail crew training and implemented the Adopt-A-Trail program to assist with ongoing monitoring and maintenance of trail system.  Completed volunteer trail projects: 0 Trail crew training sessions: 1 Trail maintenance projects: 24	Continue training trail crew volunteers and offer advanced training in specific areas of trail work such as power equipment, rock armoring, and specialty techniques.
<b>Recreation Facility Construction and Maintenance:</b>		
New Construction or Expansion (Buck Gully):	Installed 2 sets of 3 trail etiquette signs to promote trail courtesy and reduce user conflict.	Design and implement a human access monitoring system with the use of cameras or

City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
		<p>trail counters located at the 3 primary trailhead access points.</p> <p>Coordinate volunteer Eagle Scout projects with the City staff. These projects may include additional site benches, informational signage, interpretive bird blinds, and trail-side viewing decks.</p>
<p>Maintenance of Existing Facilities (Buck Gully):</p>	<p>IRC managed 24 volunteer trail maintenance (trail crew maintenance patrol) work sessions. These activities focused on vegetation trimming of the poison oak to maintain the desired trail-corridor width of 4' (tread is to remain 2' wide).</p> <p>Staff trimmed vegetation frequently.</p> <p>Painted and serviced gates.</p> <p>Maintained signage.</p> <p>Brushed over unauthorized social trails.</p> <p>Coordinated with City to continue to implement the trail closure protocol and signage system.</p> <p>Built 8 new drainage dips and removed 525' of rut from Buck Gully and Bobcat Trails.</p>	<p>Monitor the trail system for the creation of unauthorized social trails and perform closure of any social trails as needed. If required, install fencing to limit social trail use.</p> <p>Continue to monitor the area with historical runoff from Pelican Hill and perform necessary maintenance as required. Continue to coordinate with City to respond to and report flooding. Maintenance may include the expansion of the previously installed causeway, rock armoring, or boardwalk installation.</p> <p>Continue to monitor the trail tread for signs of erosion, and install new drainage features or tread armoring throughout the trail as needed.</p> <p>Continue to monitor the slope adjacent to the trail and shore up any eroding areas (using boulders or retaining walls) if necessary.</p> <p>Perform a semi-annual inspection and</p>

City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
		<p>maintenance of all bridges, gates, and kiosks including trimming trees that may impact these structures.</p> <p>Improve graffiti resistance of signage by adding graffiti coating to signs.</p>
Facility Replacement/ Repair (Buck Gully):	N/A	N/A
<b>Infrastructure Construction and Maintenance:</b>		
Removal of Inactive Field Research Materials	None found.	IRC will evaluate and remove inactive field research materials if they are no longer deemed useful.
<b>Habitat Restoration and Enhancement:</b> (Note: Funding Sources noted in first column if other than Land Owner)		
Exotic Plant Eradication: - Program Summary (NCC, in part)	<p>Priority invasive plant species were treated within Buck Gully Reserve in 2017. Weeds were targeted within reserve and park boundaries as well as along roads, trails, and fuel modification areas (NPB Fig. 2). Many invasive plants are residing along the reserve and park edges, including non-City (HOA) properties.</p> <p>The primary species targeted for eradication within Buck Gully Reserve include garland chrysanthemum, artichoke thistle, fennel, and tree tobacco.</p>	Artichoke thistle, fennel, castor bean, garland chrysanthemum, and pampas grass will continue to be controlled along trails and habitat edges. In addition, ornamental trees planted or naturally established will begin to be removed in high priority areas and, as acceptable native shrub supplies permit, will be replaced with natives.

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	All control efforts were carried out by IRC staff and staff-led volunteer groups during public stewardship events.	
Exotic Plant Eradication: - Exotic Plant Monitoring	<p>An NCC funded Early Detection Rapid Response (EDDR) survey informed invasive management efforts in 2017.</p> <p>Buck Gully Invasive control efforts in 2017 were prioritized based on both on-the-ground spring-time monitoring in 2017 and a comprehensive survey and mapping effort of vegetation along all fuel modification zones in 2012.</p>	Invasive survey results from 2012 in Buck Gully will continue to inform invasive plant removal work in the foreseeable future.
<p>Exotic Plant Eradication: - Artichoke Thistle</p> <p>- Fennel</p> <p>- Tree Tobacco</p> <p>- Castor Bean</p>	<p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• 500 m<sup>2</sup> (increase from 242 m<sup>2</sup>)</li> <li>• Estimated 894 plants (increase from 838 in 2016)</li> </ul> <p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• 4 m<sup>2</sup> (increase from 2.6 m<sup>2</sup> in 2016)</li> <li>• Estimated 25 plants (increase from 6 in 2016)</li> </ul> <p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• None (35 m<sup>2</sup> in 2016)</li> </ul> <p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• None (35 m<sup>2</sup> and 300 plants in 2016)</li> </ul>	<p>Control work will continue as needed.</p> <p>Control work will continue as needed.</p> <p>Control work will continue as needed.</p> <p>Control work will continue as needed.</p>

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
- Pampas Grass	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None (compared to 80 net m<sup>2</sup> and 75 plants in 2017)</li> </ul>	Control work will continue as needed.
- Canary Island Palm (NCC, in part)	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None (compared to 1078 net m<sup>2</sup> and 49 plants in 2016)</li> </ul>	Control work will continue as needed.
- Mexican Fan Palm (NCC, in part)	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None (compared to 890 net m<sup>2</sup> and 15 plants in 2016)</li> </ul>	Control work will continue as needed.
- Iceplant	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None</li> </ul>	Control work will continue as needed.
- Garland Chrysanthemum	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• 10 m<sup>2</sup></li> <li>• Estimated 300 plants (compared to 10 in 2016)</li> </ul>	Control work will continue as needed.
- Peppertree	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None (compared to 398 net m<sup>2</sup> and 25 plants in 2016)</li> </ul>	Control work will continue as needed.
- Russian Thistle	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• 20 m<sup>2</sup></li> <li>• Estimated 2,000 plants</li> </ul>	Control work will continue as needed. This species will be removed from the Invasive Control Program section in 2017.
- Poison Hemlock	Treatment within NCCP (Buck Gully): <ul style="list-style-type: none"> <li>• None</li> </ul>	Control work will continue as needed.

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
<p>- Lollypop Tree</p> <p>- Pride of Madeira</p> <p>- Volutaria / Moroccan Knapweed</p>	<p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• None (compared to 70 net m<sup>2</sup> and 10 plants in 2016)</li> </ul> <p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• None (compared to 3.5 net m<sup>2</sup> and 2 plants in 2016)</li> </ul> <p>Treatment within NCCP (Buck Gully):</p> <ul style="list-style-type: none"> <li>• None; not present.</li> </ul>	<p>Control work will continue as needed</p> <p>Control work will continue as needed</p> <p>This species is prioritized for eradication.</p>
Exotic Animal Control:	<p>About 161 photographs of dogs were captured by the single trail camera in Buck Gully (up from 90 in 2016). Dogs are not permitted in Buck Gully Reserve.</p> <p>A survey for all reptiles and amphibians (herpetofauna) including exotic species took place in Buck Gully in the spring of 2017. Survey methods included pitfall trapping as well as visual surveys within the main stream and pools. The surveys yielded substantial numbers of crayfish in lower Buck Gully, as well as African-clawed frogs. A report is pending.</p>	Monitoring for exotic animals will continue in 2018. Attempts will be made to remove African clawed frogs with the resources available under contract.
Habitat Restoration and Revegetation: - Restoration Proposals	No restoration proposals were authored in 2017.	
Habitat Restoration and	In 2017, the following activities occurred:	As needed site maintenance by IRC staff and



**City of Newport Beach – Buck Gully**

Project, Program, Activity	2017 Progress Report	2018 Work Plan
Revegetation: - Fuel Modification Restoration Demonstration in Buck Gully	<ul style="list-style-type: none"> <li>• 6 public stewardships</li> <li>• Approximately 90 native grass plugs were installed.</li> <li>• Staff and volunteers performed hand-weeding and watered and mulched plantings as needed from late spring through late fall.</li> <li>• Staff and volunteers collected seed from native plants for future habitat restoration use.</li> </ul>	volunteers.
Habitat Restoration and Revegetation: - Orchard Hills Salvage Cactus to Buck Gully	IRC staff and volunteers monitored and weeded around salvaged cacti (28 large cacti and 400 pads) that were transplanted from the Orchard Hills salvage site in October of 2015.	Planted cactus will continue to be monitored and maintained by IRC staff in 2018.
<b>Fire Management Activities:</b>		
Fire Prevention: - Fire Watch Program	Trained and outfitted approximately 79 new volunteers, bringing the program total to 284 volunteers ready to monitor “high risk” areas on the border of the wild lands. There were 12 “high risk” days in 2017 that necessitated Fire Watch deployment on City open space lands. The Fire Watch program is conducted in conjunction with the Greater Laguna Coast Fire Safe Council, Inter-Canyon League Fire Safe Council, Trabuco Canyon Defense Against Wildfire, Modjeska Canyon Fire Watch, OC Parks, State Parks, Orange County Fire Authority, Newport Beach Fire Department and more.	Deployment of volunteers and staff on red flag warning days and/or during Santa Ana wind events to deter fire ignition will continue.  Continued expansion of the Fire Watch program by increasing the number of trained volunteers and continue to partner and engage the services of other volunteer agencies and organizations.

**City of Newport Beach – Buck Gully**

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>In addition, the Fire Watch program participated in 18 public outreach events to educate the public on wildland/urban interface risks, including a July 4<sup>th</sup> Fire Watch deployment. The 2017 Fire Watch Symposium was attended by 89 volunteers, partners and members of the public. The Fire Watch Annual Exercise was conducted in June encompassing all fire watch locations with the inaugural activation of the Fire Watch Operations Center. In 2017, the Fire Watch Team Leader volunteer position was initiated with 8 volunteers participating in the training program.</p>	
<p>Maintenance of Fuel Breaks / Modification Zones:</p>	<p>Newport Beach Fire Department agreed to adjust seasonal fuels trimming of hazard reduction areas from summer to late spring to decrease viable seed set from non-native species. Natives were flagged and vegetation management crews were instructed to avoid plants. Thinning was implemented by Southland Landscape Maintenance. Managed areas are adjacent to NCCP.</p>	<p>IRC will continue to coordinate with the Newport Fire Department on habitat-friendly vegetation management along reserve borders.</p>
<p>Maintenance of Fuel Breaks / Modification Zones: - Brochure</p>	<p>A best management practices brochure created jointly by IRC, NPB, NCC, CNPS, and the City Fire Authority continued to be shared with the public. The emphases of the brochure are to:</p> <ol style="list-style-type: none"> <li>1. reduce fire risk,</li> <li>2. reduce the spread of exotic species, and</li> <li>3. reduce water consumption.</li> </ol> <p>The brochure was sent to all neighboring</p>	<p>Brochure continues to be available.</p>

### City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	residents and is available at local volunteer and public events.	
<b>Miscellaneous Activities and Management Programs:</b>		
Trail Condition Monitoring:	Trail condition monitoring was initiated in November of 2017 and was completed in early 2018. Data analysis will take place in 2018 and any resulting recommendations will be shared with the City.	The condition of trails and trail-side vegetation will be monitored again in the summer/fall of 2018.
Raptor Surveys:	<ul style="list-style-type: none"> <li>• Since 2009, IRC has organized a citizen science-based raptor nest monitoring program to document the breeding activity of raptors across the historic Irvine Ranch including the NPB-owned portions. IRC contracted with Bloom Biological Inc. (BBI) to conduct most of the initial raptor nest surveys and to provide training to volunteer monitors.</li> <li>• No active nests were discovered in Buck Gully in 2017. This is the fourth year in a row where no active raptor nests were found in Buck Gully.</li> <li>• Reserve-wide data were presented as a poster at the International Urban Wildlife Conference held from June 4 – 7, 2017, in San Diego, CA. The title was “What we’ve learned from over 10 years of monitoring nesting raptors in Orange County, CA.</li> <li>• The full draft report, including data for individual raptor species, can be made</li> </ul>	Raptor surveys will continue in 2018.

## City of Newport Beach – Buck Gully

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	available upon request.	
Sensitive Species Monitoring: - Birds	Surveys for California gnatcatcher (CAGN), coastal cactus wren (CAWR), and Least Bell's vireo (LBV) were conducted in Buck Gully Reserve in 2017. A total of 18 CAGN individuals (7 pairs and 4 dispersing juveniles) were detected in 2017 at 7 separate territories, an increase from 8 individuals among 5 territories detected in 2016. CAWR were not detected in Buck Gully in 2017. CAWR have not been detected in Buck Gully since 2013. Three surveys for Least Bell's Vireo (LBV) took place from July through August 2017. One LBV individual (likely a hatch year male) was observed along lower Buck Gully stream on August 4, 2017 but no active nests were detected.	CAGN, CAWR, and LBV monitoring in Buck Gully will continue in 2018.
Sensitive Species Monitoring: - Native Herpetofauna	A survey for all reptiles and amphibians (herpetofauna) including exotic species took place in Buck Gully in the spring of 2017. Survey methods included pitfall trapping as well as visual surveys within the main stream and pools. A report is pending.	TBD
Scientific Research:	IRC staff and volunteers currently service and maintain seven cameras in and around Buck Gully Reserve, three of which occur within the Reserve.  Camera data are used for a variety of projects including tracking use and movement by native	IRC is continuing to operate its wildlife camera monitoring program across the central and coastal reserves in 2018.

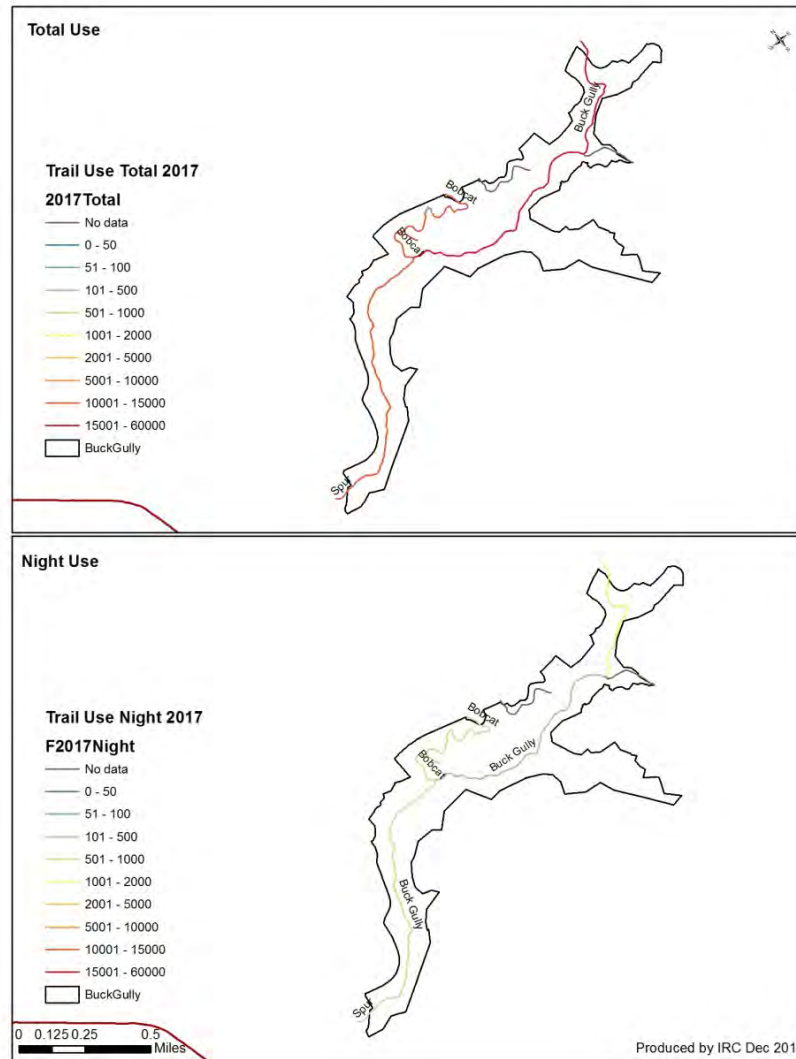
**City of Newport Beach – Buck Gully**

Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p>wildlife, identification of individual bobcats, and monitoring changes in and impacts of human access.</p> <p>Trends were found using the photos from the six cameras in and around Buck Gully from 2008 to 2017. See NPB Fig. 3 below for a summary of wildlife activity rate through time.</p> <p><u>Deer:</u></p> <ul style="list-style-type: none"> <li>• No mule deer have been detected in Buck Gully since 2012</li> </ul> <p><u>Coyote:</u></p> <ul style="list-style-type: none"> <li>• Average coyote activity dropped sharply in 2010 and has remained consistently low through 2017 even with fluctuations</li> <li>• Activity is greatest tends to be in fall (September) and winter (December) and lowest in summer (June)</li> </ul> <p><u>Bobcat:</u></p> <ul style="list-style-type: none"> <li>• Average bobcat activity in the Buck Gully decreased in 2010 and has remained relatively low through 2017</li> <li>• No seasonal pattern of activity detected from camera traps.</li> </ul> <p><u>Grey Fox:</u></p> <ul style="list-style-type: none"> <li>• No gray fox were observed in Buck Gully.</li> </ul>	

**City of Newport Beach – Buck Gully**

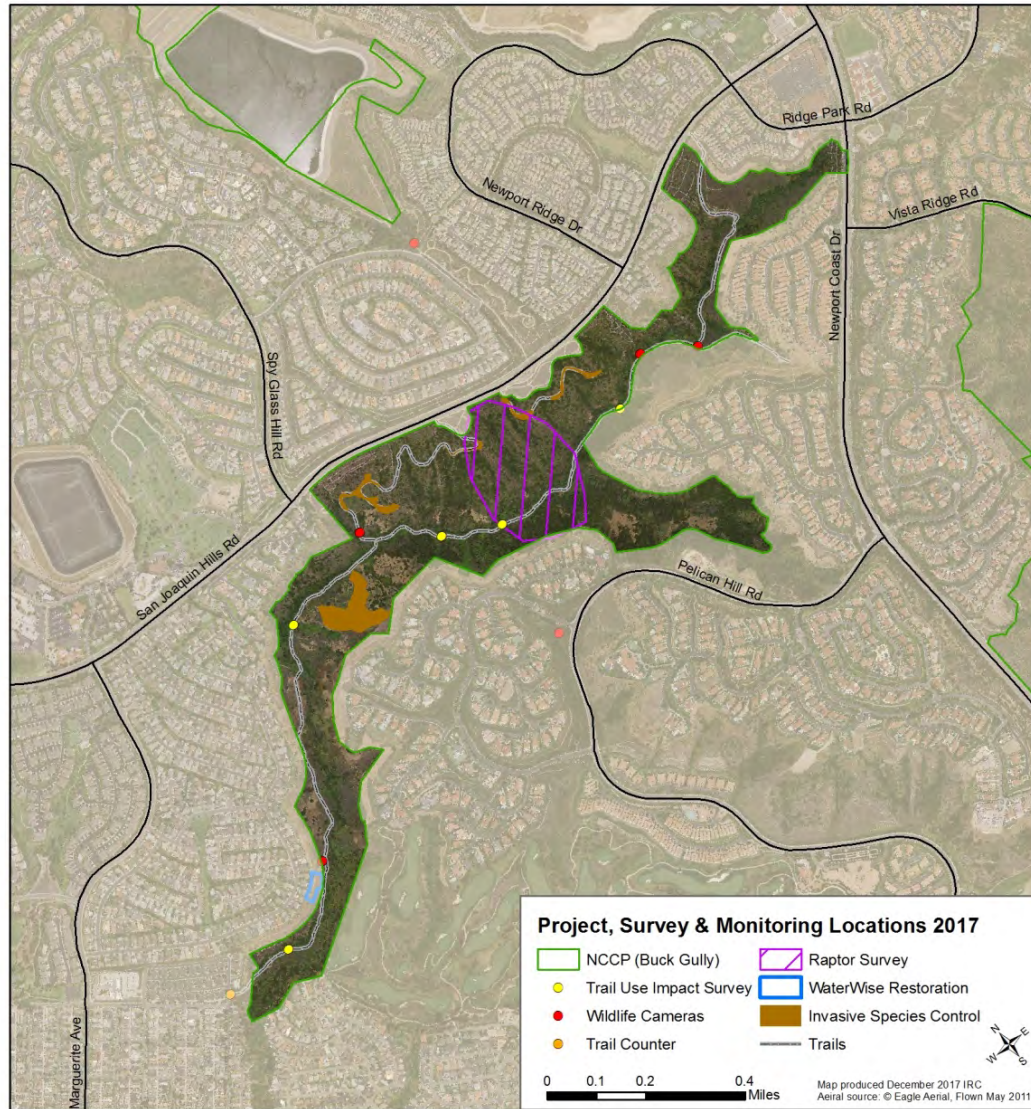
Project, Program, Activity	2017 Progress Report	2018 Work Plan
	<p><u>Mountain lion:</u></p> <ul style="list-style-type: none"> <li>• There remain no confirmed reports of mountain lions in the Coastal Reserve.</li> </ul>	
<p>Conservation Capacity:</p>	<p>IRC will continue to manage Buck Gully consistent with the Buck Gully 2009 Resource and Recreation Management Plan and the 2012 assessment of Fire modification zones. These documents identified encroachment, weed invasion, run-off, and erosion of edge habitat as primary threats to habitat, and fragmentation and road mortality as primary threats to wildlife. Management goals for 2017 included final implementation of a showcase hazard reduction zone replanting, eradication and control of target invasive species, and continued monitoring of wildlife activity.</p>	<p>Conservation actions will focus on targeted invasive species control, continued camera trapping to monitor wildlife, and the passive restoration of a highly diverse grassland in central Buck Gully. Activities will focus on the removal of invasive plant species, including artichoke thistle, fennel, and black mustard with the aim of facilitating the expansion of existing native species. All activities will incorporate volunteer assistance to increase capacity.</p>

### City of Newport Beach – Buck Gully



Newport Beach Fig. 1: Estimated Annual 7 Day Access of Trails in Buck Gully

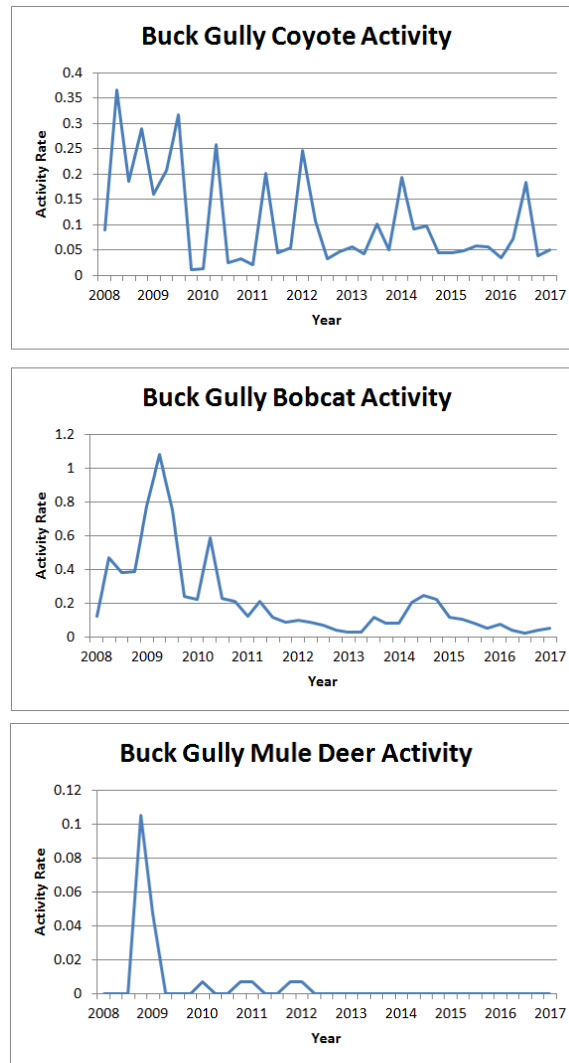
### City of Newport Beach – Buck Gully



Newport Beach Fig. 2: Projects and Surveys in Buck Gully Reserve in 2017.



### City of Newport Beach – Buck Gully



Newport Beach Fig. 3: Activity rates of coyote, bobcat, and mule deer from the six cameras in and around Buck Gully from 2008 to 2017. Activity rate is the average number of photographs captured of a particular species per trap night.

## **ATTACHMENTS**

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**2017 Progress Report & 2018 Work Plan**

**ATTACHMENTS**  
**Central/Coastal OC NCCP Wildlands**

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## ATTACHMENTS

### Central/Coastal OC NCCP Wildlands

#### **Irvine Company Orchard Hills Minor Amendment**

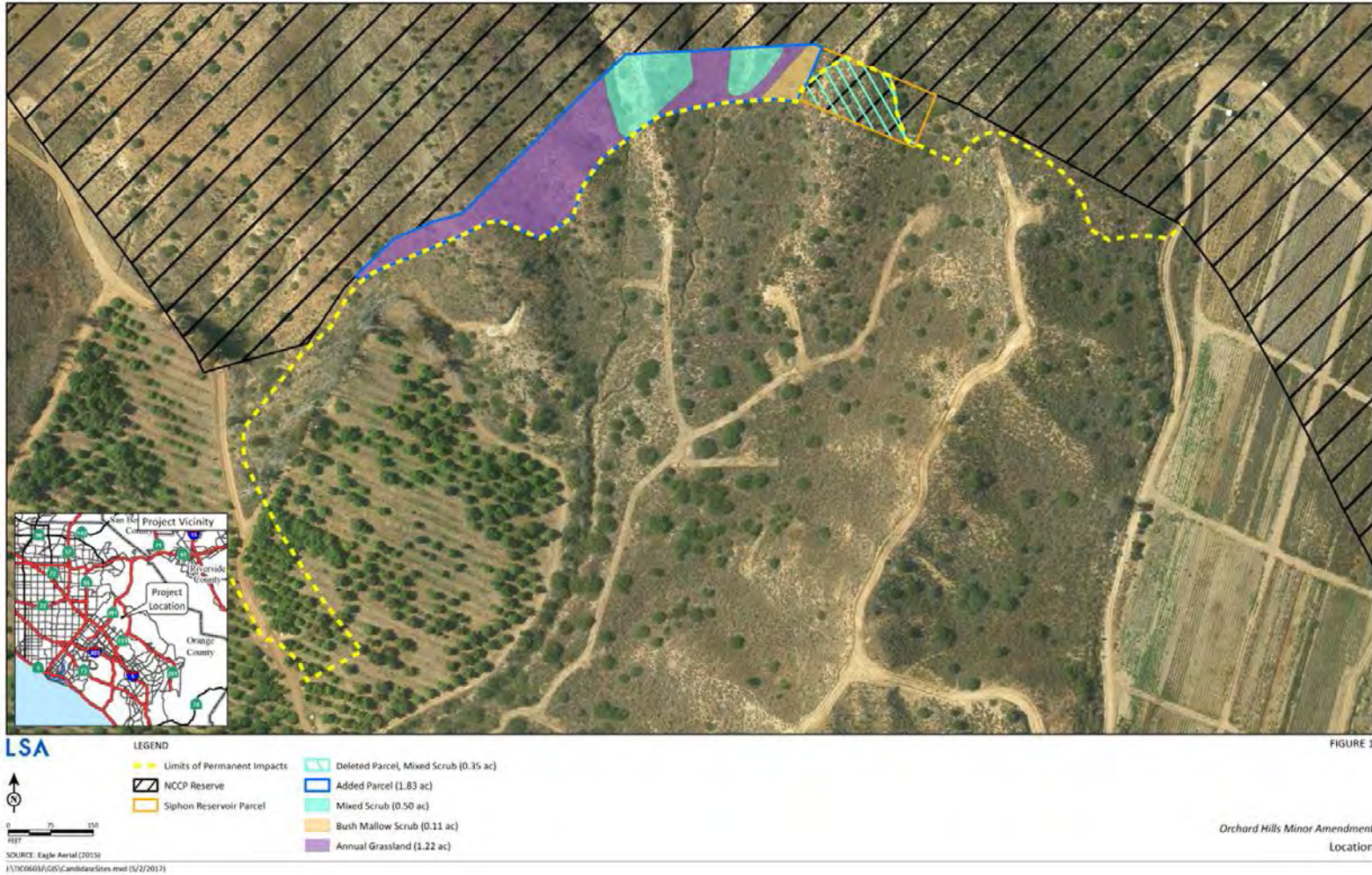
In May 2017 the Irvine Company proposed an amendment to the boundaries of the Nature Reserve of Orange County (Reserve) through a Minor Amendment (MA 17-01). The purpose of the Minor Amendment was to remove a parcel from the Reserve (“Deleted Parcel”) and add an adjacent parcel (“Added Parcel”) to the Reserve. The Deleted Parcel (0.35 ac) was mistakenly graded during construction activities associated with the Orchard Hills development. The Added Parcel (1.83 ac) is located to the immediate west of the Deleted Parcel. The Minor Amendment was approved by CDFW and USFWS in June 2017. It was approved by the NCC in September 2017.

A location map is on the following page. The following documents are available upon request:

- Minor Amendment MA 17-01
- CDFW/USFWS approval letter
- September NCC meeting agenda
- December NCC meeting agenda

# ATTACHMENTS

## Central/Coastal OC NCCP Wildlands



**Orchard Hills Minor Amendment (MA 17-01) Location**

## ATTACHMENTS

### Central/Coastal OC NCCP Wildlands

<b>The Irvine Company 2017 Annual Report Habitat Mitigation Sites Within the NCCP Reserve System</b>				
<b>Development Name</b>	<b>Mitigation Site(s)</b>	<b>Project that Mitigation Applies to</b>	<b>Performance Standards Status</b>	<b>Current Status</b>
<b>PA27-Turtle Ridge Bommer Canyon Mitigation Area</b>	<b>PA28</b>	PA 27 Development	The Corps and CDFW have approved the restoration aspect of the project.	Restoration is complete and approved. Conservation easement needs to be recorded.
<b>Pelican Hill</b>	<b>Cameo Highlands</b>	N/A	Installation completed in January 2016. 1st annual report distributed in August 2016. Resource agency approval obtained in October 2017.	Completed
<b>Santiago Hills II</b>	<b>Irvine Regional Park Drain Outlet</b>	Santiago Hills II	Installation complete December 2008. Years 1-4 standards met.	USFWS has visited the site. Signoff letter pending. Should receive in early 2018.
<b>PA1-Orchard Hills</b>	<b>Portions of Phase 3 and Phase 4</b>	PA 1 Development	Installed in phases beginning September 2016 and completed March 2017. 1st annual report to be distributed December 2017. Target agency approval in 2022.	Phases 3 and 4 are in 2nd year of monitoring.
<b>OCTA</b>	<b>Agua Chinon (Parcel R)</b>	OCTA	Installation completed in 2013. Target agency approval in 2021.	In progress

## ATTACHMENTS

### Central/Coastal OC NCCP Wildlands

**CONTACT LIST:**

<b>Phone</b>	<b>OC Parks/IRC Managed</b>	<b>Contact</b>
714-721-4212	<b>Irvine Ranch Wildlands</b>	John Gump, OC Parks Operations Manager
949-585-6482		Adam Shuck, OC Parks Supervising Ranger
714-508-4750		Michael O'Connell, IRC Executive Director
714-508-4763		David Raetz, IRC Deputy Director
714-508-4778		Sherry Fuller, IRC Director of Business Operations
714-508-4765		Dr. Jutta Burger, IRC Managing Dir. Science/Stewardship
714-508-4737		Michelle Claud-Clemente, IRC Dir. of Community Prog.
714-508-4762		Adam Maywhort, IRC Acting Dir., Planning & Field Ops.

<b>Phone</b>	<b>City of Irvine/IRC Managed</b>	<b>Contact</b>
949-724-6692	<b>Irvine Open Space Preserve</b>	Laurie Hoffman, Director - Irvine Community Services
949-724-6642		Darin Loughrey, Manager – Irvine Comm. Services
714-5084750		Michael O'Connell, IRC Executive Director
714-508-4763		David Raetz, IRC Deputy Director
714-508-4778		Sherry Fuller, IRC Director of Business Operations
714-508-4765		Dr. Jutta Burger, IRC Managing Dir. Science/Stewardship
714-508-4737		Michelle Claud-Clemente, IRC Dir. of Community Prog.
714-508-4725		Jill Sprance, IRC Field Ops. Manager

## ATTACHMENTS

### Central/Coastal OC NCCP Wildlands

Phone	City of Newport Beach/IRC Managed	Contact
949-644-3157	<b>Buck Gully</b>	Laura Detweiler, N.B. Recreation & Sr. Services Director
949-644-3159		Sean Levin, N.B. Recreation & Sr. Services Deputy Dir.
949-644-3160		Justin Schmillen, N.B. Recreation Manager
714-5084750		Michael O'Connell, IRC Executive Director
714-508-4763		David Raetz, IRC Deputy Director
714-508-4778		Sherry Fuller, IRC Director of Business Operations
714-508-4765		Dr. Jutta Burger, IRC Managing Dir. Science/Stewardship
714-508-4737		Michelle Claud-Clemente, IRC Dir. of Community Prog.
714-508-4725		Jill Sprance, IRC Field Ops. Manager

Phone	Irvine Company/IRC Managed	Contact
949-720-2609		Dan Miller, Irvine Company Senior Vice President
949-720-2878		Dean Kirk, Irvine Company Senior Director
714-5084750		Michael O'Connell, IRC Executive Director
714-508-4763		David Raetz, IRC Deputy Director
714-508-4778		Sherry Fuller, IRC Director of Business Operations
714-508-4765		Dr. Jutta Burger, IRC Managing Dir. Science/Stewardship
714-508-4737		Michelle Claud-Clemente, IRC Dir. of Community Prog.
714-508-4762		Adam Maywhort, IRC Acting Dir., Planning & Field Ops.



**Nature Reserve of Orange County**

**Annual Report 2017**

**Section: 8.7**

University of California,  
Irvine

February 8, 2018

Mr. James M. Sulentich, Executive Director  
Natural Communities Coalition  
15600 Sand Canyon Avenue  
Irvine, California 92618

RE: 2017 Annual Report for the University of California, Irvine to the Natural Communities Coalition (NCC)

Dear Mr. Sulentich:

This is the Annual Report for 2017 submitted by the University of California, Irvine (UCI) to the Natural Communities Coalition. UCI has lands enrolled in the NCCP including a closed landfill on the North Campus, an adjacent section of San Diego Creek (the created flood control channel), the UCI Ecological Preserve on the main campus, and a strip adjacent to the San Joaquin Hills Transportation Corridor (SR-73) along the campus's southwestern boundary from the UCI Ecological Preserve to the terminus of campus lands on the western side of Bison Drive. This report follows the general guidelines recommended by US Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) (FWS/CDFG-OR-2257.5) where applicable, although these guidelines were intended for much larger areas with different use patterns.

To provide some background about the three areas that comprise the UCI NCCP-enrolled lands, there are a few features of our enrolled habitats that distinguish them from most of the other NCCP habitats. The landfill is an historic county facility that was closed and capped in 1960, and is fenced, posted, and is not open to public access. The San Diego Creek channel abutting the Landfill is estuarine, and the drop structure at the MacArthur bridge has been colonized by salt marsh species such as *Juncus acutus* and *Jaumea carnosa* – and, unfortunately, non-native taxa such as *Lepidium latifolium* (broadleaved pepper grass, broadleaved pepperweed) and the highly invasive *Limonium ramossissimum* (Algerian sea lavender, also present along Bonita Creek and which has colonized the salt marsh habitat of Upper Newport Bay). Least Bell's Vireos inhabit the riparian habitat in the San Diego Creek channel and California Least Terns forage in the Creek. The biological corridor (strip) along the San Joaquin Hills Transportation Corridor (73) consists of a steep slope with no trails or public access. It sustains a healthy stand of coastal sage scrub that is used by California gnatcatchers.

In conjunction with UCI and other collaborators, the Natural Communities Coalition (NCC) has taken the lead in conducting studies of the coastal cactus wren and California gnatcatcher, and has initiated a large-scale (12.5 acres) cactus transplantation effort to increase wren habitat. These restoration efforts have been funded through EEMP and Mitigation Measure 2, and both projects have been successfully implemented and are now completed. The Natural Communities Coalition, UCI and others have an on-going experiment to determine the most feasible method for eradication of black mustard on the Preserve and in other NCC-enrolled habitats.

Since there has been no change in the following categories of Natural Communities Coalition concern (recreation use, monitoring and management; recreation facility construction and maintenance; infrastructure construction and maintenance; fire management activities; and miscellaneous activities and management programs), they are not addressed in detail in this report. The monitoring of the cactus transplantation and mustard eradication projects is managed by the NCC (see the 2015, 2016 and 2017 reports, schedule and figures below). The following summary addresses the issues identified in the USFWS/CDFWS (formerly CDFG) template, where applicable, to the three UCI areas enrolled in the NCC:

#### **I. Recreation Use, Monitoring and Management - Current Use Policies**

- UCI Ecological Preserve: The UCI Ecological Preserve (ca. 62 acres) is open to the public, with five access points through walk-in gates. Access is permitted throughout the year, and the trail system is widely appreciated by the University Hills and other members of the surrounding community. Several information kiosks created by Eagle Scouts have been established at key access points, the primary one being at Los Trancos and Locke Streets and inspiring and informative new signage designates established trails and identifies key habitat interpretive features. User recommendations were developed by UCI in collaboration with the NCC and are posted at several entry points. Each year Bowler and his students collect trash on the Preserve, usually accumulating several garbage bags full.
- Biological Corridor along SR-73: There are no public access, trails or access points on the steep, narrow biological corridor adjacent the SR-73.
- The Landfill on UCI's North Campus: Public access is not permitted on the closed landfill on North Campus. The landfill is fenced and posted to deny random public entry.
- The San Diego Creek flood control channel segment within the NCC enrollment area has hiking and riding trail along the levee next to it.

## **Recreation Monitoring**

- UCI Ecological Preserve: The access gates are all linked to existing trails and the public stays on them. There is no need to monitor the trails in a formal way, however, if a new trail is detected, it will be closed. Special events are not permitted in the Ecological Preserve unless specially approved.
- Biological Corridor and Landfill: Public access is not allowed or available on the habitat strip along the SR-73 or the landfill on North Campus. A hiking and riding trail passes beside the Landfill on the San Diego Creek levee.

## **User Compliance Programs**

- This does not apply to the UCI NCCP-enrolled lands. There has been occasional trespass from equestrians and joggers on the landfill, and UCI Facilities Management has had to repair a jogger access point that was made in the landfill fence in the past. Landfill fences are repaired and posting has been re-established following discovery of trespass/vandalism damage.
- **Educational Programs/Outreach**
- UCI Ecological Preserve: An educational signage project was implemented by TGIF (UCI, ASUCI) on the relatively small (62 acre) UCI Ecological Preserve, and many University classes visit the site (additional use is described below). Definition of accepted trails and decommissioning of inappropriate spider trails has been established as part of this project.

## **II. Recreation Facility Construction and Maintenance**

### **Construction of New Recreational Facilities or Expansion of Existing Facilities**

- This does not apply to UCI's three sites, none of which have existing or planned recreational facilities.

### **Maintenance of Existing Recreation Facilities**

- This does not apply to UCI NCCP-enrolled lands.

## **III. Infrastructure Construction and Maintenance**

- Does not apply to NCCP-enrolled UCI lands.

## IV. Habitat Restoration and Enhancement

### Research and Monitoring:

1. Local adaptation and response to climate change in *Artemisia californica* and associated insect communities:

Kailen Mooney and his graduate student Jordan Rainbow in Ecology and Evolutionary Biology at UCI initiated a 3-5 year common garden experiment on the perimeter of the UCI Ecological Preserve adjacent to the north entrance along East Peltason Drive. This study site is one of three analogous research sites along the California coast (Sonoma County and Santa Barbara County).

In 2017 the project site on the Ecological Preserve was mowed and individual container plants of *A. californica* sourced from the different areas were planted. The plants were maintained by hand weeding and supplemental irrigation. Data were collected and recorded and there will be published products flowing from the NSF-funded project.

In 2018 the project will be maintained as in 2017 and controlled water manipulations to mimic rainfall regimes from the north will be initiated on portions of the study arena.

- 2) Effects of drought on non-native grassland restored to coastal sage scrub using inland and coastal seed sources:

The study will be initiated in 2018 and is will be part of a networked study (Drought Net) to examine the impacts of decreased rainfall on natural communities, but with the following additional factors added to the design: seed sourced from mesic vs. xeric environments in the local region (Orange County), the process of restoration of coastal sage scrub habitat, and the influence of water addition. The natural community utilized within the basic design of Drought Net is annual grassland, which will be subjected to a treatment of reduced rainfall via rainfall exclosures.

In 2017 seed was collected for a subset of species within the UCI Ecological Preserve, in addition to a few other areas in Orange County. Anticipated activities in 2018 include continuation of seed collection for the species under study, mowing of the study footprint, and weed control. Due to unseasonably dry conditions in late 2017, it is possible an additional season of weed control and seed collection will occur in 2018-2019.

- 3) Long term vegetation monitoring transects:

Six long term vegetation monitoring transects in grassland, coastal sage scrub, and ecotone habitats have been established on the UCI Ecological

Preserve. They utilized the same sampling protocols as NCC's larger vegetation monitoring transects to facilitate comparisons and expand the scope of understanding of community dynamics to the preserve lands. These transects will be monitored again spring 2018.

#### 4) Monitoring of the invasive Shot hole Borer:

Willow, sycamore, and cottonwood species occurring in natural areas within NCCP enrolled lands were evaluated for the presence of shothole borers during the past year. This monitoring is associated with additional natural areas within UCI campus and the UC San Joaquin Marsh. The majority (but not all) trees were surveyed along riparian drainages and observed trees were flagged. Trees that had no to minor infestations were marked with a metal tag, given a number, and GPS'd. A drainage within a linkage area of the NCCP was sampled and out of 55 trees observed, 23.5% were lightly infested and the remaining moderately to heavily infested. This effort was conducted in coordination with monitoring efforts being conducted by Akif Eskalen and Shannon Lynch regionally.

In 2018, Akif Eskalen and Shannon Lynch will include some of these areas in their research on biocontrol treatments.

### **Habitat Restoration/Revegetation**

- **UCI Ecological Preserve:** A 12.5 acre coastal cactus scrub restoration project was initiated in 2012 by the NCC, UCI and other partners (see the monitoring reports by Land IQ for Measure M and EEMP funded efforts). This project transplanted whole cactus plants and individual pads from a donor site near the corner of Anteater and Bonita Canyon on UCI lands. The NCC was awarded EEMP and Measure M2 funds to restore and expand coastal sage and cactus scrub habitat on the Preserve to enhance the cactus wren and California gnatcatcher populations. On March 20, 2015, avian monitoring surveys recorded eight pairs of California gnatcatchers and an additional single male and two pairs of coastal cactus wrens.
- Ongoing weed control of targeted species on the Ecological Preserve occurred during the spring of 2017. Individuals were either sprayed with a backpack sprayer or hoed by crews with Nakae and Associates funded by NCC.
- Land IQ completed a fifth year of monitoring and weed control activities for the Cactus Scrub Restoration Project conducted as mitigation under Measure M for the Orange County Transportation Authority. NCC and Land IQ staff conducted a tour with Wildlife and Army Corps agency, and OCTA staff spring 2017.

- In November 2016, a final five-year report was completed for the Environmental Enhancement and Mitigation Program, Cactus Wren Habitat Linkage Enhancement and Restoration Project. The report was completed by Margo Griswold with Land IQ for the Natural Communities Coalition and conducted on the UCI-Ecological Preserve.
- In the early winter of 2017, approximately 400 cactus pads sourced from cacti within the preserve were collected and planted along unauthorized trails. Cactus pads were only collected from mature individuals less than 1 meter in height and outside the nesting season of the Cactus Wren. In addition, signs were added indicating no biking at two entrances and 4 “habitat restoration in progress” to indicate unauthorized trail closures. Mowing to maintain existing trails was conducted late spring 2017.
- Trail work in 2018 will entail moving of a couple of signs where trails have grown in to other areas where they are needed. Supplemental planting of approximately 30-50 *Eriogonum fasciculatum* containers will occur in the early winter with seed sourced from the preserve in 2017.
- In 2017, UCI-Nature staff and faculty with the Center for Environmental Biology met with NCC staff to discuss the development of a fuel modification demonstration project and affiliated student led monitoring. In 2018, group collaborators will submit proposals for grant funding as part of the project planning process.
- **Biological Corridor:** Nine acres of coastal sage scrub have been created in the biological corridor, and the primary activity on this strip along the SR-73 has been spot treatment of artichoke when plants are discovered.
- **Landfill:** The University has no current plans or implementation schedule for habitat restoration on the landfill. Post-closure landfill operations including a landfill gas recovery system, groundwater monitoring system, and storm water management systems operated by the County of Orange and UCI currently preclude habitat restoration on the landfill.

### **Potential projects for the near future**

- Re-collect and voucher the vascular plant flora in the NCCP enrolled UCI lands with validating collections placed in the UCI Herbarium (IRVC) and

duplicates placed in other southern California collections (UCR, Rancho Santa Ana Botanic Garden herbarium, and so forth)

- Verify and voucher the occurrence of *Brodiaea terrestris* on the UCI Ecological Preserve
- Expand the estuarine aquatic species list in Reach 1 of San Diego Creek
- Digitization of the relevant collections from NCCP enrolled habitats in IRVC (the UCI Herbarium)
- Examine the vernal pool flora and fauna (particularly *Brachinecta lindahli*) of the two pools on the Ecological Preserve

## **Recommended NCC funded restoration and enhancement activities**

### **Continued Exotic Plant Eradication**

- **UCI Ecological Preserve:** The NCC accessed the UCI Preserve to control artichoke thistle in the spring of 2017. To implement control activities, NCC contracted with the weed monitoring and control team that has been used in previous years. In addition to *Cynara cardunculus*, the UCI Ecological Preserve has a black mustard problem, and UCI is collaborating with the NCC and others in continued weed abatement research on the Preserve. This research was implemented during 2010, continued through 2011, 2012 and 2013, 2014 and is ongoing. Magnificent interpretive signage coupled with termination of spider trails has made this a strong year for the Ecological Preserve.
- **Biological Corridor:** Exotics are not a problem in the biological corridor strip at this time. If a problem emerges, treatment will be incorporated into other eradication efforts on the NCCP/NCC lands.
- **Landfill:** The landfill has a large ice plant (*Malephora crocea*) problem, and ice plant is the dominant vegetative cover.
- The San Diego Creek channel and MacArthur Drop Structure next to the landfill: Algerian sea lavender (*Limonium ramosissimum*) and *Lepidium latifolium* have established large populations that need to be eradicated. Algerian sea lavender has already invaded Upper Newport Bay near Jamboree. Garland chrysanthemum (*Chrysanthemum coronatum*) also occurs along the channel sides. All of these have invaded the UCNRS San Joaquin Marsh Reserve, but are being controlled through removal efforts within the Marsh Reserve – but it would be extremely helpful for the NCC to initiate exotic control in the enrolled San Diego Reach 1 area below the landfill.

### **Exotic Animal Control**



- UCI Ecological Preserve and Biological Corridor:** The primary potential exotic animal problem for the sage scrub habitats on the UCI Ecological Preserve and the biological corridor is the possible intrusion of brown-headed cowbirds. Though not in recent years, the TCA conducted very effective cowbird removal using traps in the San Joaquin Marsh and Bonita Canyon. It is possible that feral cats could hunt these sites, but none have been seen. The exotic (“garden”) landsnail *Cornu aspersum* (formerly *Helix aspersa*) escapes from irrigated landscaping into both of the sage scrub habitats, but in general this species does not do well far from wet habitats. The Spanish milk snail, *Otala lactea*, occurs on the UCI Ecological Preserve, but does not appear to be a significant problem at this time. This mollusk can tolerate much more xeric conditions than *C. aspersum*. Both of these exotic mollusks seem to inhabit microhabitats different from the native landsnail *Helminthoglypta tudiculata* that is associated with sage scrub. The decollate snail has been introduced within the San Diego Creek watershed and occurs along the flood control periphery, and these predators could prey upon *Helminthoglypta*.
- Landfill:** The Spanish milk snail (*Otala lactea*) has a large population at the San Diego Creek facing side of the landfill and also on the top of the landfill where there are places one cannot walk without crushing dozens of these exotic landsnails. Because there is no native habitat on the landfill, it is nearly devoid of animal life. In the winter Canada geese graze on European annual grasses as they appear on the landfill.
- Current NCC-partnered projects include the ongoing maintenance and management of the 12.5 acres of Measure M and EEMP cactus scrub restoration by Nakae and Land IQ on the Ecological Preserve

### **Fire Management Activities**

- UCI Ecological Preserve:** The UCI Ecological Preserve is surrounded entirely by roads, housing (University Hills) or landscaped areas. At present the eastern side abuts The Irvine Company’s Research Park, and there is a landscaped break between the urban interface and the habitat. There is a defensible space zone (maintained by the Irvine Campus Housing Authority in consultation with the Orange County Fire Authority) located between the Ecological Reserve and University Hills, a faculty and staff housing development. This zone consists of irrigated green vegetation within the development area, followed by a hand-cleared break of ca.15-20 feet, and then by a 100-foot zone of vegetation that has been thinned. The patchy nature of shrub fuel load is such that this zone is mostly grass and

herbaceous exotics. There are no proposed burns or other fuel management projects for the UCI Ecological Preserve.

- **Biological Corridor:** The strip of coastal sage scrub along the SR-73 lies between the Toll Road and parking lots, greatly reducing any fire threat fire along this narrow zone. There is no proposed burn or fuel management proposal for the habitat strip along the Toll Road.
- **Landfill:** There is no fuel load on the ice plant covered/barren landfill, and the San Diego Creek segment along the landfill does not support fire-risk vegetation.

### **Maintenance of Existing Fuel Breaks or Fuel Modification Zones**

- This does not apply to UCI NCCP/NCC habitats.

Thank you for your consideration. If you have any questions regarding activities on UCI's NCCP/NCC sites, please do not hesitate to forward them to us.

Sincerely,

Richard G. Demerjian  
Assistant Vice Chancellor  
Environmental Planning and Sustainability

Cc T. Huxman  
M. Lulow  
P. Bowler

### **Relevant Unpublished Reports Submitted in 2015 and relevant publications**

Land IQ. October, 2015. 2015 Performance Monitoring Report, Year 3. Measure M Cactus Scrub Restoration for the University of California, Irvine Ecological Preserve. 47 pages.

Land IQ. December, 2015. 2015 Performance Monitoring Report Environmental Enhancement and Mitigation Program. Cactus wren habitat linkage enhancement and restoration project. 63 pages.

Land IQ. September, 2016. 2016 Performance Monitoring Report, Year 4. Measure M Cactus Scrub Restoration for the University of California Irvine Ecological Preserve. 43 pages.

Land IQ. November, 2016. 2016 Performance Monitoring Report, Year 5 - Final. Environmental Enhancement and Mitigation Program. Cactus Wren Habitat Linkage Enhancement and Restoration Project. 79 pages.

Land IQ. June 2017. 2017 Performance Monitoring Report, Year 5 – Final. Measure M Cactus Scrub Restoration for the University of California Irvine Ecological Preserve. 35 pages of narrative plus four appendices.

Roslin, T., Hardwick, B., Novotny, V., Petry, W.K., Andrew NR, Asmus A, Barrio IC, Basset Y, Boesing AL, Bonebrake TC, Cameron EK, Dáttilo W, Donoso DA, Drozd P, Gray CL, Hik DS, Hill SJ, Hopkins, T., Huang S, Koane B, Laird-Hopkins B, Laukkanen L, Lewis OT, Milne S, Mwesige I, Nakamura A, Nell CS<sup>6</sup>, Nichols E, Prokurat, A., Sam K, Schmidt NM, Slade A, Slade V, Suchanková, A., Teder Tvan Nouhuys, S., Vandvik V., Weissflog, A., Zhukovich, V.; and Slade, E.M. 2017. Higher predation risk for insect prey at low latitudes and elevations. *Science* **356**: 742-744.

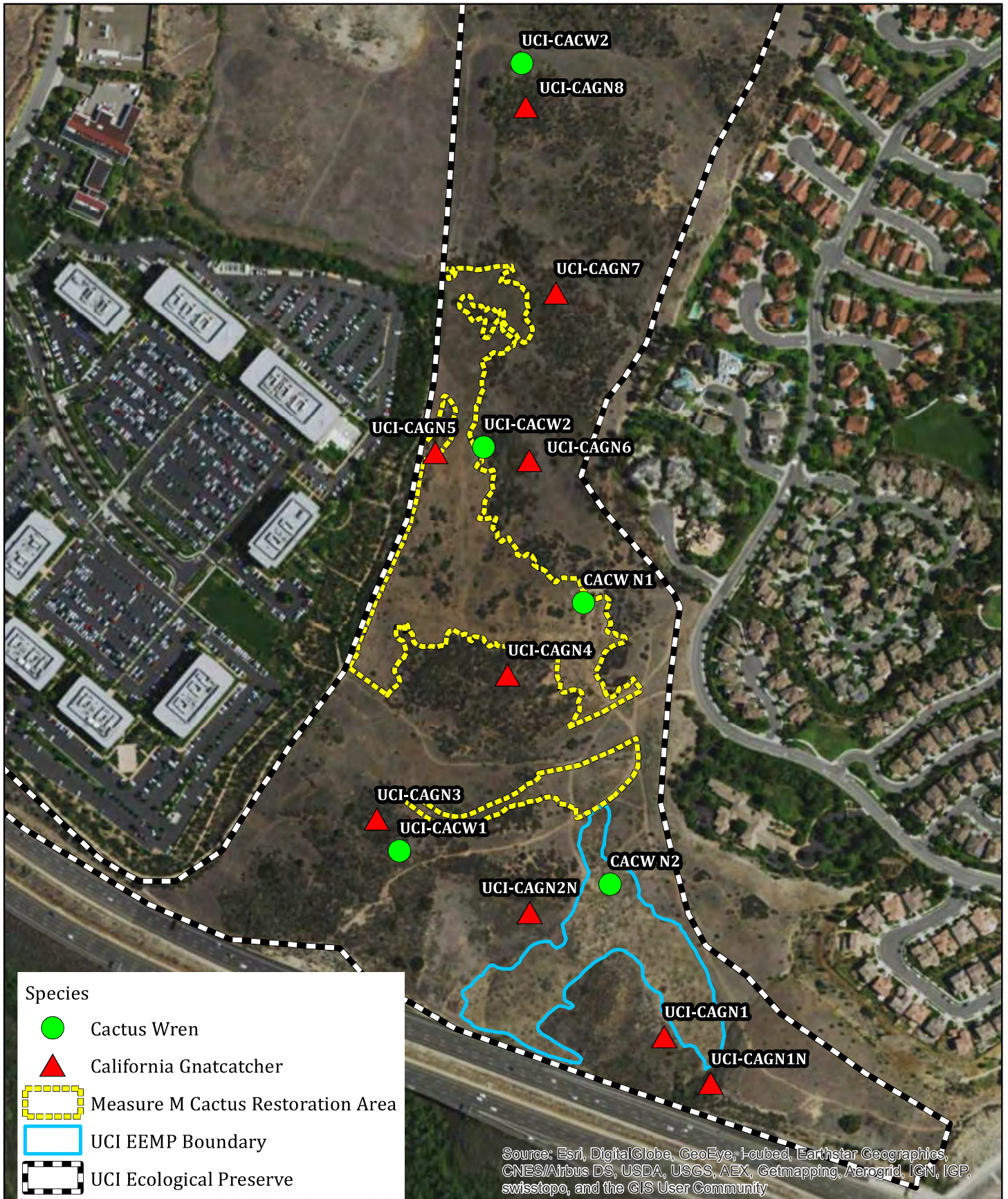
Approximate Time-line of Activities for the NROC Measure M2 Cactus Scrub Restoration Project at UCI Ecological Preserve

I. Site preparation, cactus salvage and planting, Fall 2011

Tasks	Oct. 10 - 14	Oct. 17 - 21	Oct. 24 - 28	Oct. 31 - Nov. 4	Nov. 7 - 11	Nov. 14 - 18
	M T W Th F	M T W Th F	M T W Th F	M T W Th F	M T W Th F	M T W Th F
Prepare donor site for cactus harvesting	(3 men)					
Salvage cactus clumps and cut pods at donor site	(8 men)					
Prepare site and plant cactus clumps at UCI Ecological Preserve	(8 men)					
Plant hardened cactus pods and water cactus at UCI Ecological Preserve	(8 men)					

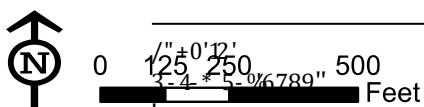
II. Restoration Monitoring, Spring 2012 - 2016

Tasks	Spring 2012	Spring 2013	Spring 2014	Spring 2015	Spring 2016
Qualitative performance monitoring					
Quantitative performance monitoring (vegetation sampling)					
Survey for Cactus Wren					



**Figure 13. California Gnatcatcher and Cactus Wren Locations in 2015**

Measure M Cactus Scrub Restoration Area within the UCI Ecological Preserve



# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.8**

Irvine Ranch Water  
District

Irvine Ranch Water District  
Siphon Reservoir Preserve

Recreation Use, Monitoring & Management:

Project, Program, Activity	2017 Status	2018 Work Plan
Siphon Reservoir is not open to the public. A private fishing club uses the site primarily on weekends.	On-going fishing club use.	IRWD will continue the fishing club lease through 2018.
There are no trails or other recreational amenities at the site. The area is visited by IRWD staff 1-2X/week. <b>In addition, IRWD's</b> biologist inspects the site approximately once per month to monitor site conditions.	Monitoring complete	Weekly site monitoring will continue in 2018.
No educational or outreach programs are provided on the site.	None	None

Recreation Facility Construction & Maintenance:

Project	2017 Status	2018 Work Plan
No recreational facilities were build or are planned for the site.	None	None

Infrastructure Construction & Maintenance:

Project	2017 Status	2018 Work Plan
IRWD conducted regular required maintenance on the Siphon Reservoir dam. This included removal of all vegetation on the dam face. The vegetation removal was monitoring by a qualified biologist	Complete	IRWD will continue to conduct maintenance on the dam face in 2018. Vegetation removal on the dam face is required by the State of California, Division of Dam Safety.

Habitat Restoration & Enhancement:

Project	Funding Source	2017 Status	2017 Work Plan
No projects are currently in place, however, invasive species are monitored at the site.	IRWD funds invasive species monitoring at this site.	No large outbreaks of invasive species were recorded at the site.	IRWD will continue to monitor the site for invasive species.

Fire Management Activities:

Fuel Treatment	Accomplished 2017	Proposed for 2018
None	None	None



Miscellaneous Activities and Management Programs:

Project	2017 Status	2018 Plan
IRWD regularly collects and tests the water quality of the reservoir approximately once a week as required by state regulations.	Complete	IRWD will continue to conduct water quality sampling in Siphon Reservoir throughout 2018, per State requirements for recycled water.

# **Nature Reserve of Orange County**

## **Annual Report 2017**

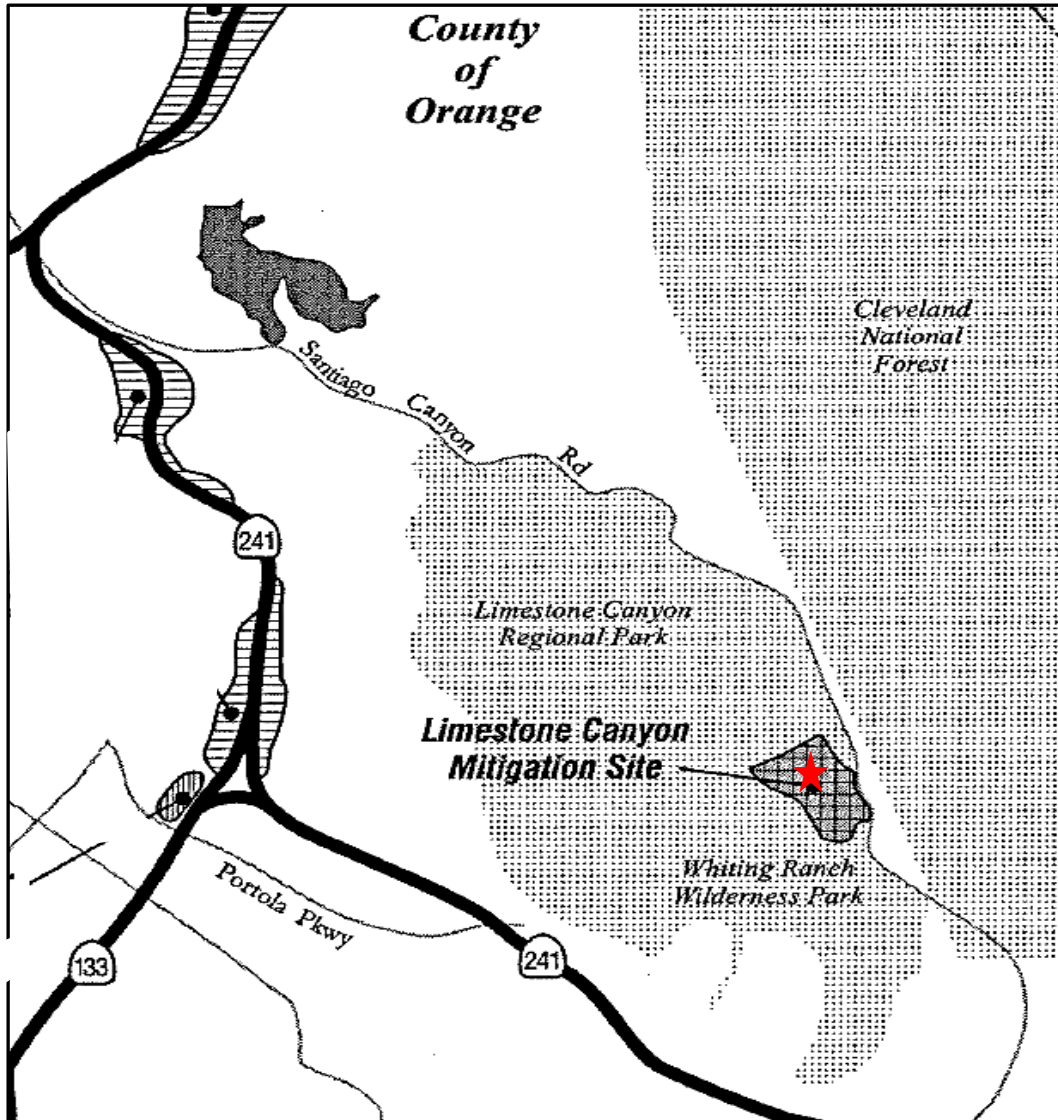
### **Section: 8.9**

# Transportation Corridor Agencies



The Transportation Corridor Agencies (TCA) created numerous restoration sites in Orange County, most of which are within the Orange County Central/Coastal NCCP Reserve System. These sites, which include Siphon Reservoir, Limestone, Coyote Canyon Landfill, Bonita Creek Channel, San Diego Creek Salt Water Marsh, Strawberry Farms, Glenwood/Pacific Park, Bonita Reservoir, and the University of California, Irvine (UCI) Preserve area are shown on the map above. Restoration work at Siphon Reservoir, Coyote Canyon Landfill, San Diego Creek Salt Water Marsh, Glenwood/Pacific Park, Bonita Reservoir, and the UCI Preserve is complete. These sites have met the required performance standards and some have been transferred to other entities for permanent management; no further discussion of these sites is provided in this report. The TCA continues to work on, and monitor, the remaining sites: Limestone, Bonita Creek Channel, and Strawberry Farms. Other 2017 TCA environmental activities included the monitoring of the State Route (SR) 241 Wildlife Protection Fence Project between the SR-91 and SR 261, within the NCCP Central Subarea. A brief overview of the TCA mitigation sites (excluding the transferred sites) is provided below and the 2017 specific activities are detailed in the tables that follow.

### Limestone Canyon



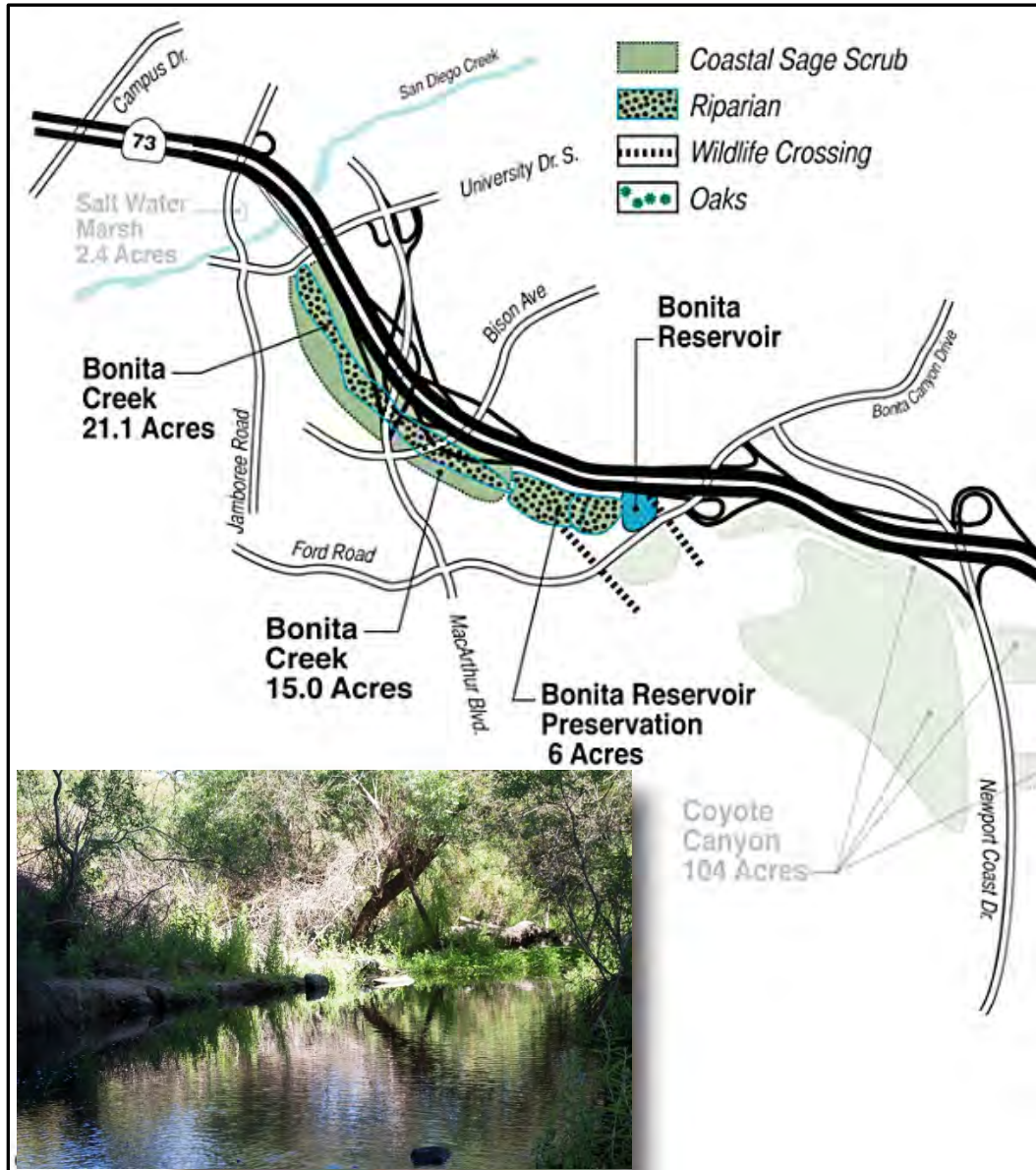
The 50-acre Limestone Canyon mitigation site is located west of Santiago Canyon Road and traversed by the Santiago Creek. Site restoration efforts began in 1995 as part of the required mitigation for impacts to wetland and streambed resources related to the construction of State Routes 133, 261, and that portion of SR 241 between SR 133 and SR-91. Prior to the habitat restoration, the site was dominated by disturbed barrens as a result of previous aggregate mining operations. The 1993 Final Wetland and Streambed Resource Mitigation Plan (Plan) for the ETC identified 34.6 acres of restoration area at the Limestone site, including willow woodland, mulefat scrub, sycamore woodland, oak woodland, and floodplain scrub. Additionally, the plan identified approximately five acres of existing CSS for enhancement at the site. TCA continues to monitor this site, which is part of Limestone Regional Park. The wetland mitigation areas have achieved compliance with all the conditions contained in the California Department of Fish and Wildlife

(CDFW) Streambed Alteration Agreement, U.S. Army Corps of Engineers (ACOE) Individual Permit, and the USFWS Biological Opinions.

2017 Site Photos



### Bonita Creek Channel



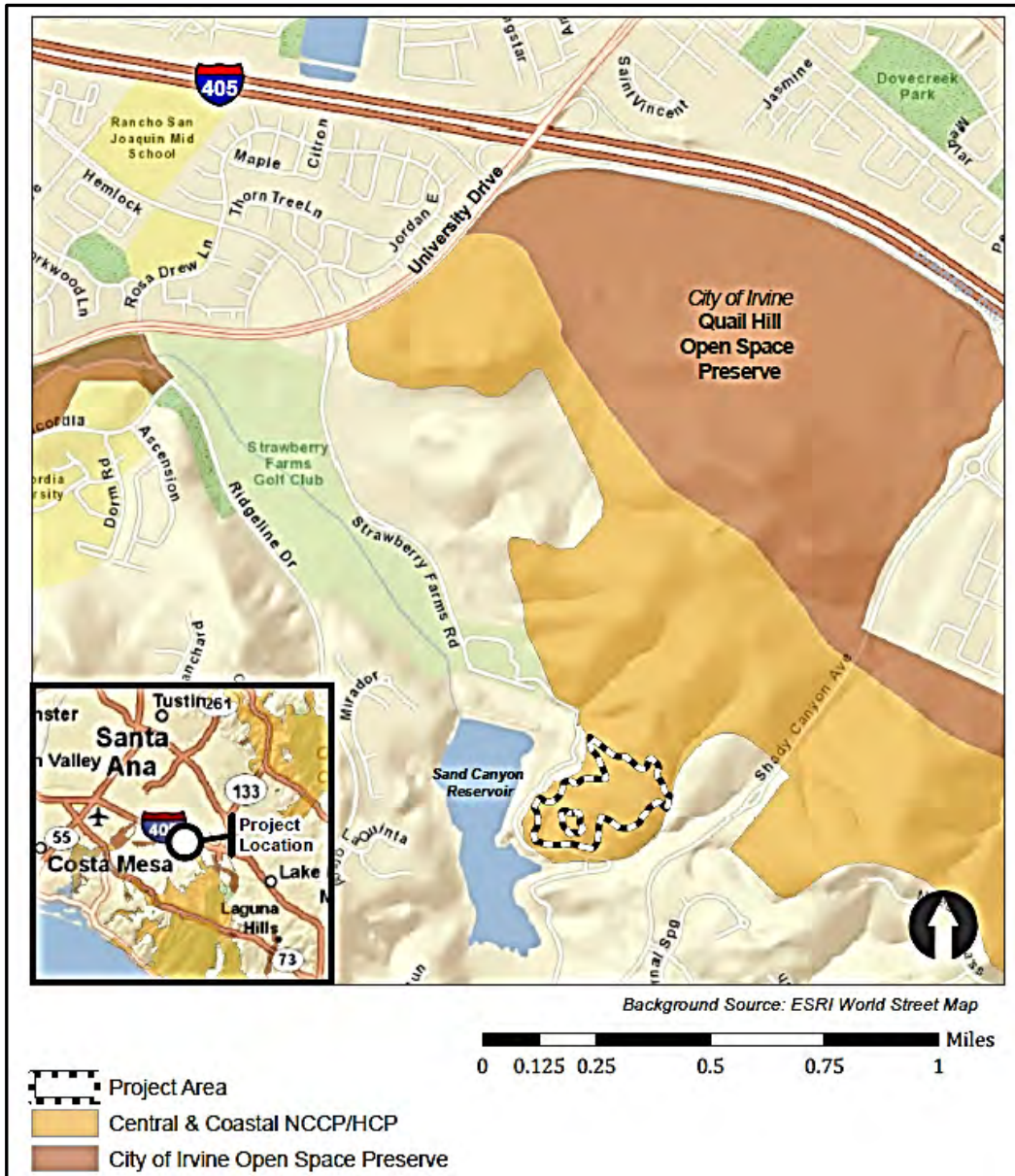
Located in the City of Newport Beach, the Bonita Creek Channel was a former underground culvert that now includes 21 acres of riparian woodland habitat/mulefat scrub, and 15 acres of revegetated CSS. This mitigation site was developed as part of the SR 73 construction project. After purchase of the land by TCA in 1994, the area was restored to a thriving wetland and CSS community. One goal of the revegetation program was to provide self-sustaining riparian habitats that would achieve specific patterns of vegetation cover and height. In 2002, USFWS provided concurrence that TCA had met the performance standards for the CSS habitat; however, TCA continues to have management responsibilities for the site. An evaluation of the hydrologic, biogeochemical, and biologic conditions of the site indicates a functioning riparian habitat. Furthermore, the site is utilized as a wildlife corridor connecting the San Joaquin Hills and Upper

Newport Bay. The Bonita Creek Channel restoration site is a valued environmental education resource with its public use trails and proximity to numerous K-12 schools, colleges, and recreational facilities. The site provides an excellent educational demonstration of habitat restoration by applying science to solve real world problems. In 2017, TCA and restoration ecologist, Dr. Margot Griswold, led a guided tour of the site to members of the Orange County Association of Realtors for a firsthand look at a completely restored Bonita Creek Channel - a thriving wetland and coastal sage scrub community.

2017 Site Photos



Strawberry Farms



Strawberry Farms is a 15-acre site located within the 360-acre Quail Hill Preserve owned and managed as open space by the City of Irvine (City). When the Quail Hill Preserve was dedicated within the NCCP/HCP, the Irvine Company (Company) retained the right to perform habitat restoration for mitigation credits within the project parcel. In 2010, the TCA was granted rights through an agreement with the Company and the City to design, implement, and manage habitat restoration within the site, with the approval of the resource agencies. The area is currently being restored with a mosaic of native habitat types as surplus mitigation for future TCA capital improvement projects. Long-term management of the parcel will be the responsibility of the City, once it has achieved successful and resilient restoration and enhancement.



2017 Site Photos



### SR 241 Wildlife Safety Fence



TCA continues to monitor the now-completed SR 241 Wildlife Safety Fence, which runs along both sides of a six-mile stretch of The Toll Road, from the SR 261 junction north to the SR-91 Freeway. The fence is 10-to-12 feet high; has an 18-inch “outrigger,” is buried 24 inches to prevent animals from digging under the fence; and is in close proximity to the roadway shoulder to minimize natural habitat loss. Effectiveness of the fence and efficacy of the undercrossings is being monitored through an adaptive management approach over a three-year period. In spite of the Canyon Fire 2 damage to some of the jump-out ramps, the second year (January-November 2017) post-construction monitoring data shows no breaches and/or vehicle-wildlife collisions with the target species (mountain lion, bob cat, coyote, and deer) in the project area. There is also evidence of an increased use of bridge undercrossings and culverts in the fence area, indicating that the fence and undercrossings have safely enhanced wildlife movement across SR 241.

Caltrans is now in the process of redesigning the jump-out ramps that were damaged during the fire. TCA will continue to coordinate with Caltrans on the repair and maintenance of the fence and will continue to monitor the fence's effectiveness in 2018.

2017 Site Photos



**Recreation Use, Monitoring & Management:**

<b>Project/ Program/ Activity</b>	<b>2017 Status</b>	<b>2018 Work Plan</b>
Bonita Creek Channel	Use of public trail.	Use of public trail.

**Recreation Facility Construction & Maintenance:**

<b>Project/ Program/ Activity</b>	<b>2017 Status</b>	<b>2018 Work Plan</b>
Bonita Creek Channel	Exotic species and trash removal.	Exotic species and trash removal.

**Infrastructure Construction & Maintenance:**

<b>Project/ Program/ Activity</b>	<b>2017 Status</b>	<b>2018 Work Plan</b>
Bonita Creek Channel	As needed maintenance of the Austin Sand Filter at Bison Ave.	As needed maintenance of the Austin Sand Filter at Bison Ave.
ETC Wildlife Fence Project	Monitoring and Maintenance.	Monitoring and maintenance.

**Habitat Restoration & Enhancement:**

<b>Project/ Program/ Activity</b>	<b>2017 Status</b>	<b>2018 Work Plan</b>
Bonita Creek Channel*	Exotic species and trash removal.	Exotic species and trash removal.
Strawberry Farms*	Spot weeding was conducted	Year 5 Performance Monitoring and maintenance will be conducted.
ETC Wildlife Fence Project*	Monitoring and maintenance.	Maintenance and monitoring.

*\*Funding source: TCA*

**Miscellaneous Activities and Management Programs:**

<b>Project/ Program/ Activity</b>	<b>2017 Status</b>	<b>2018 Work Plan</b>
Limestone Canyon	Cowbird trapping conducted.	Conduct cowbird trapping.

**MITIGATION MATRIX 1997--2017**  
**Mitigation Sites within the Orange County Central/Coastal NCCP Reserve System**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
Limestone Canyon Mitigation Site	Planted 1995/1996	Eastern Transportation Corridor (SR-241, 261 & 133) construction	50-acre site within the northeastern portion of Limestone Regional Park in Orange County. South of Santiago Canyon Road. Adjacent to Santiago Creek, north of the intersection of Jackson Ranch Road and Santiago Canyon Road.	Limestone Canyon, adjacent to Santiago Creek. Between Silverado and Modjeska Canyons, immediately north of the junction of Williams Canyon and Santiago Creek.	<p>Site preservation and revegetation of 50-acre wetland/riparian woodland and upland habitat within a degraded alluvial floodplain.</p> <p>Revegetation of willow woodland, mulefat scrub, sycamore/elderberry woodland, oak woodland, CSS, and floodplain sage scrub.</p>	<p>Produce a self-sustaining riparian and upland habitat similar to existing habitat in the area. Establish 2.6 acres willow woodland; 7.5 acres sycamore elderberry woodland; 14.3 acres upland or oak woodland.</p>	<p>In 2007, willow woodland habitat had established with 115% native cover. Native tree cover was 56% in 2007. Sycamore trees met 5<sup>th</sup> year criteria for height.</p> <p>Average height of mulefat, elderberry, increased in 2007 but performance criteria had not yet been met for oak woodland, sycamore/elderberry tree canopy cover and floodplain scrub native shrub cover.</p>	<p>Site continues to recover from the October 2007 Santiago Fire. And scouring flows of 2011.</p> <p>Cowbird trapping by TCA will continue.</p>

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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
Bonita Creek Channel	<p>1. Planted in March – May 1996. Two small areas adjacent to Bison and MacArthur Bridges were planted and seeded March 1997.</p> <p>2. &amp; 3. Planted in 1996/1997.</p> <p>4. Seeded in Fall 1997.</p>	San Joaquin Hills Transportation Corridor (SR 73) construction	Bonita Creek/Channel, south of SJHTC, between University Drive and Bonita Canyon Road, Newport Beach.	Bonita Creek/Channel, southeast of the San Diego Creek Channel to Bonita Canyon Reservoir	<p>1. Restoration of 21.1 acres of riparian woodland and mulefat scrub. Additional habitat under bridges is not counted in the mitigation acreage.</p> <p>2. Creation of 15.0 acres of CSS on the Bonita Channel Slopes.</p> <p>3. Creation of 2.4 acres of saltbush scrub adjacent to Bonita Channel.</p>	<p>1. Provide self-sustaining riparian habitat that will achieve similar patterns of cover and species distribution as an existing riparian community.</p> <p>2. &amp; 4. The habitat is occupied by breeding pairs of CAGN; or</p> <p>The site has values of percent cover and species diversity not statistically different from high quality habitat in the vicinity; or USFWS and FHA unanimously agree that the habitat has structure and composition of naturally occurring CAGN or fully functional CSS.</p>	<p>1. In 2001 the site met the 5<sup>th</sup> year performance standard for cover and height; met the definition of a jurisdictional wetland, and supported wildlife characteristic of a riparian woodland habitat. Wildlife use, including invertebrates, bird and small and large mammals was documented over the five-year monitoring period.</p> <p>Avian woodland species increased as species typical of open marsh and riparian scrub decreased mirroring the development of the riparian</p>	<p>Sites met the conditions of the USFWS BO. Received concurrence from USFWS in 2002.</p> <p>Minimal maintenance along the County trail is performed as needed, including cutting back saltbush every two years and exotic species removal of eucalyptus saplings and pampas grass seedlings every five years.</p>

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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
					<p>4. Preservation/ Restoration of 6 acres CSS adjacent to Bonita Reservoir.</p>	<p>3. The habitat is occupied by breeding pairs of CAGN; or</p> <p>USFWS and FHA unanimously agree that the habitat has structure and composition of naturally occurring saltbush scrub habitat; or</p> <p>The total cover by native saltbush scrub species is at least 70 percent, and the sites are not being artificially sustained.</p>	<p>woodland habitat. In 2001, a least Bell's vireo pair nested on the site and CAGN and willow flycatcher foraged in the mitigation area. Large mammals use the site as a movement corridor.</p> <p>2. In 2001 the Bonita Channel slopes supported successfully breeding CAGN for a 3<sup>rd</sup> season and vegetation cover values were comparable to naturally occurring CSS. In 2001 7 pairs of CAGN nested in the mitigation area and fledged 32-39 young.</p>	

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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
							<p>3. In 2001, the saltbush scrub achieved the performance criteria for vegetation cover.</p> <p>4. In 2001, the restoration area achieved the performance standards for breeding CAGN.</p>	
Strawberry Farms 15-acre Parcel Habitat Restoration Site	Restoration planning in 2011. Site preparation and cactus transplantation in January/February 2012.	Surplus mitigation for TCA's future capital improvement projects.	Southwest corner of the 360-acre Quail Hill Preserve, City of Irvine. Sand Canyon Reservoir to west and open space north, east, and south. Accessed from Strawberry Farms Road	Sand Canyon Reservoir, Strawberry Farms Golf Course, and Strawberry Farms west and adjacent to preserve. Shady Canyon is south/southeast; 405 Freeway to northeast; University	Restoration and enhancement of 13.3 acres of CSS, including 0.39 acres of native perennial grassland. 1.86 acres within the CSS restoration area to be improved with coastal	<p>1. The site does not require significant maintenance during the last year of the five- year establishment period.</p> <p>2. Soil is stable with no significant erosion.</p> <p>3. Native plant cover after 3<sup>rd</sup> year of monitoring is greater than 35% absolute cover with at least 25% absolute cover from perennial</p>	<p>Site installation completed in 2012.</p> <p>Permanent photo points were established to track the development of the vegetation</p> <p>Establishment maintenance, weeding, and monitoring conducted from 2012 through 2017.</p> <p>The native habitat continues to mature,</p>	Fifth year monitoring and maintenance currently in progress.



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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
			of University Drive.	Drive is northwest to west.	prickly pear transplantaion to develop coastal cactus wren habitat.	<p>species. At end of 5<sup>th</sup> year, total native cover is greater than 70% absolute cover with at least 55% from perennial species.</p> <p>4. Species diversity is 80% of immediately adjacent, existing, natural CSS.</p> <p>5. Majority of native plant species set seed and seedlings of at least 5 CSS species demonstrate recruitment in year 5.</p> <p>6. After 5<sup>th</sup> year, no Cal-IPC List A species present and exotic grass and forb species make up no more than 10% absolute cover.</p>	<p>and is expected to meet the fifth year performance standards.</p> <p>The native vegetation is reproductively mature, with native annual species recruiting from the seedbank and perennial native shrub species flowering and recruiting new individuals.</p>	

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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
Eastern Transportation Corridor Wildlife Fence Project	<p>Phase 1 installation April 2014 – March 2015.</p> <p>Phase 2A installation January 2015 – September 2015.</p> <p>Phase 2B installation September 2015 – January 2016.</p>	Eastern Transportation Corridor construction.	<p>Both sides of SR 241 from the SR 91 interchange to the SR 261 interchange.</p> <p>Within the Central/Coastal Orange County NCCP/HCP.</p>	<p>Orange County. SR241 runs from Rancho Santa Margarita to Yorba Linda. Route 241 connects with SR 133, SR 261, and SR 91. The route begins at Oso Parkway near Rancho Santa Margarita, runs northward through Irvine, meets SR 133, continues north, meets SR 261 near</p>	Installation of new wildlife protective fencing as a corrective measure for the existing wildlife crossings on the north leg of SR 241	<p>The fence is a 10-to 12-foot high chain link fence with an 18-inch outrigger angled away from the road and buried 24-inches to discourage animals from digging under the fence. Earthen jump out ramps at periodic intervals along the roadway provide escape routes in the event animals breach the fence and become trapped on the roadway side of the fence.</p>	<p>Construction-Related Minimization Measures from the Joint EIR/EIS for the Central/Coastal Orange County NCCP/HCP implemented in 2014 - 2015.</p> <p>Second year monitoring. Caltrans roadkill data shows zero animals (target species) killed within the fence area from January through November 2017 (second year monitoring).</p>	Continuing year 3 of monitoring and maintenance (as needed).

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**Transportation Corridor Agencies**

Development Name	Mitigation Site(s) & Date Installed	Project Being Mitigated	Location of Mitigation Sites	Geographic Region	Description of Mitigation	Performance Standards Summary	Performance Standards Status	Current Status
				Irvine Lake,	runs northeastward to its northern terminus at SR91 near the Santa Ana River.			

# **Nature Reserve of Orange County**

## **Annual Report 2017**

### **Section: 8.10**

Southwest Resource  
Management Association



## SRMA Portola South Annual Report for the NCC 2017 Annual Report

# Southwest Resource Management Association

### Introduction

The Portola South project is a 101-acre native habitat area owned by the Southwest Resource Management Association (SRMA) and is located in the City of Lake Forest. The site is mapped in the northeastern quarter of Section 8 on the U.S. Geological Survey (USGS) 7.5-minute El Toro Quadrangle, Township 6 South, Range 7 West. The property is divided by Glenn Ranch Road into northern and southern portions, with Saddleback Ranch Road further dividing the northern part of the site.

The Portola South Viejo property serves as important wildlife corridor linkage, connecting the Whiting Ranch Wilderness Preserve to the north, with the Aliso Creek Open Space Preserve lands to the south. The property supports high quality wetland, riparian and upland habitat, including habitat for coastal California gnatcatcher and cactus wren. The property is one of the last major pieces to be officially conserved within the NCCP/HCP Reserve, which is part of the Orange County Central and Coastal Subregion.

Acquisition and conservation of the Viejo Property has resulted in the preservation and enhancement of approximately 4 acres (2,520 linear feet) of existing vegetated jurisdictional aquatic resources, (i.e., wetlands, riparian areas and perennial stream channel); and approximately 0.26 acre (3,408 linear feet), of existing un-vegetated jurisdictional aquatic resources/waters of the U.S. (i.e., ephemeral stream channels), ranging in size from 1.0 to 3.0-feet in width. In order to expand upon these resources, and additional 0.17 acre area of enhancement of existing vegetated jurisdictional aquatic resources (i.e., wetlands), was implemented through the removal of non-native exotics plants and revegetation with native wetland species.

The property was transferred to SRMA on June 13, 2017. SRMA is an approved entity with the California Department of Fish & Wildlife to hold conservation easements and fee title lands in Southern California and has over 6,000 acres of land under its control in Southern California. SRMA is the long-term manager of the site and USA Portola Properties, LLC (Permittee) is responsible for fulfilling the habitat mitigation and monitoring plan (HMMP). The Permittee has contracted with Dudek to implement the restoration of the (HMMP).

## I. **Management Activities**

### A. **General Maintenance :**

1. **Weed removal** - Weeds are largely under control throughout the wetland mitigation/restoration areas where container plans were installed. During the season, weeds are treated or removed and disposed at the restoration sites. Woody perennials are monitored by staff and will be controlled through various methods (manual, cut stump, foliar) once found and at the appropriate growth stage.
2. **Trash & Debris Removal** - Minor trash and debris such as windblown food wrappers and mylar balloons were more common along the SCE access road and trails due to unauthorized access by the public and trash coming from nearby roads.
3. **Fence Repairs:** Minor fence repairs were made by the Permittee to patch construction fencing and silt fencing that were damaged by flood events and wind damage.
4. **Mountain Bike Trail Abandonment and Revegetation:** Implementation of the mitigation/restoration program within the Viejo Property resulted in the cut-off and elimination of several unauthorized mountain bike trails. Many of these trailhead originated within the Portola Hills property, so the upper trail access points were for the most part eliminated. Some access is still possible via the Whiting Ranch open space area to the north and from SCE utility access road to the west. SRMA and the permittee are working to evaluate existing unauthorized trails and will designate trails to remain, as well as those to be de-commissioned and/or restored. Restoration will either be passively achieved through natural native plant recruitment or through more active earthen barriers with planting and seeding at key potential entry points going forward.
5. **Signs:** Signs have been installed at key access points and are maintained when damaged or replaced when stolen.
6. **Erosion control:** Remedial erosion control work was required in 2016/2017 to address erosion problems from the above normal rainfall experienced in late 2016 and early 2017. Some minor road and water drainages needed smoothing and the two wetland basins in Stream 6, at the south end of the project, required sediment removal from the basins, storm drain culverts and additional erosion control protection was installed and supplemental container plantings and seeding were implemented in order to restore the areas to their original conditions prior to the damage. Other locations within the project also had minor erosion control repairs completed, with additional seeding implemented.

## II. **Biological Resources**

### **A. Biological Surveys:**

While focused biological surveys were not performed in 2017, incidental observations of any plant or animals are noted by SRMA staff and kept in field journals and an ongoing database. Every five years, SRMA will conduct focused surveys for Coastal cactus wren, California gnatcatcher and Least Bell's vireo. SRMA will also do focused surveys every five years for rare plants identified in the resource management plan.

### **B. Initial Habitat Restoration and Five-Year Maintenance:**

Permittee responsible mitigation is in Year Two of the restoration period and the mitigation project met all of the Year Two performance standards including:

- Percent of native cover
- Container plant survival
- Average container tree and shrub height
- Maximum allowable cover of non-native weed cover, and
- Maximum allowable cover of perennial non-native invasives.

### **C. Public Uses and Controls:**

**Patrol and Enforcement:** Weekly foot and vehicle patrols are conducted to review fence and gate conditions (graffiti, mechanical), remove or note dumped or thrown trash, mountain bike use and new trails, overall habitat condition and incidental observations of wildlife. An annual meeting with Orange County Parks is also scheduled.

No public access will be allowed on the property. However, because of the historical use of the Edison Riding & Hiking Trail, it is anticipated some amount of unauthorized public use will continue. In general, public use that does not result in disturbance of native vegetation will not be actively enforced. However, the following uses are prohibited:

- Mountain biking
- Hiking, geocaching, birding, and any sort of nature observation
- Equestrian horseback riding

## III. **Administration:**

A. Annual Budgeting: SRMA has received a non-wasting endowment to manage the 101 acre site in perpetuity. SRMA has also received three years of compliance monitoring and maintenance up front so that the non-wasting endowment's interest has the opportunity to grow.

#### IV. Summary

While the Portola South property has remained in a natural state since surrounding areas were developed, the site retains much of its natural functions and values as it did before the area became urbanized and external pressures more prevalent. The property drains into the Aliso Creek watershed, which is a vital corridor to the Santa Ana Mountains and the Cleveland National Forest. Management and monitoring by SRMA will continue to provide control of erosion, wind-blown trash, and inventory of species, removal of non-native woody plant species and illegal access or uses.



Coastal sage scrub upland habitat



Cactus wren pair foraging near Aliso Creek



Sycamore riparian woodland



Ephemeral basin restoration planting



**Southwest Resource Management  
Association (SRMA)  
2018 Annual Work Plan**

The 2018 Annual Work Plan provides guidelines for the long-term protection, management, and maintenance of the existing native upland habitat and the established, restored, and enhanced wetland and waters mitigation area within the 101.7-acre Southern California Edison (SCE) Viejo Property (Viejo Property). The Viejo Property, as part of the Orange County Central and Coastal Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Reserve, is intended to function as native habitat in perpetuity.

The mitigation for the Portola Mitigation Project is being conducted by Dudek, on behalf of SunRanch Capital Partners, USA Portola Properties. Permit obligations for the mitigation program will continue until the mitigation project is deemed complete by the resource agencies, at the successful conclusion of the designated five-year mitigation, maintenance and monitoring period. SRMA owns the 101 acres and is providing the compliance monitoring during the mitigation period. Once mitigation has been met and signed off by the regulatory agencies, SRMA will provide the long-term maintenance and management of the site in perpetuity.

<b>2018 Tasks</b>	<b>Responsible Party</b>	<b>Implementation Status/Timing</b>
Wetlands & Waters Mitigation Construction & 5-Year Maintenance/Monitoring Permittee	Permittee	Construction complete. Currently completed Year 2 of monitoring/maintenance
Trail Closures (Active Revegetation in Wetlands/Water Mitigation Areas; Passive Revegetation in Upland Areas)	Permittee/SRMA	Working with Permittee
Uplands Habitat Ongoing Monitoring, Management, Adaptive Management, Patrolling, Enforcement, Erosion, Trail Maintenance, Signage/Gate Maintenance, Education, Work Plan, Progress	SRMA	Weekly site visits to document conditions
Wetlands & Waters Ongoing Habitat Monitoring, Maintenance, Infrastructure Repair/Replace, Reporting, Adaptive Management,	SRMA	Weekly site visits to document conditions