



February 20, 2019

Sarah Pierce
 SANDAG
 401 B Street, Suite 800
 San Diego, CA 92101-4231

RE: City of Chula Vista Otay River Valley and Salt Creek Cactus Wren 3 Project (SANDAG GRANT #5004731) - Year 3, 4th Quarter – FINAL REPORT

Dear Ms. Pierce:

Attached please find a copy of the Year 3 Final Report prepared for the Chula Vista MSCP Otay River Valley and Salt Creek Cactus Wren Habitat Restoration and Enhancement Program (SANDAG GRANT #5004731). This Report provides a summary of tasks performed during the third year (September 15, 2017 to September 14, 2018).

The City appreciates the funding from SANDAG to implement this project. The following table summarizes the goals of the project and what has been accomplished within 3 years:

Project Goals	Accomplishments
Restore and enhance degraded habitat for coastal cactus wrens within: <ul style="list-style-type: none"> • 7 acres of Salt Creek • 3 acres of Otay River Valley/Millenia Parcels 	<ul style="list-style-type: none"> • 3.26 acres existing cholla were shrub-thinned at Salt Creek • 16.97 acres were planted with cholla cuttings at Salt Creek and the Millenia parcels • Total of 20.23 acres of treated area between the two sites
<ul style="list-style-type: none"> • Reduce the risk of cactus wren habitat loss from fires; • Reduce weed infestation; and • Remove invasive seed sources that can migrate to adjacent sensitive habitat areas 	<ul style="list-style-type: none"> • Due to intensive maintenance efforts, absolute weed cover at the restoration and enhancement sites was very low and averaged approximately 0.37 percent within the shrub-thinned patches and 1.36 percent within the planted coast cholla patches • Spray visits were effective at controlling weed growth • Spraying was focused around the shrub-thinned and planted coast cholla patches • By controlling non-native weeds, more water becomes available for the existing cholla patches and rooted cactus cuttings

Project Goals	Accomplishments
<p>Improve connectivity within an existing avian wildlife corridor by complementing similar coastal cactus wren projects in the vicinity</p>	<ul style="list-style-type: none"> • A total of 11 coastal cactus wrens and 13 nests were detected incidentally and during the spring 2018 surveys <ul style="list-style-type: none"> ○ This is compared to one adult cactus wren and two cactus wren nests that were observed during the 2015 season, prior to implementation. • Cactus wrens have moved into two of the shrub-thinned and two of the planted areas since December 2016 • Other sensitive bird species were recorded during the survey and/or incidentally included the coastal California gnatcatcher and southern California rufous-crowned sparrow. • Other commonly encountered species that forage in and around the edges of the enhancement sites included the California towhee, northern mockingbird, and California quail. • Other wildlife observed in the cactus wren restoration and enhancement sites include, Belding's orange-throated whiptail, San Diego black-tailed jackrabbit, and desert cottontail

Long-term management activities will be the responsibility of the City of Chula Vista and the County of San Diego as the Otay Ranch Preserve Owner and Manager and will include weed control through spraying of non-native annuals such as mustards, filaree, tocalote, and grasses, using a glyphosatebased product. Long-term control of weeds and shrubs around coast cholla habitat patches will reduce the risk of catastrophic fires that have the potential to cause the loss of coastal cactus wren habitat.

This invoice represents our final invoice and project report.

Please remit payment to:

City of Chula Vista
Development Services Department
Attn: Cheryl Goddard, Senior Planner
276 Fourth Avenue
Chula Vista, CA 91910

If you have any questions, please feel free to call me at (619) 476-2329.

Sincerely,

A handwritten signature in blue ink that reads "Cheryl Goddard". The signature is fluid and cursive, with a large initial "C" and a long, sweeping tail.

Cheryl Goddard
Senior Planner

Enclosures:

- Invoice #4731-11
- Year 3 Final Report
- Recon Invoice 58830



An Employee-Owned Company

September 14, 2018

Ms. Cheryl Goddard
City of Chula Vista
Planning and Building Department
276 Fourth Avenue, MS P-101
Chula Vista, CA 91910

Reference: Year 3 Final Report for the Otay Ranch Coastal Cactus Wren Habitat Restoration and Enhancement Program (SANDAG Grant Number 5004731; RECON Number 7682)

1.0 Introduction

This Year 3 final report provides background information about and summarizes the tasks performed during the third year (September 15, 2017 to September 14, 2018) of the coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) habitat restoration and enhancement program located within the Otay Ranch Preserve. Three quarterly reports for Year 3 were prepared and submitted by RECON and information from those reports is summarized below. This Year 3 final report also summarizes the results of the focused coastal cactus wren surveys that were conducted in spring of 2018 at the treatment sites, as well as the results of the relevé vegetation surveys.

The target areas for restoration and enhancement within the Salt Creek and Millenia parcels are all located within the Otay Ranch Preserve (Figures 1 through 3b; see Attachment 1 for all figures and photographs). Overall, the Otay Ranch Preserve currently contains 3,657 acres of preserve land established to create an open space system that will protect natural resources and provide a series of interconnected viable habitats to protect species and regional wildlife corridors covered by the Multiple Species Conservation Program (MSCP).

Sensitive habitat communities identified within the Otay Ranch Preserve include maritime succulent scrub, coastal sage scrub, valley needlegrass grassland, non-native grassland, southern willow scrub, freshwater marsh, cismontane alkali marsh, and Baccharis floodplain scrub. Sensitive species observed on-site include coastal cactus wren, coastal California gnatcatcher (*Poliophtila californica californica*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), ashy spike-moss (*Selaginella cinerascens*), San Diego viguiera (*Bahiopsis [=Viguiera] laciniata*), snake cholla (*Cylindropuntia californica* var. *californica*), decumbent goldenbush (*Isocoma menziesii* var. *decumbens*), California adolphia (*Adolphia californica*), and San Diego barrel cactus (*Ferocactus viridescens*).

2.0 Coastal Cactus Wren Status and Conservation

Populations of the coastal cactus wren are in decline throughout much of southern California, including San Diego County. Over the last two decades, large, intense fires have damaged coastal cactus wren habitat in the Lake Jennings area (Cedar Fire in 2003), the San Pasqual Valley (Witch Fire in 2007), and the Otay-Sweetwater region, which includes the San Diego National Wildlife Refuge (Harris Fire in 2007). This recent trend of cactus wren population decline has been observed in other regions of southern California. Regional recovery efforts for coastal populations of cactus wrens are intended to stabilize and eventually increase population sizes.

Coast cholla (*Cylindropuntia prolifera*) die-off has likely contributed to a decrease in suitable habitat for coastal cactus wren and the observed population declines. In the Otay Ranch Preserve, coast cholla patches have declined in the last 10 to 15 years due to competition for water resources with weeds and native shrubs. Cactus wrens typically forage on the ground, and thick weed cover can prevent the wrens from finding their prey. In addition, the below-average rainfall during most of the last decade has caused many patches of coast cholla to suffer or die from severe drought stress. The drought conditions have also likely decreased the availability of insect prey for foraging wrens.

As part of the pre-implementation monitoring for this project, a focused coastal cactus wren survey was conducted at the Salt Creek parcels in November 2015 in and around the proposed shrub thinning and planting areas. During that survey, a total of two nests and one adult wren were observed in the vicinity of the treatment areas (Figure 4). Focused cactus wren surveys at the Millenia parcels in the spring of 2015 did not detect any wrens.

Salt Creek is identified in the Otay Ranch Resource Management Plan as an avian corridor for coastal cactus wren and coastal California gnatcatcher, providing north/south movement along the Otay River Valley. Salt Creek connects with the Otay River Valley just west of the Lower Otay Reservoir. This corridor system provides a critical linkage to several MSCP designated biological core areas, including the Otay River, Wolf Canyon, Otay Lakes, Otay Mountain (with connections east toward Tecate Peak), the Jamul Mountains, San Miguel Mountain, and the upper Sweetwater River. The Salt Creek area has also been identified as a high priority location for conducting habitat restoration and enhancement for cactus wrens in the South San Diego County Coastal Cactus Wren Habitat Conservation and Management Plan (The Nature Conservancy 2015).

3.0 Project Goals

Project goals are listed below:

- Restore and enhance degraded habitat for coastal cactus wrens within approximately 3 acres of Otay River Valley (Otay Ranch Preserve – Millenia Parcels) and 7 acres of Salt Creek (Otay Ranch Preserve – Salt Creek Parcels);
- Reduce the risk of cactus wren habitat loss from fires;
- Reduce weed infestation;
- Remove invasive seed sources that can migrate to adjacent sensitive habitat areas; and
- Improve connectivity within an existing avian wildlife corridor by complementing similar coastal cactus wren projects in the vicinity: County of San Diego (San Diego Association of Governments [SANDAG] TransNet Environmental Mitigation Program [EMP] Grant), City of Chula Vista (SANDAG TransNet EMP Grant), and the California Department of Transportation (Johnson Canyon Mitigation Site).

4.0 Year 3 Tasks Performed from September 2017 to September 2018

4.1 Monitoring Methods

Bird Surveys (Task 2d)

On April 4 and 6, 2018, a Year 3 spring survey for the coastal cactus wren was conducted at the restoration areas by RECON biologists Mandy Weston and Alex Fromer in order to detect the current status of this species. Survey methods included walking through the designated areas at a slow pace and listening and looking for bird activity. All wildlife detected either visually or by call during the spring survey, or incidentally, were noted and are listed in Attachment 2. The results of these surveys are summarized in Section 4.4, Year 3 Cactus Wren Survey.

Vegetation Sampling (Task 2e)

Vegetation patch sampling was done using the relevé method. All plant species occurring in each patch were recorded, and the cover of each species was estimated. Each of the vegetation treatment areas was sampled by RECON biologists Anna Leavitt and JR Sundberg on May 31 and July 17, 19, 24, and 27, 2018. Each vegetation stand was photographed from the same location as in Year 1. The results of the vegetation sampling efforts are presented in Section 4.6, Year 3 Vegetation Sampling, and the plant species list is presented in Attachment 3.

4.2 2017–18 Weather Summary

Between September 1, 2017 and August 30, 2018, rainfall at Brown Field (the closest reporting station) was 4.15 inches (Table 1; U.S. Department of Commerce [USDC] 2018a), which was 8.22 inches below normal. At Brown Field, normal rainfall during this time period is approximately 12.37 inches based on rainfall data collected between 1981 and 2010 (USDC 2018b).

The early portion of the rainy season (September through December) was well below normal with a rainfall deficit of approximately 3.35 inches. Heavier rainfall in January resulted in germination of annual species; however, by late January through mid-February, annual species had begun to desiccate due to above-average temperatures and well-below-average rainfall. Additional rains occurred in late February and March. These rains rejuvenated native annuals that had begun to desiccate from the extremely dry conditions in late January and early February. The total rainfall for the 2017-18 season was below normal by 8.22 inches.

Table 1			
September 2017 through August 2018 Rainfall Compared to Normal Rainfall			
Month	Precipitation (inches)¹	Normal Rainfall: Precipitation (inches)²	Difference (inches)
2017			
September	0.13	0.23	- 0.10
October	T	0.49	-0.49
November	0.31	1.15	-0.84
December	T	1.92	-1.92
<i>Total</i>	<i>0.44</i>	<i>3.79</i>	<i>-3.35</i>
2018			
January	1.58	2.48	-0.90
February	0.93	2.16	-1.23
March	1.05	2.45	-1.40
April	T	0.94	-0.94
May	0.14	0.21	-0.07
June	T	0.15	-0.15
July	0.01	0.09	-0.08
August	0.00	0.1	-0.1
<i>Total</i>	<i>3.71</i>	<i>8.58</i>	<i>- 4.87</i>
GRAND TOTAL	4.15	12.37	-8.22
¹ SOURCE: USDC 2018a.			
² SOURCE: USDC 2018b.			

4.3 Maintenance

Weed Control (Task 1d)

After a very dry fall, rains in January germinated weeds. Spring herbicide treatment began in early March 2018 and continued into June 2018. The RECON Field Crew treated non-native plant species within the restoration area with glyphosate herbicide and also removed non-native plants by hand (Photographs 1 and 2). Spraying was done to prevent weeds from flowering and setting seeds. Non-native species that were controlled included filaree (*Erodium* spp.), tocalote (*Centaurea melitensis*), short-pod mustard (*Hirschfeldia incana*), slender wild oat (*Avena barbata*), and other annual grasses such as red brome (*Bromus madritensis* ssp. *rubens*). Herbicide was applied by licensed applicators under the supervision of RECON Field Crew Director Ruth Vallejo-Reviczky, who is a certified Pest Control Advisor.

Seed Collection (Task 1c)

On January 18, native seed consisting of purple needle grass (*Stipa pulchra*), foothill needle grass (*Stipa lepida*), littleseed muhly (*Muhlenbergia microsperma*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), Greene's ground-cherry (*Physalis crassifolia*), cryptantha (*Cryptantha* sp.), and California poppy (*Eschscholzia californica*). These seeds had been collected during Year 2.

4.4 Monitoring Results

Year 3 Cactus Wren Survey

On April 4 and 6, 2018, during the spring cactus wren survey, 20 species of birds were detected within the 14 restoration areas at Salt Creek and the Millenia parcels. Sensitive species detected during the spring survey are shown in Figures 5a and 5b. All wildlife detected either visually or by call during the survey were noted and are listed in Attachment 2. A total of 13 coastal cactus wren nests were observed during the survey, and incidentally during vegetation surveys within patches 1a, 2, 3a, 5, and 6 (Photographs 3 and 4, see Figure 5a). A total of 11 cactus wrens, including multiple family groups, were observed in and around shrub thinned and planted patches 2, 3a, 3c, 5, and 6 (see Figure 5a). The following species of birds were the most commonly detected (in descending order) during the spring 2018 survey.

- cliff swallow (*Petrochelidon pyrrhonota tachina*)
- common raven (*Corvus corax clarionensis*)
- house finch (*Haemorhous [=Carpodacus] mexicanus frontalis*)
- mourning dove (*Zenaida macroura marginella*)
- Anna's hummingbird (*Calypte anna*)
- southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
- California towhee (*Melospiza [=Pipilo] crissalis*)
- lesser goldfinch (*Carduelis psaltria hesperophilus*)
- coastal California gnatcatcher (*Polioptila californica californica*)
- western meadowlark (*Sturnella neglecta*)

Year 3 Vegetation Sampling

Attachment 3 lists the plant species observed at the vegetation treatment areas. The following results are from the 14 relevant locations:

Shrub-Thinned Patches (Salt Creek Parcels):

- Average coast cholla height:
 - Less than 1 foot: 8.75 percent
 - Between 1 and 3 feet in height: 41.25 percent
 - Over 3 feet in height: 50.00 percent
- Average total cover (shrub and herbaceous): 33.33 percent
- Average bare ground: 66.67 percent

- Average total cover of coast cholla (absolute cover): 23.75 percent
- Average percent coast cholla cover out of the total cover (relative cover): 71.26 percent
- A total of 32 plant species were recorded at the relevé locations:
 - 24 native species
 - 8 non-native species
- Average non-native cover (absolute cover): 0.37 percent
- Average non-native cover out of the total cover (relative cover): 1.11percent

Planted Coast Cholla Patches (Salt Creek Parcels and Millenia Parcels):

- Average coast cholla height:
 - Less than 1 foot: 36.67 percent
 - Between 1 and 3 feet in height: 42.56 percent
 - Over 3 feet in height: 20.78 percent
- Average total cover (shrub and herbaceous): 22.33 percent
- Average bare ground: 77.67 percent
- Average total cover of coast cholla (absolute cover): 6.78 percent
- Average percent coast cholla cover out of the total cover (relative cover): 30.36 percent
- A total of 61 plant species were recorded at the relevé locations:
 - 42 native species
 - 19 non-native species.
- Average non-native cover (absolute cover): 1.36 percent
- Average non-native cover out of the total cover (relative cover): 6.09 percent

4.5 Previous Reporting

Quarterly Reports (Task 3a)

Quarterly reports that summarized ongoing tasks for the project were submitted in January 2018 (Quarterly Report I), April 2018 (Quarterly Report II), and July 2018 (Quarterly Report III).

5.0 Discussion

5.1 Weed Control

Due to intensive maintenance efforts, absolute weed cover at the restoration and enhancement sites was very low across the 14 sites and averaged approximately 0.37 percent within the shrub-thinned patches and 1.36 percent within the planted coast cholla patches. Spray visits were effective at controlling weed growth. Spraying was focused around the shrub-thinned and planted coast cholla patches (Photographs 5-8). By controlling non-native weeds, more water becomes available for the existing cholla patches and rooted cactus cuttings.

5.2 Cactus and Other Plant Growth

After the January rains, the cactus cuttings could be seen to swell with water and showed signs of new growth. Cholla height and cover increased over previous years. Native annuals germinated from the winter rains and some species were flowering by early April 2018 (Photographs 9 and 10). Conditions were dry and warm during April; however, cooler temperatures and additional light rain in May allowed natives to continue to grow. The cover of native annuals varied between the shrub-thinned patches with the understory in some patches dominated by native annuals while other thinned patches had very few native annuals. The patches with few native annuals were targeted for seed dispersal to increase native cover and the insect prey base for cactus wrens.

Photographs 11-13 show some of the planted and shrub thinned patches at the Millenia parcels and Salt Creek parcels. Photograph 14 shows a shrub thinned patch and an adjacent un-thinned area that depicts

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how green and healthy the cholla is in the shrub thinned patch as compared to the adjacent un-thinned area. Based on these observations, the cholla are clearly competing with the shrubs for available water.

Photographs 15-32 show the changes in shrub-thinned areas with a series of before and after pictures. Other species of cactus that are present on the slopes and that benefit from the weeding and shrub thinning program include the MSCP-covered coast barrel cactus (*Ferocactus viridescens*) and narrow endemic snake cholla (*Cylindropuntia californica* var. *californica*; Photographs 33 and 34).

5.3 Cactus Wren and Other Wildlife Use

A total of 11 coastal cactus wrens and 13 nests were detected incidentally and during the spring 2018 surveys (Photograph 35). This is compared to one adult cactus wren and two cactus wren nests that were observed during the 2015 season, prior to implementation. The cactus wrens have moved into two of the shrub-thinned and two of the planted areas since December 2016, an indication that the shrub-thinning and planting program is working.

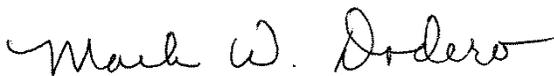
Other sensitive bird species that were recorded during the survey and/or incidentally included the coastal California gnatcatcher and southern California rufous-crowned sparrow (see Figures 4a and 4b). Other commonly encountered species that forage in and around the edges of the enhancement sites included the California towhee, northern mockingbird, and California quail. Other wildlife observed in the cactus wren restoration and enhancement sites include the MSCP-covered sensitive species, Belding's orange-throated whiptail, and the San Diego black-tailed jackrabbit, a California Department of Fish and Wildlife Species of Special Concern as well as the common desert cottontail (*Sylvilagus audubonii*) (Photograph 36).

6.0 Future Work

Long-term management activities will be the responsibility of the POM and will include weed control through spraying of non-native annuals such as mustards, filaree, tocalote, and grasses, using a glyphosate-based product. Long-term control of weeds and shrubs around coast cholla habitat patches will reduce the risk of catastrophic fires that have the potential to cause the loss of coastal cactus wren habitat.

If you have any questions regarding the coastal cactus wren habitat restoration and enhancement program, please do not hesitate to contact me at 619-308-9333 x 115 or mdodero@reconenvironmental.com.

Sincerely,



Mark Dodero
Senior Biologist

MWD:sh

Attachments

7.0 References Cited

American Ornithologists' Union

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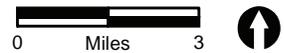
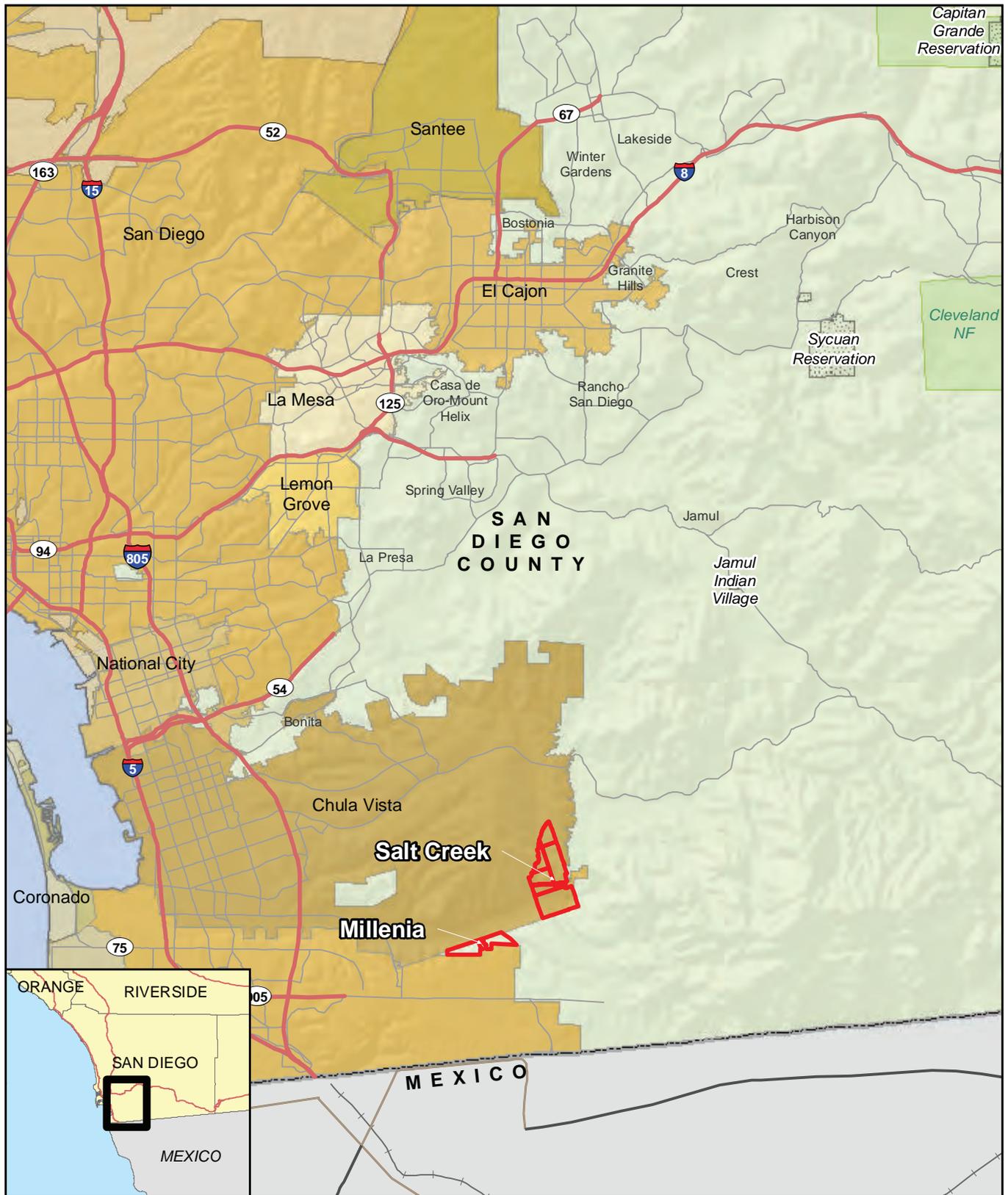
8.0 Contributors to this Report

RECON biologists that conducted field surveys, analyzed data, and provided photos for the report include Anna Leavitt, JR Sundberg, Mandy Weston, Alex Fromer, and Mark Doderio.

ATTACHMENTS

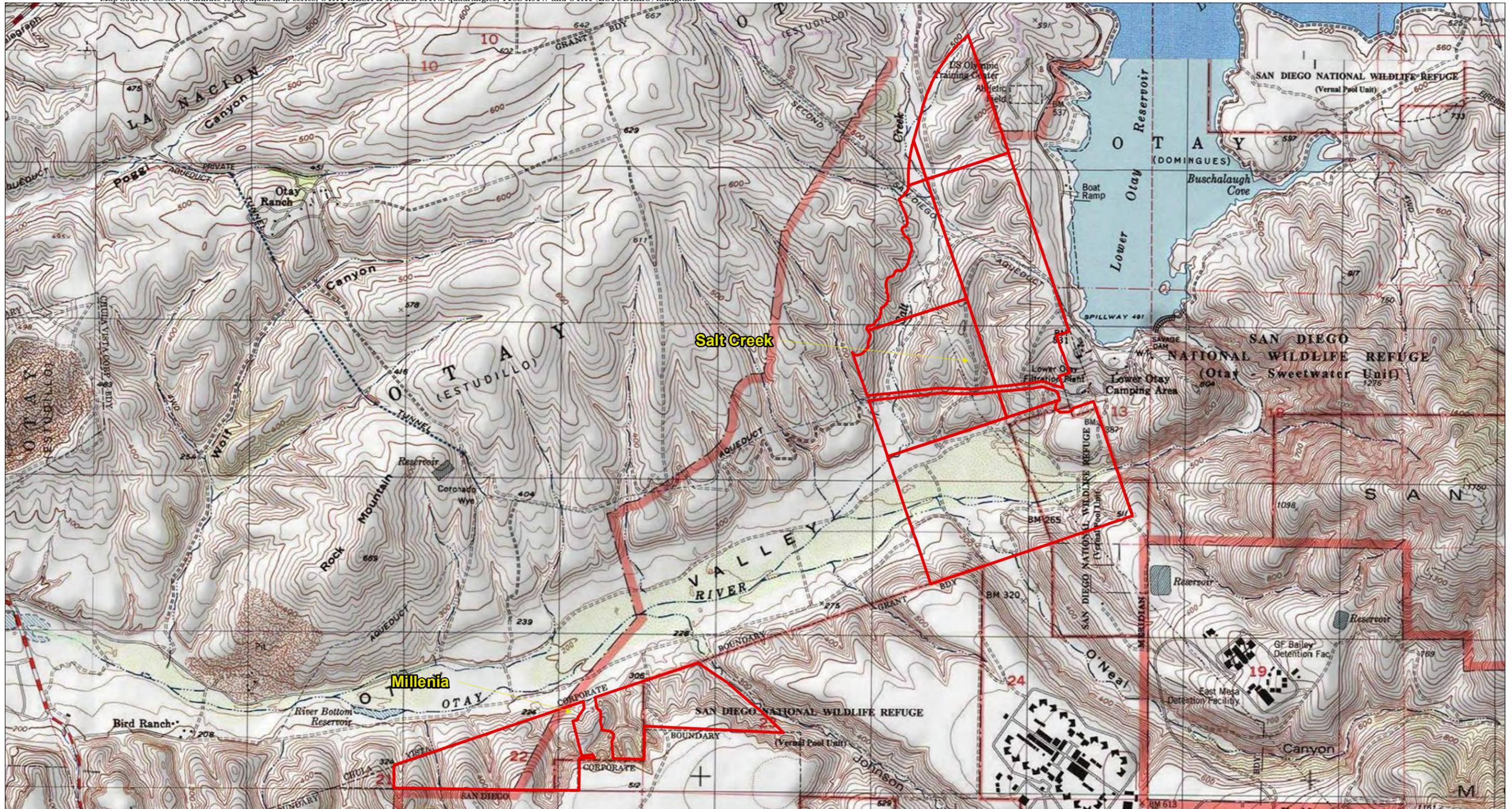
ATTACHMENT 1

Figures and Photographs

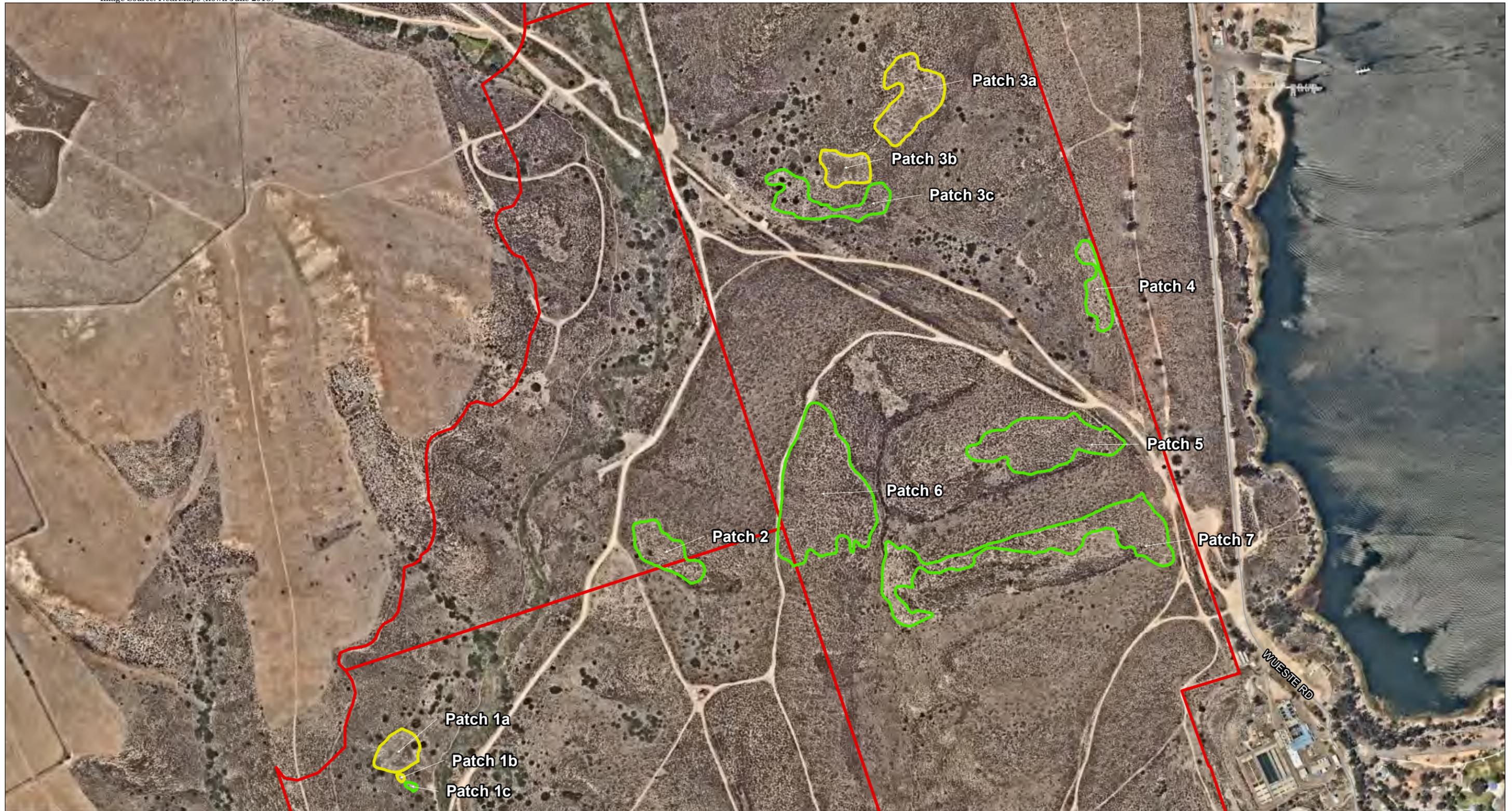


Otay Ranch Preserve: Salt Creek and Millenia Parcels

FIGURE 1
Regional Location



 Otay Ranch Preserve: Salt Creek and Millenia Parcels



CACW Habitat Restoration Locations

- Planted
- Shrub Thinning



FIGURE 3a
Coastal Cactus Wren Habitat Restoration Locations, Salt Creek Parcels



CACW Habitat Restoration Locations

 Planted



- Pre-implementation Coastal Cactus Wren Survey Area
- Sensitive Wildlife Observations**
- Birds**
- Coastal Cactus Wren (*Campylorhynchus brunneicapillus*)
- Coastal Cactus Wren Nest (*Campylorhynchus brunneicapillus*)

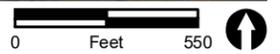
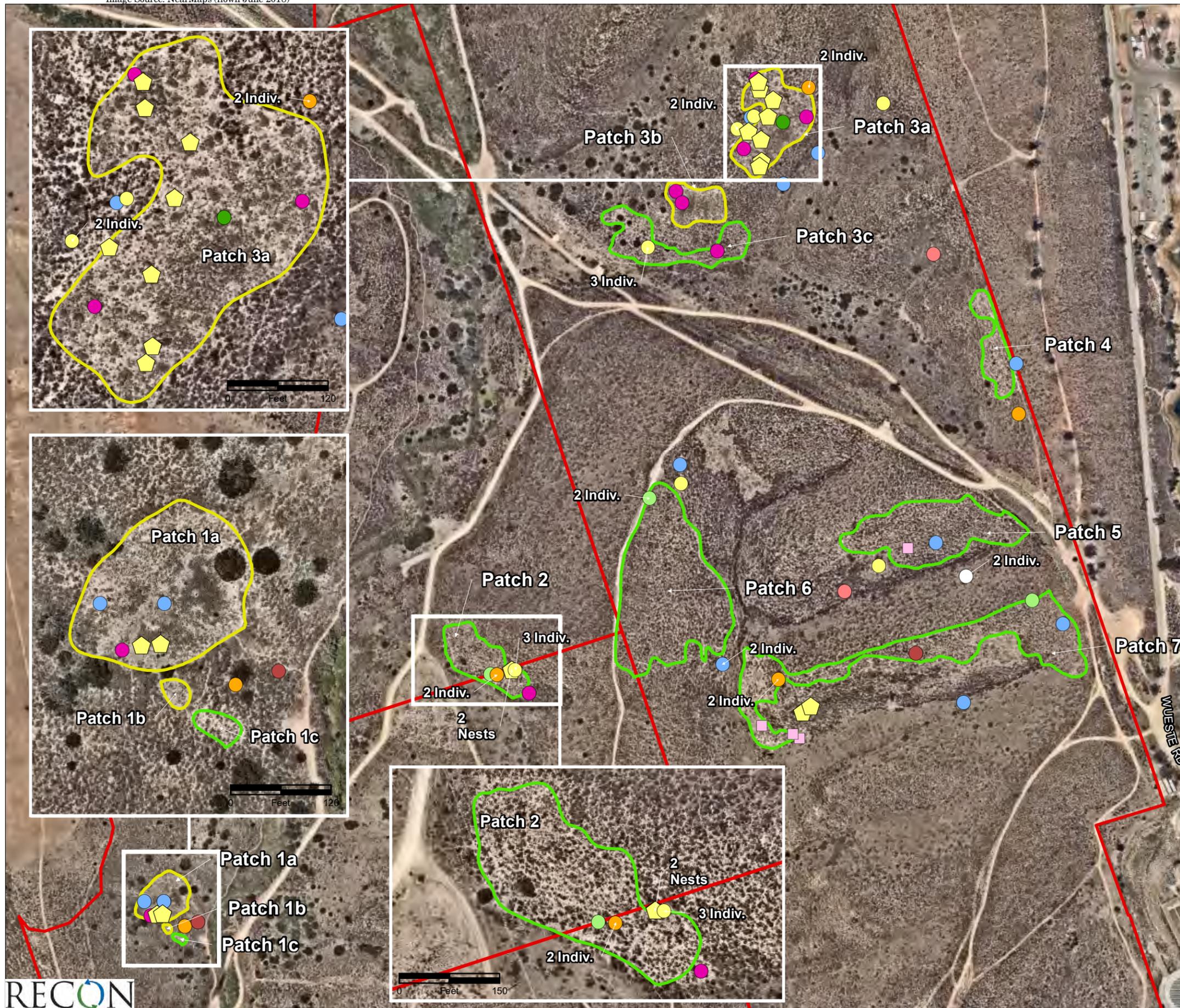


FIGURE 4
Pre-implementation: Sensitive Wildlife Species
Observed or Detected in November 2015, Salt Creek Parcels



Otay Ranch Preserve: Salt Creek Parcels

CACW Habitat Restoration Locations

- Planted
- Shrub Thinning

Sensitive Wildlife Observations

- American Peregrine Falcon
- Cooper's Hawk
- Coastal California Gnatcatcher
- Coastal Cactus Wren
- ⬠ Coastal Cactus Wren Nest
- Northern Harrier
- Southern California Rufous-crowned Sparrow
- Belding's Orange-throated Whiptail
- San Diego Black-tailed Jackrabbit
- San Diego Desert Woodrat

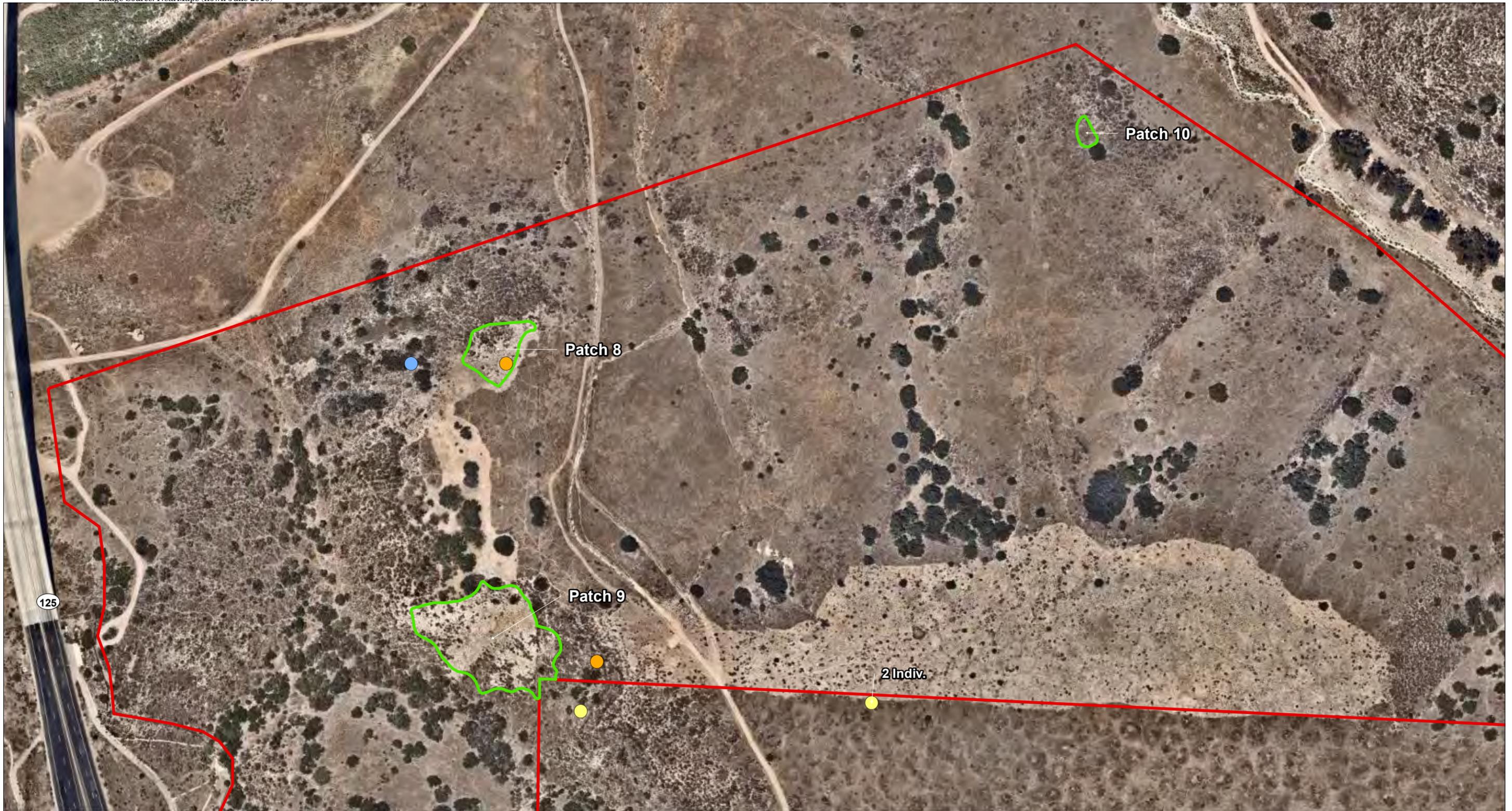
Sensitive Plant Observations

- Snake Cholla

Note: Observations of more than one individual are noted on the point



FIGURE 5a
Sensitive Species Observed or Detected
in Spring 2018, Salt Creek Parcels



- | | |
|---|--|
| Otay Ranch Preserve: Millenia Parcels | Sensitive Wildlife Observations |
| CACW Habitat Restoration Locations | ● Coastal California Gnatcatcher |
| Planted | ● Coastal Cactus Wren |
| | ● Southern California Rufous-crowned Sparrow |



FIGURE 5b
Sensitive Species Observed or Detected in Spring 2018, Millenia Parcels



PHOTOGRAPH 1
RECON Crews Spraying Non-natives



PHOTOGRAPH 2
RECON Crews Hand Pulling Non-natives



PHOTOGRAPH 3
Cactus Wren Nest in Patch 2



PHOTOGRAPH 4
Cactus Wren Nest in Patch 3a



PHOTOGRAPH 5
RECON Crews Spraying Non-natives in Patch 6



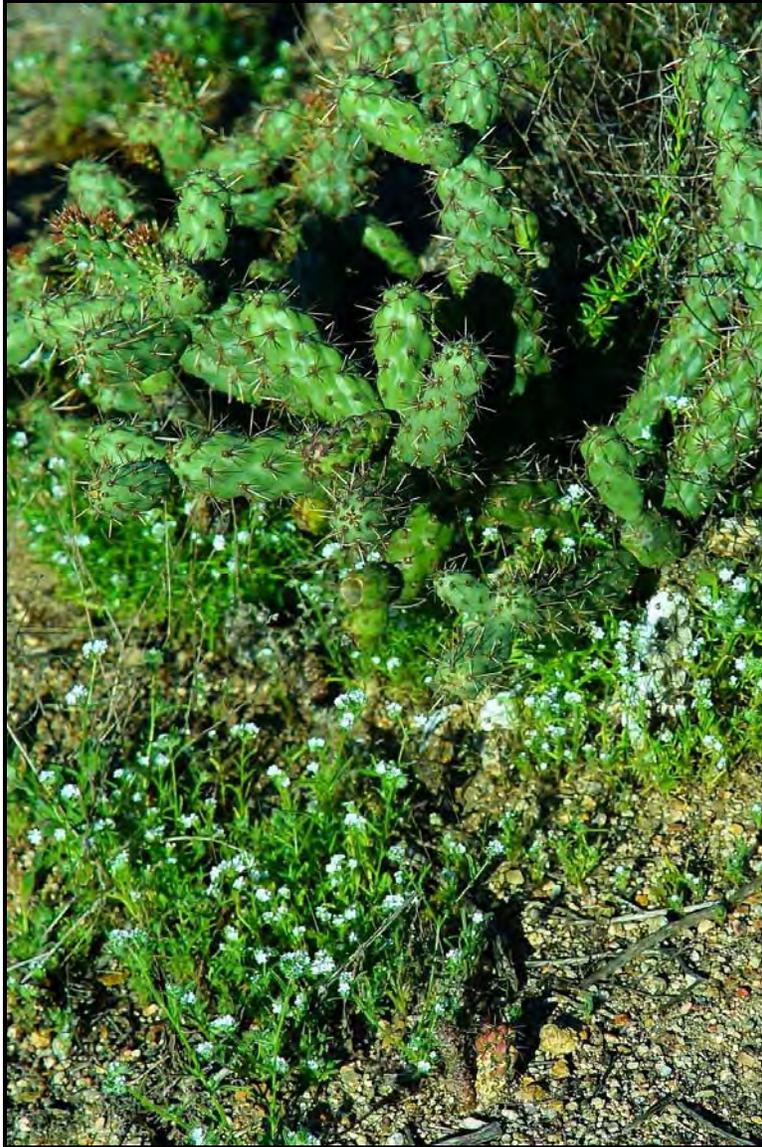
PHOTOGRAPH 6
RECON Crews Spraying Non-natives in Patch 5



PHOTOGRAPH 7
RECON Crews Spraying Non-natives in Patch 7



PHOTOGRAPH 8
Non-native *Erodium* sp. Recently Sprayed with Herbicide



PHOTOGRAPH 9
Cryptantha (*Cryptantha* sp.)
Growing at a Shrub-thinned Patch



PHOTOGRAPH 10
Fringed Spineflower (*Chorizanthe fimbriata*)
Growing at a Cholla Planting Site



PHOTOGRAPH 11
Cholla Planting Site Patch 8 at the Millenia Parcel, June 2018



PHOTOGRAPH 12
Cholla Planting Site Patch 9 at the Millenia Parcel, June 2018



PHOTOGRAPH 13
Shrub-thinned Patch 3b at Salt Creek, April 2018



PHOTOGRAPH 14
Shrub-thinned Patch 3a at Salt Creek Showing How Much Healthier
the Cholla is in the Shrub Thinning Area



PHOTOGRAPH 15
Shrub Thinning Patch 1a Prior to Implementation,
Salt Creek, December 2015



PHOTOGRAPH 16
Same View of Patch 1a, September 2018



PHOTOGRAPH 17
Shrub Thinning Patch 1a Prior to Implementation,
Salt Creek, December 2015



PHOTOGRAPH 18
Same View of Patch 1a, September 2018



PHOTOGRAPH 19
Shrub Thinning Patch 3a Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 20
Same View of Patch 3a, August 2018



PHOTOGRAPH 21
Shrub Thinning Patch 3a Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 22
Same View of Patch 3a, August 2018



PHOTOGRAPH 23
Shrub Thinning Patch 3a Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 24
Same View of Patch 3a, August 2018



PHOTOGRAPH 25
Shrub Thinning Patch 3b Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 26
Same View of Patch 3b, September 2018



PHOTOGRAPH 27
Shrub Thinning Patch 3b Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 28
Same View of Patch 3b, September 2018



PHOTOGRAPH 29
Shrub Thinning Patch 3b Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 30
Same View of Patch 3b, September 2018



PHOTOGRAPH 31
Shrub Thinning Patch 3b Prior to Implementation,
Salt Creek, November 2015



PHOTOGRAPH 32
Same View of Patch 3b, September 2018



PHOTOGRAPH 33
Coast Barrel Cactus Benefits from the
Shrub Thinning and Weeding Programs



PHOTOGRAPH 34
Snake Cholla also Benefits from the
Shrub Thinning and Weeding Programs



PHOTOGRAPH 35
Coastal Cactus Wren at Salt Creek



PHOTOGRAPH 36
Desert Cottontails are Commonly Observed at
Cholla Planting and Shrub Thinning Sites

ATTACHMENT 2

Wildlife Species Observed/Detected

Attachment 2
Wildlife Species Observed/Detected Incidentally and During the Spring 2018 Cactus Wren Survey
at the Otay Ranch Cactus Wren Habitat Restoration and Enhancement Site

Scientific Name	Common Name	Treatment Area Number	On-Site Abundance/Seasonality (Birds Only)	Evidence of Occurrence
INVERTEBRATES (Nomenclature for fairy shrimp from Eriksen and Belk 1999; for spiders and insects from Evans 2008; for butterflies from San Diego Natural History Museum 2002)				
APIDAE	HONEY BEES			
<i>Apis mellifera</i>	honey bee (I)	3, 5, 6, 7		O
PAPILIONIDAE	PARNASSIANS & SWALLOWTAILS			
<i>Papilio zelicaon</i>	anise swallowtail	9		O
PIERIDAE	WHITES & SULPHURS			
<i>Anthocharis sara sara</i>	Pacific Sara orangetip	1, 2, 6		O
RIODINIDAE	METALMARKS			
<i>Apodemia mormo virgulti</i>	Behr's metalmark	5, 7		O
NYMPHALIDAE	BRUSH-FOOTED BUTTERFLIES			
<i>Coenonympha californica californica</i>	common California ringlet	8, 9		O
AMPHIBIANS (Nomenclature from Crother et al. 2008)				
HYLIDAE	TREE FROGS			
<i>Pseudacris hypochondriaca</i>	Baja California treefrog	3		V
REPTILES (Nomenclature from Crother et al. 2008)				
PHRYNOSOMATIDAE	SPINY LIZARDS			
<i>Sceloporus occidentalis longipes</i>	Great Basin fence lizard			O
TEIIDAE	WHIPTAIL LIZARDS			
<i>Aspidoscelis hyperythra beldingi</i>	Belding's orange-throated whiptail	2, 6		O
COLUBRIDAE	COLUBRID SNAKES			
<i>Lampropeltis californica</i>	California kingsnake	6		O

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Scientific Name	Common Name	Treatment Area Number	On-Site Abundance/Seasonality (Birds Only)	Evidence of Occurrence
BIRDS (Nomenclature from American Ornithologists' Union 2015 and Unitt 2004)				
ANATIDAE	DUCKS, GEESE, & SWANS			
<i>Anas platyrhynchos platyrhynchos</i>	mallard	3 (Flying Overhead)	F / Y	O
ODONTOPHORIDAE	NEW WORLD QUAIL			
<i>Callipepla californica californica</i>	California quail	1, 3, 5, 6	F / Y	O
ACCIPITRIDAE	HAWKS, KITES, & EAGLES			
<i>Accipiter cooperii</i>	Cooper's hawk	4, 5	F / Y	O
<i>Buteo jamaicensis</i>	red-tailed hawk	1, 6	F / Y	O
<i>Circus cyaneus hudsonius</i>	northern harrier	5, 7	F / Y	O
FALCONIDAE	FALCONS & CARACARAS			
<i>Falco columbarius</i>	merlin	3	U / W	O
<i>Falco peregrinus anatum</i>	American peregrine falcon	3	U / W	O
<i>Falco sparverius sparverius</i>	American kestrel	8	F / Y	O
COLUMBIDAE	PIGEONS & DOVES			
<i>Zenaida macroura marginella</i>	mourning dove	3, 4, 5, 7, 6, 8, 9, 10	C / Y	O
CUCULIDAE	CUCKOOS & ROADRUNNERS			
<i>Geococcyx californianus</i>	greater roadrunner	3, 4, 9	F / Y	O
APODIDAE	SWIFTS			
<i>Aeronautes saxatalis</i>	white-throated swift	5	F / Y	O
TROCHILIDAE	HUMMINGBIRDS			
<i>Calypte anna</i>	Anna's hummingbird	3, 4, 5, 7, 6, 2, 1, 10	F / Y	O
TYRANNIDAE	TYRANT FLYCATCHERS			
<i>Sayornis nigricans semiatra</i>	black phoebe	3	F / Y	O
<i>Tyrannus vociferans vociferans</i>	Cassin's kingbird	3, 6, 8, 9	F / Y	O
CORVIDAE	CROWS, JAYS, & MAGPIES			
<i>Corvus corax clarionensis</i>	common raven	1, 2, 3a, 4, 5, 6, 7, 8, 9	F / Y	O

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Scientific Name	Common Name	Treatment Area Number	On-Site Abundance/ Seasonality (Birds Only)	Evidence of Occurrence
HIRUNDINIDAE	SWALLOWS			
<i>Petrochelidon pyrrhonota tachina</i>	cliff swallow	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	C / S	O
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	3, 8	C / S	O
AEGITHALIDAE	BUSHTIT			
<i>Psaltriparus minimus melanurus</i>	bushtit	1, 3, 5, 6, 7, 9	C / Y	O
TROGLODYTIDAE	WRENS			
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	5, 6, 9	U / Y	O
<i>Thryomanes bewickii</i>	Bewick's wren	1, 3, 9	F / Y	O
<i>Troglodytes aedon parkmanii</i>	house wren	3, 10	F / Y	V
SYLVIIDAE	GNATCATCHERS			
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	1, 3	F / Y	O
<i>Polioptila californica californica</i>	coastal California gnatcatcher	1, 3, 4, 5, 6, 7, 8,	F / Y	O
TIMALIIDAE	BABLERS			
<i>Chamaea fasciata henshawi</i>	wrentit	3, 4, 6, 9	F / Y	V
MIMIDAE	MOCKINGBIRDS & THRASHERS			
<i>Mimus polyglottos polyglottos</i>	northern mockingbird	2, 4, 6, 7	F / Y	O
<i>Toxostoma redivivum redivivum</i>	California thrasher	3, 9	F / Y	O
STURNIDAE	STARLINGS & MYNAS			
<i>Sturnus vulgaris</i>	European starling (I)	3, 8	C / Y	O
EMBERIZIDAE	EMBERIZIDS			
<i>Aimophila ruficeps canescens</i>	southern California rufous-crowned sparrow	1, 2, 3, 4, 6, 7, 8, 9	U / Y	
<i>Chondestes grammacus strigatus</i>	lark sparrow	7	U / Y	O
<i>Melospiza melodia</i>	song sparrow	3, 1, 8	F / Y	O
<i>Melospiza [=Pipilo] crissalis</i>	California towhee	3, 4, 7, 6, 2, 1, 8, 9	F / Y	O
<i>Pipilo maculatus</i>	spotted towhee	3	F / Y	O
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	3, 4, 5	F / W	O

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at the Otay Ranch Cactus Wren Habitat Restoration and Enhancement Site

Scientific Name	Common Name	Treatment Area Number	On-Site Abundance/ Seasonality (Birds Only)	Evidence of Occurrence
ICTERIDAE	BLACKBIRDS & NEW WORLD ORIOLES			
<i>Agelaius phoeniceus</i>	red-winged blackbird	3	C / Y	O
<i>Sturnella neglecta</i>	western meadowlark	1, 2, 3, 6, 8, 9, 10	C / Y	O
FRINGILLIDAE	FINCHES			
<i>Spinus [=Carduelis] psaltria hesperophilus</i>	lesser goldfinch	1, 2, 3, 4, 5, 7, 8, 9	F / Y	O
<i>Spinus [=Carduelis] tristis salicamans</i>	American goldfinch	1, 9	F / Y	O
<i>Haemorhous [=Carpodacus] mexicanus frontalis</i>	house finch	1, 2, 3, 4, 5, 6, 7, 9, 10	C / Y	O
MAMMALS (Nomenclature from Bradley et al. 2014)				
LEPORIDAE	RABBITS & HARES			
<i>Lepus californicus bennettii</i>	San Diego black-tailed jackrabbit	7		O
<i>Sylvilagus audubonii</i>	desert cottontail	3, 7		O
SCIURIDAE	SQUIRRELS & CHIPMUNKS			
<i>Otospermophilus beecheyi</i>	California ground squirrel	3		O
CRICETIDAE	NEW WORLD MICE & RATS			
<i>Neotoma lepida intermedia</i>	San Diego desert woodrat	3		M
(I) = Introduced species				
ABUNDANCE (birds only; based on Garrett and Dunn 1981)			EVIDENCE OF OCCURRENCE	
C	= Common to abundant; almost always encountered in proper habitat, usually in moderate to large numbers		M	= Midden
F	= Fairly common; usually encountered in proper habitat, generally not in large numbers		O	= Observed
S	= Spring/summer resident; probable breeder on-site or in vicinity		V	= Vocalization
U	= Uncommon; occurs in small numbers or only locally			
W	= Winter visitor; does not breed locally			
Y	= Year-round resident; probable breeder on-site or in vicinity			

ATTACHMENT 3
Plant Species Observed

Attachment 3
Plant Species Observed Within the Otoy Ranch Cactus Wren Habitat Restoration and Enhancement Site

Scientific Name	Common Name	Parcel Set	Origin
LYCOPODS			
SELAGINELLACEAE	SPIKE-MOSS FAMILY		
<i>Selaginella cinerascens</i> A.A. Eaton	ashy spike-moss	Salt Creek	N
ANGIOSPERMS: MONOCOTS			
AGAVACEAE	AGAVE FAMILY		
<i>Chlorogalum parviflorum</i> S. Watson	small-flower soap-plant, amole	Salt Creek	N
<i>Yucca schidigera</i> Ortgies	Mojave yucca	Millenia	N
IRIDACEAE	IRIS FAMILY		
<i>Sisyrinchium bellum</i> S. Watson	western blue-eyed grass	Millenia	N
POACEAE (GRAMINEAE)	GRASS FAMILY		
<i>Avena barbata</i> Pott ex Link	slender wild oat	Salt Creek, Millenia	I
<i>Avena fatua</i> L.	wild oat	Millenia	I
<i>Bromus hordeaceus</i> L.	soft chess	Salt Creek, Millenia	I
<i>Bromus madritensis</i> L. ssp. <i>rubens</i> (L.) Husn.	red brome	Salt Creek, Millenia	I
<i>Festuca [=Vulpia] myuros</i> L.	rattail sixweeks grass	Salt Creek	I
<i>Muhlenbergia microsperma</i> (DC.) Kunth	littleseed muhly	Millenia	N
<i>Schismus barbatus</i> (L.) Thell.	Mediterranean schismus	Millenia	I
<i>Stipa [=Nassella] lepida</i> Hitchc.	foothill needle grass	Salt Creek, Millenia	N
<i>Stipa [=Nassella] pulchra</i> Hitchc.	purple needle grass	Salt Creek	N
THEMIDACEAE	BRODIAEA FAMILY		
<i>Dichelostemma capitatum</i> (Benth.) Alph. Wood	blue dicks	Salt Creek	N
ANGIOSPERMS: DICOTS			
ANACARDIACEAE	SUMAC OR CASHEW FAMILY		
<i>Malosma laurina</i> Nutt. ex Abrams	laurel sumac	Salt Creek	N
<i>Rhus integrifolia</i> (Nutt.) Benth. & Hook. f. ex Rothr.	lemonade berry	Salt Creek, Millenia	N

Attachment 3
Plant Species Observed Within the Otay Ranch Cactus Wren Habitat Restoration and Enhancement Site

Scientific Name	Common Name	Parcel Set	Origin
APIACEAE (UMBELLIFERAE)	CARROT FAMILY		
<i>Daucus pusillus</i> Michx.	rattlesnake weed	Salt Creek	N
<i>Foeniculum vulgare</i> Mill.	fennel	Millenia	I
ASTERACEAE	SUNFLOWER FAMILY		
<i>Artemisia californica</i> Less.	California sagebrush	Salt Creek, Millenia	N
<i>Baccharis sarothroides</i> A. Gray	broom baccharis	Salt Creek, Millenia	N
<i>Bahiopsis</i> [= <i>Viguiera</i>] <i>laciniata</i> (A. Gray) E.E. Schilling & Panero	San Diego viguiera, San Diego County viguiera	Salt Creek, Millenia	N
<i>Centaurea melitensis</i> L.	totalote, Maltese star-thistle	Salt Creek, Millenia	I
<i>Corethrogyne filaginifolia</i> [= all previously known <i>Lessingia filaginifolia</i> varieties in California] (Hook. & Arn.) Nutt.	California-aster, San Diego sand aster*, San Dieguito sand aster*	Salt Creek	N
<i>Deinandra</i> [= <i>Hemizonia</i>] <i>fasciculata</i> (DC.) Greene	fascicled tarweed	Salt Creek, Millenia	N
<i>Dittrichia graveolens</i> (L.) Greuter	stinkwort	Salt Creek	I
<i>Encelia californica</i> Nutt.	California encelia	Millenia	N
<i>Erigeron</i> [= <i>Conyza</i>] <i>canadensis</i> L.	horseweed	Millenia	N
<i>Gutierrezia californica</i> (DC.) Torr. & A. Gray	California matchweed	Salt Creek	N
<i>Isocoma menziesii</i> (Hook. & Arn.) G.L. Nesom var. <i>decumbens</i> (Greene) G.L. Nesom	decumbent goldenbush	Millenia	N
<i>Isocoma menziesii</i> (Hook. & Arn.) G.L. Nesom var. <i>menziesii</i>	spreading goldenbush	Salt Creek	N
<i>Lactuca serriola</i> L.	prickly lettuce	Salt Creek, Millenia	I
<i>Laennecia</i> [= <i>Conyza</i>] <i>coulteri</i> A. Gray G.L. Nesom	Coulter's horseweed	Salt Creek	N
<i>Logfia</i> [= <i>Filago</i>] <i>gallica</i> (L.) Coss. & Germ.	daggerleaf cottonrose	Millenia	I
<i>Pseudognaphalium biolettii</i> Anderb. [= <i>Gnaphalium bicolor</i>]	bicolor cudweed	Salt Creek, Millenia	N
<i>Pseudognaphalium</i> [= <i>Gnaphalium</i>] <i>californicum</i> (DC.) Anderb.	California everlasting, green everlasting	Salt Creek	N
<i>Sonchus asper</i> (L.) Hill ssp. <i>asper</i>	prickly sow thistle	Millenia	I
<i>Sonchus oleraceus</i> L.	common sow thistle	Millenia	I
<i>Stephanomeria</i> sp.	wreath-plant	Salt Creek	N

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Scientific Name	Common Name	Parcel Set	Origin
BORAGINACEAE	BORAGE FAMILY		
<i>Cryptantha intermedia</i> (A. Gray) Greene	nievitas cryptantha	Salt Creek	N
<i>Heliotropium curassavicum</i> L. var. <i>oculatum</i> (A. Heller) I. M. Johnst. ex Tidestr.	seaside heliotrope, alkali heliotrope	Salt Creek	N
<i>Pholistoma</i> sp.	fiesta flower	Salt Creek	N
BRASSICACEAE (CRUCIFERAE)	MUSTARD FAMILY		
<i>Brassica nigra</i> (L.) W.D.J. Koch	black mustard	Salt Creek, Millenia	I
<i>Hirschfeldia incana</i> (L.) Lagr.-Fossat	short-pod mustard	Salt Creek	I
<i>Lepidium nitidum</i> Nutt.	shining peppergrass	Salt Creek, Millenia	N
<i>Sinapis arvensis</i> L.	charlock	Millenia	I
CACTACEAE	CACTUS FAMILY		
<i>Cylindropuntia californica</i> (Torr. & A. Gray) F.M. Knuth var. <i>californica</i>	snake cholla	Salt Creek	N
<i>Cylindropuntia</i> [= <i>Opuntia</i>] <i>prolifera</i> (Engelm.) F.M. Knuth	coast cholla	Salt Creek, Millenia	N
<i>Ferocactus viridescens</i> (Torr. & A. Gray) Britton & Rose	San Diego barrel cactus, coast barrel cactus*	Salt Creek, Millenia	N
<i>Mammillaria dioica</i> K. Brandegee	fish-hook cactus	Salt Creek, Millenia	N
<i>Opuntia littoralis</i> (Engelm.) Cockerell.	coast prickly-pear, shore cactus	Salt Creek	N
CHENOPODIACEAE	GOOSEFOOT FAMILY		
<i>Salsola tragus</i> L.	Russian thistle, tumbleweed	Salt Creek, Millenia	I
CLEOMACEAE	SPIDERFLOWER FAMILY		
<i>Peritoma</i> [= <i>Isomeris</i>] <i>arborea</i> (Nutt.) H. H. Iltis	bladderpod	Salt Creek, Millenia	N
CRASSULACEAE	STONECROP FAMILY		
<i>Dudleya pulverulenta</i> (Nutt.) Britton & Rose	chalk lettuce, chalk dudleya	Salt Creek	N
CUCURBITACEAE	GOURD FAMILY		
<i>Marah macrocarpa</i> (Greene) Greene	wild cucumber	Salt Creek	N

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Scientific Name	Common Name	Parcel Set	Origin
EUPHORBIACEAE	SPURGE FAMILY		
<i>Croton</i> [=Eremocarpus] <i>setiger</i> Hook.	turkey-mullein, dove weed	Salt Creek, Millenia	N
<i>Euphorbia</i> [=Chamaesyce] <i>maculata</i> L.	spotted spurge	Millenia	I
<i>Euphorbia</i> [=Chamaesyce] <i>polycarpa</i> Benth.	smallseed sandmat	Salt Creek, Millenia	N
FABACEAE (LEGUMINOSAE)	LEGUME FAMILY		
<i>Acmispon glaber</i> (Vogel) Brouillet [= <i>Lotus scoparius</i>]	deerweed, California broom	Salt Creek	N
GERANIACEAE	GERANIUM FAMILY		
<i>Erodium botrys</i> (Cav.) Bertol.	long-beak filaree	Salt Creek, Millenia	I
<i>Erodium cicutarium</i> (L.) L'Hér. ex Aiton	redstem filaree	Millenia	I
LAMIACEAE	MINT FAMILY		
<i>Salvia columbariae</i> Benth.	chia	Salt Creek	N
MYRSINACEAE	MYRSINE FAMILY		
<i>Lysimachia</i> [=Anagallis] <i>arvensis</i> (L.) U. Manns & Anderb.	scarlet pimpernel	Millenia	I
PHYTOLACCACEAE	POKEWEED FAMILY		
<i>Phytolacca americana</i> L.	pokeweed, pokeberry, pigeonberry	Salt Creek	I
POLYGONACEAE	BUCKWHEAT FAMILY		
<i>Chorizanthe fimbriata</i> Nutt.	fringed spineflower	Salt Creek	N
<i>Eriogonum fasciculatum</i> Benth.	California buckwheat	Salt Creek, Millenia	N
RHAMNACEAE	BUCKTHORN FAMILY		
<i>Adolphia californica</i> S. Watson	California adolphia, spineshrub, San Diego adolphia*	Millenia	N
SIMMONDSIACEAE	JOJOBA FAMILY		
<i>Simmondsia chinensis</i> (Link) C.K. Schneid.	jojoba, goatnut	Salt Creek, Millenia	N
SOLANACEAE	NIGHTSHADE FAMILY		
<i>Lycium andersonii</i> A. Gray	waterjacket	Millenia	N
<i>Nicotiana glauca</i> Graham	tree tobacco	Salt Creek	I
<i>Physalis crassifolia</i> Benth.	Greene's ground-cherry	Salt Creek	N

Attachment 3
Plant Species Observed Within the Otay Ranch Cactus Wren Habitat Restoration and Enhancement Site

Scientific Name	Common Name	Parcel Set	Origin
<p><i>Notes:</i> Scientific and common names were primarily derived from the Jepson Online Interchange (University of California 2016). In instances where common names were not provided in this resource, common names were obtained from Rebman and Simpson (2014). Additional common names were obtained from the USDA maintained database (USDA 2013) or the Sunset Western Garden Book (Brenzel 2001) for ornamental/horticultural plants. Common names denoted with * are from County of San Diego 2010.</p> <p>ORIGIN N = Native to locality I = Introduced species from outside locality</p>			