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A Company of Specialists

October 5, 2012

Mr. Glen Laube
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Chula Vista, CA 91910

Reference: Year 3 Annual Report for the Chula Vista Cactus Wren Habitat Restoration and Enhancement Program (SANDAG Grant Number 5001130; RECON Number 5296)

Introduction

This third annual report provides background information and summarizes the tasks performed during the third year (September 2011 to August 2012) of the coastal cactus wren (*Campylorhynchus brunneicapillus*) habitat restoration and enhancement program in the Chula Vista Central City Preserve. Three quarterly reports have previously been prepared by RECON in 2012. Information from those reports is summarized below for tasks completed between September 1, 2011 and August 31, 2012. This annual report also summarizes the results of the relevé vegetation surveys that were conducted in spring 2012 at the treatment sites, as well as the results of the bird point count monitoring.

The Central City Preserve is in the central portion of the city of Chula Vista, east of Interstate 805, south of State Route 54 and Bonita Road, and north of Otay Lakes Road (Figure 1; see Attachment 1 for all Figures and Photographs). The Central City Preserve covers approximately 1,350 acres and is subdivided further into four Preserve Management Areas (PMAs) for data management purposes and for the development of the Area Specific Management Directives that were prepared in 2004 (Figure 2). Each PMA consists of a number of open space areas, referred to as subunits, which are surrounded by residential development. Each of these subunits was assigned a number to organize and distinguish each distinct survey area (Figure 3). Restoration and enhancement work was performed in PMA 1 subunits 1–2a, 1-2b, and 1–1a (Figure 4).

During the first year of the project (August 2009-August 2010), a total of approximately 5.75 acres of shrub were thinned around existing cholla (*Cylindropuntia prolifera*) patches. Approximately 2.48 acres of dried weedy areas were also dethatched using weed whips. Cholla cuttings were planted in all of the dethatched areas, around existing cholla patches to increase cholla density, and within existing openings in coastal sage scrub (approximately 0.81 acre), for a total of approximately 9.04 acres of treated area.

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 decade, large, intense fires have damaged coastal cactus wren habitat in the Lake Jennings area (Cedar Fire, 2003), the San Pasqual Valley (Witch Fire, 2007) and the Otay-Sweetwater Region, which includes the San Diego National Wildlife Refuge (Harris Fire, 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.

In the Central City Preserve, coast cholla patches have declined in the last 10–15 years due to competition with weeds and large shrubs such as lemonadeberry (*Rhus integrifolia*). In addition, the below-average rainfall during most of the last decade has caused many patches of coast cholla to suffer from severe drought stress or die. This cholla die-off has likely caused a decrease in suitable habitat for coastal cactus wren that has contributed to the observed population declines.

Project Goals and Habitat Restoration Methods

- Increase coast cholla patch sizes and density within portions of the Central City Preserve to benefit populations of coastal cactus wrens.

- Restore and enhance patches of coast cholla in a distribution pattern that facilitates dispersal of cactus wrens between areas of suitable habitat within PMA 1.

- Proactive reduction of native and non-native fuels in the immediate vicinity of nesting-sized coast cholla patches to decrease the risk of catastrophic fires that could eliminate wren habitat.

- Restore habitat for coastal cactus wrens and other covered species, including coastal California gnatcatcher (*Polioptila californica californica*) and Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), in areas currently dominated by weeds.

- Restore and enhance coastal cactus wren habitat through the selective thinning and removal of lemonadeberry, other native shrubs, and exotic annuals that are directly competing with coast cholla to the detriment of cactus wren populations.

2011-12 Rainfall Summary and Ecological Effects

Between July 1, 2011 and June 30, 2012, rainfall in Chula Vista (8.41 inches) was below normal (which is approximately 10 inches) (Table 1). Significant fall rains began in November 2011, when nearly 3 inches of rain fell during that month. This heavier than normal rain episode was followed by below-normal rainfall in December 2011 and January 2012, with less than an inch in each of those months.

Well-spaced rains eventually returned in February and March, and this helped continue the growth of the native vegetation, including coast cholla and prickly pear (*Opuntia littoralis*), in the treatment areas. The weather pattern that occurred in 2011-12, consisting of several heavy rain periods spread over the season, triggered multiple germination events of non-native weeds such as black mustard (*Brassica nigra*), short-pod mustard (*Hirschfeldia incana*), and tocalote (*Centaurea melitensis*). A more detailed description of weed control efforts and information regarding the seasonal growth of the enhanced cactus wren habitat areas are discussed below.

The photographs included in this report depict the seasonal changes in habitat and weed growing conditions that occurred during the 2011-12 growing season. Weed control efforts, observed native plant growth, and monitoring results were documented through photographs taken at the restoration and enhancement sites.

TABLE 1
SUMMARY OF RAINFALL DATA BY MONTH
AT CHULA VISTA
JULY 1, 2011 - JUNE 30, 2012

Month	Monthly Rainfall (inches)
July	0.00
August	0.00
September	0.15
October	0.34
November	2.97
December	0.84
January	0.57
February	1.23
March	1.60
April	0.71
May	0.00
June	0.00
TOTAL PRECIPITATION	8.41 inches

Year 3 Tasks Performed September 2011 through August 2012

Maintenance

Weed Control

As mentioned above, heavier than normal rain occurred in November 2011, which caused weeds to germinate. Annual weeds that had germinated from early rains were sprayed in December and January to prevent them from flowering and setting seeds (Photograph 1). Glyphosate was used to control non-native annuals in dethatch and shrub thinning areas, and in locations that were immediately adjacent to access roads. Non-native species that were controlled included tocalote, black mustard, short-pod mustard, crown daisy (*Glebionis coronaria* = *Chrysanthemum coronarium*), filaree (*Erodium* spp.), California bur clover (*Medicago polymorpha*), and annual grasses such as Mediterranean schismus (*Schismus barbatus*) (Photograph 2). Herbicide was applied by licensed applicators under the supervision of RECON Field Crew Director Ruth Vallejo, who is a certified Pest Control Advisor.

By early February, weeds were successfully controlled both from the intital spraying effort and the subsequent below-normal rainfall in January (Photograph 3). After heavier rains occurred again in February, March, and April, additional weeds germinated and required control. Because of the extended rainfall season, additional weeding visits were needed, and weeding was performed by the RECON field crews in Ferbuary, March, April, and June (Photograph 4). These repeated visits helped to significantly reduce the overall cover of weeds at the treament sites, especially in the dethatch areas formerly dominated by mustard and tocalote.

In addition to mustards and other annual weeds, a small population of hollow-stem asphodel (*Asphodelus fistulosus*; California Invasive Plant Council ranked moderate/alert) was also controlled at one of restoration areas in Rice Canyon. The plants were growing along the access road that runs the length of the canyon. Since the plants were not yet in flower, RECON maintenance crews used shovels to uproot the plants and then dry them in the sun (Photograph 5). This treatment will minimize the chance that this weed will invade the surrounding cactus wren and other sensitive species habitat.

Shrub and Cactus Maintenance

During scheduled weeding visits and prior to the start of the bird breeding season, native shrubs that had been previously cut and showed signs of regrowth were sprayed with herbicide. In previously cleared patches, small shrub seedlings were also sprayed with herbicide to prevent them from growing large and competing with the coast cholla and prickly pear. The openings created by the thinning program have significantly increased potential open-ground foraging areas for the coastal cactus wren. In thinning areas, the primary resprouting shrubs included jojoba (*Simmondsia chinensis*) and lemonadeberry. This spray program will reduce the long-term vegetation maintenance around nesting-sized cactus patches.

As discussed in the Year 2 annual report, some of the older/larger cholla in the shrub thinning areas have begun to lean due to the increasing weight of the growing stems (Photograph 6). In some cases branches that have accumulated enough weight to have broken and dropped to the ground (Photograph 7). The branches that have fallen will likely reroot and begin growing again, but to reduce the chance that branches will break under the weight of the numerous new stems and persistent fruits, the project biologist directed the maintenance crews to trim selected plants. The maintenance crew trimmed plants using machetes, and the newly cut stem material was distributed into treatment areas that had less cholla cover (Photographs 8-9).

Year 3 Update on the Repair of Inadvertent Grading and Vehicle Damage at Terra Nova Drive

During a Year 2 site visit in early November 2010, RECON biologists discovered a small area of grading (approximately 8,300 square feet) within the preserve (south of Terra Nova Drive). A second area of disturbance was also discovered north of Terra Nova Drive (approximately 3,300 square feet) caused by a vehicle turning around adjacent to a water pipeline owned by the City of San Diego. Prior to this grading disturbance, weeding maintenance and cholla planting had been performed in these areas. In 2011, RECON coordinated and met with City of Chula Vista and City of San Diego Water Department staff to repair the damage and install a fence to protect the preserve from inadvertent impacts.

Under contract with the City of San Diego, RECON repaired the damaged areas in July 2011. Hundereds of cholla cuttings were planted at each site, and a protective three-strand wire fence was installed at both areas The two repaired sites are being maintained as part of the regularly scheduled maintenance visits for the cactus wren project (Photographs 10-11).

At the southern repair area, the project biologists noticed what appeared to be non-native snails around that particular treatment area prior to the repair work. These snails had been observed in this area in the past. Since the repairs were made, snails have moved into the northern portion of the repair area. The snails tend to cover many of the surfaces in the area, including cholla (Photograph 12). Looking at a taxonomic key to nonnative snail prepared by the Los Angeles County Agricultual Weights and Measures Department (Garrison 1993) and internet information, it appears that the snails may be the white garden snail (*Theba pisana*). This tentative identification will need to be verified by an expert in terrestrial molluscs. The white garden snails are originally from the Mediterrean region. Potential control of this snail is beyond the scope of this project, but we wanted to bring this occurrence to the attention of the wildlife agencies. Similar infestations of non-native snails have been seen over the years in other parts of southern San Diego County.

Monitoring

Vegetation Sampling Methods

Vegetation patch sampling was done using the relevé method. Treated vegetation patches greater than 0.10 acre were sampled. All plant species occurring in each patch were recorded, and the cover of each species was estimated. A total of 26 vegetation treatment areas were sampled by RECON biologist Anna Bennett between April and June 2012. Twenty of the vegetation study plots are located at shrub thinning sites, and six are located at weed dethatching areas. The results of the vegetation sampling efforts are presented in the Year 3 Vegetation Sampling Results section below.

Bird Point Count Methods

Repeat bird point counts were conducted by RECON biologists Beth Procsal and Erin McKinney at 26 stations. Point count locations were recorded using a handheld global positioning system unit so that the points can be relocated each year for repeat surveys. During May-June 2012, RECON biologists surveyed for 10 minutes at each point location and recorded birds that were detected either visually or by call. The results of the bird point count data are summarized below in the Year 3 Bird Count Results section.

Year 3 Vegetation Sampling Results

Attachment 2 lists the species observed at the shrub thinning areas in and around Rice Canyon. Attachment 3 lists the species observed at the weed dethatch areas in and around Rice Canyon. Plant nomenclature is from: University of California 2012; Brenzel 2001; Rebman and Simpson 2006; and U.S. Department of Agriculture 2008

The following results are from the 20 relevé shrub thinning locations:

- The average cholla height at the shrub thinning plots was:
    - Cholla less than 1 foot: 10.1%
    - Cholla between 1 and 3 feet in height: 12.0%
    - Cholla over 3 feet in height: 77.9%
- Average total cover (shrub and herbaceous): 27.2%
- Average bare ground: 72.8 %
- Average total cover of cholla: 17.0%
- Average percent cholla cover out of the total cover: 62.4%
- A total of 117 plant species were recorded at the shrub thinning locations: 87 native species and 30 non-native species
- Average non-native cover: 0.6%
- Average non-native cover out of the total cover: 2.2%

The following results are from the six relevé dethatch locations:

- Average cholla height at the weed dethatch locations:
    - Cholla less than 1 foot: 55.0%
    - Cholla between 1 and 3 feet in height: 27.8%
    - Cholla over 3 feet in height: 17.2%
- Average total cover (shrub & herbaceous): 9.2%
- Average bare ground: 90.8%
- Average total cover of cholla: 6.3%
- Average % cholla cover out of total cover: 70.0%
- A total of 50 plant species were recorded in the dethatch areas: 30 native and 20 non-native species
- Average total non-native cover: 0.7%
- Average non-native cover out of total cover: 7.6%

Year 3 Bird Point Count Results

In spring 2012, 24 species of birds were detected during the point count monitoring compared to 23 species during the spring 2012 point counts, 14 species during the May 2010 counts and 15 species in August 2009. The following species of birds were the 10 most commonly observed (in descending order) during the spring 2012 point counts:

House finch (*Carpodacus mexicanus*)
Lesser goldfinch (*Carduelis psaltria hesperophilus*)
Anna's hummingbird (*Calypte anna*)
California towhee (*Pipilo crissalis*)
Mourning dove (*Zenaida macroura*)
California quail (*Callipepla californica californica*)
Wrentit (*Chamaea fasciata henshawi*)
Northern rough-winged swallow (*Stelgidopteryx serripennis*)
Coastal California gnatcatcher (*Polioptila californica californica*)
Bewick's wren (*Thryomanes bewickii*)

Discussion

Weed Control Results

Due to the continued maintenance efforts, weed cover at the shrub clearing and dethatch sites remained low in spring 2012. Non-native cover at the shrub clearing sites was 0.6 percent in 2012. The relative percentage of weeds at the shrub thinning sites also remained low at 2.2 percent in 2012.

At the dethatch sites, non-native cover was 0.7 percent in 2012. The relative percentage of weeds at the dethatch sites dropped from 28 percent percent of the total cover in 2010 to 16.5 percent in 2011 and to a low of 7.6 percent in 2012. These numbers indicate that weed control efforts have been successful and are continuing to maintain low levels of non-native cover.

Cactus and Other Native Plant Growth

Even though rainfall was below normal during the 2011-2012 season, due to the absence of significant weed competition, cactus cuttings and existing cholla patches continued to expand in size during Year 3 (Photograph 13-16). As weed cover and competition have been reduced, more water has become available for native plant growth. The positive effects of this additional water are reflected in the large number of new cholla and prickly pear stems that have appeared each year on the cuttings originally planted in 2009. This new growth is particularly evident at the weed dethatching areas (Photograph 17-19). Prickly pear cuttings planted in 2009 have already begun to flower and are being visited by native pollinators such as cactus and sweat bees (Photograph 20). Pollinated cactus flowers are producing numerous fruits that provide potential food for wrens and other wildlife (Photograph 21). Over time, the dethatch areas will fill in with dense cholla and prickly pear that will benefit the coastal cactus wren by providing additional nesting areas.

Quantitative data shows that the cover of cholla at the shrub thinning sites increased about 3 percent since 2010, while the average cover of cholla at the dethatch sites increased about 3.3 percent. The most noticeable change in the cholla at the dethatch areas was the increase in height of the plants. The percentage of cholla that were one to three feet tall increased from just 4 percent in 2010 to nearly 28 percent in 2012.The percentage of cholla over three feet tall increased from 5 percent in 2010 to over 17 percent in 2012. Also, the average cover of cholla relative to the total plant cover at the dethatch sites increased from 50 percent in 2010 to over 70 percent in 2012.

As discussed in the maintenance section above, in some shrub thinning locations, coast cholla plants that were leaning on native shrubs for support prior to thinning needed to have portions of their stems trimmed to prevent some of the branches from breaking under the weight of new growth. Photograph 22 shows some of the cholla after trimming and the numerous cuttings produced. The cholla stems trimmed from these plants were dispersed throughout the patches to increase the amount of cholla cover.

As in Years 1 and 2 of the project, shrub thinning locations had significantly more native annual cover than the dethatch sites. In the winter and spring of 2012, shrub clearing areas often supported large populations of annual natives such as Cleveland cryptantha (*Cryptantha clevelandii*) and Nievitas crypthantha (*C. intermedia*) (Photograph 23). Other species such as wishbone bush (*Mirabilis laevis*) and Nuttall's snapdragon (*Antirrhinum nuttallianum*) were also commonly observed in the shrub thinning areas (Photograph 24). Additional annual species observed at the shrub thinning areas included caterpillar phacelia (*Phacelia cicultaria* var. *hispida*) coastal bird's-foot trefoil (*Acmispon maritimus* = *Lotus salsuginosus*), canchalagua (*Zeltnera* (=*Centaurium*) *venusta*), whispering bells (*Emmenanthe penduliflora*), and sapphire woolly-star (*Eriastrum sapphirinum*) (Photographs 25-30).

Cactus Wren and Other Wildlife Use

Incidental observations of birds by the project biologist during the 2011 maintenance site visits indicated that cactus wrens were beginning to occupy one of the shrub treatment areas in the southwest portion of the preserve in the spring of 2011. Although cactus wrens were not detected during the 2012 spring point counts, a cactus wren was incidentally observed near the northwestern edge of the same shrub thinning area (Figure 5). A cactus wren nest was also observed in another separate shrub thinning patch to the north of Terra Nova Drive (see Figure 5).

Another sensitive bird species, coastal California gnatcatcher, was observed at eight point locations and three additional incidental observations during the vegetation sampling, for a total of 11 locations (Photograph 31). Other commonly encountered species included the house finch, California towhee and mourning doves that forage in and nest in the chollas and around the edges of the enhancement sites (Photograph 32).

Several species of reptiles commonly use the cactus wren restoration and enhancment sites, including the common western fence lizard (*Sceloprorus occidentalis*) and California kingsnake (*Lampropeltis getula californiae*). Sensitive reptile species also observed include the Multiple Species Conservation Program-covered Belding's orange-throated whiptail (*Aspidoscelis hyperythrus*) and the red diamond rattlesnake (*Crotalus ruber*), which is a California species of special concern (Photograph 33).

Mammal species that were detected at the restoration and enhancment sites include cottontail rabbits (*Sylvilagus audubonii*), coyotes (*Canis latrans*), and the San Diego desert woodrat (*Neotoma lepida intermedia*; California Department of Fish and Game Species of Special Concern), which collects cactus spines to build it's nest at the base of the coast cholla. Invertebrates that are often seen in the cholla patches include funnel web spiders of the family Agelendiae that spin their webs in the cholla to capture prey (Photograph 34).

We are encouraged by the rapid growth of cholla and prickly pear cuttings. The ongoing maintenance program will continue to reduce non-native species cover and competition with native plants such as coast cholla (Photograph 35).

Future Restoration and Enhancement Tasks

In Year 4 of the restoration and enhancement program, weeds will continue to be controlled, as needed, to prevent seed set. Small amounts of native annual seed that have been collected will be redistributed in dethatch areas that have had little native annual cover. The increased native annual cover will support a greater diversity of insect species, which will in turn provide food for cactus wrens that often forage on the ground. Vegetation sampling and bird point counts will be repeated in the spring of 2013.

If you have any questions regarding the coastal cactus wren habitat restoration and enhancement program, do not hesitate to call.

Sincerely,

Mark W. Dodero

Mark Dodero
Senior Biologist

MWD:sjg

Enclosure(s)

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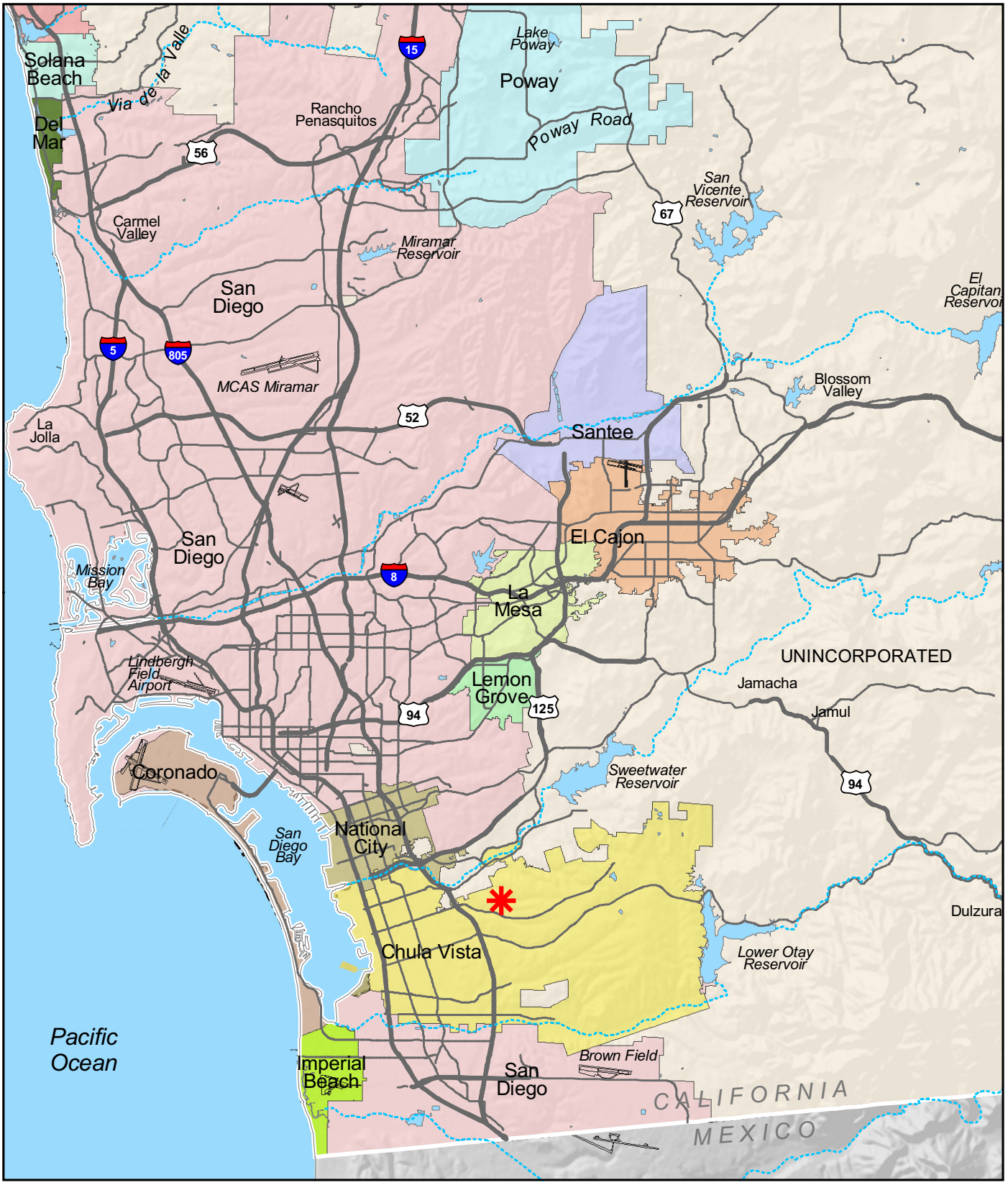
Contributers to this Report

RECON biologists that conducted field surveys and analyzed data included Anna Bennett, Beth Proscal, Erin McKinney, and Cailin O'Meara.

ATTACHMENTS

ATTACHMENT 1



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Project Location

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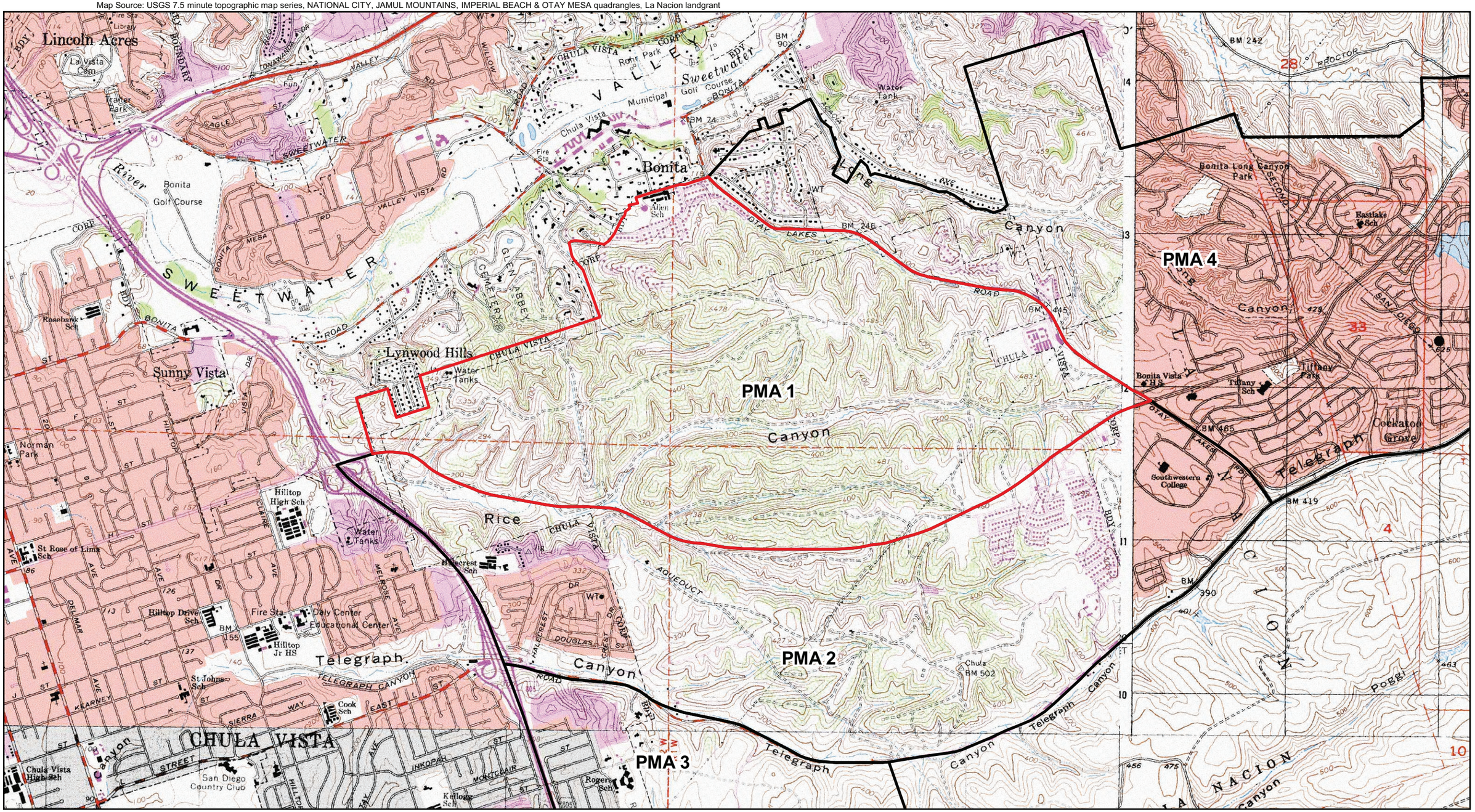
FIGURE 1

Regional Location

Map Source: USGS 7.5 minute topographic map series, NATIONAL CITY, JAMUL MOUNTAINS, IMPERIAL BEACH & OTAY MESA quadrangles, La Nacion landgrant



Preserve Management Areas

PMA 1

Other PMAs

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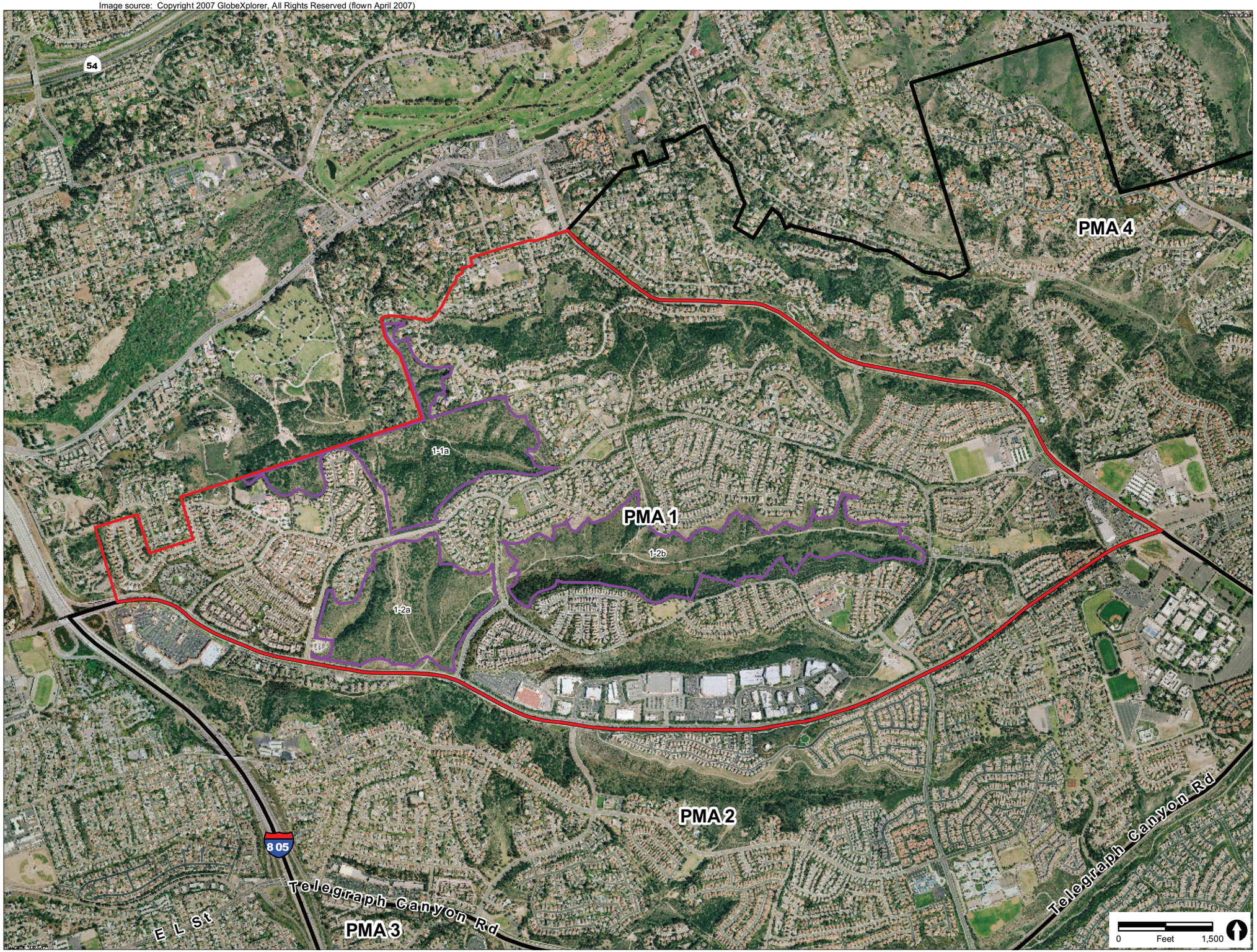
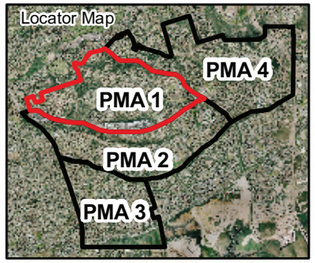
FIGURE 2

Project Location on USGS Map

Image source: Copyright 2007 GlobeXplorer, All Rights Reserved (flown April 2007)





Preserve Management Areas

- PMA 1
- Other PMAs
- PMA Subunits

FIGURE 3
Preserve Management Subunits Selected for Restoration

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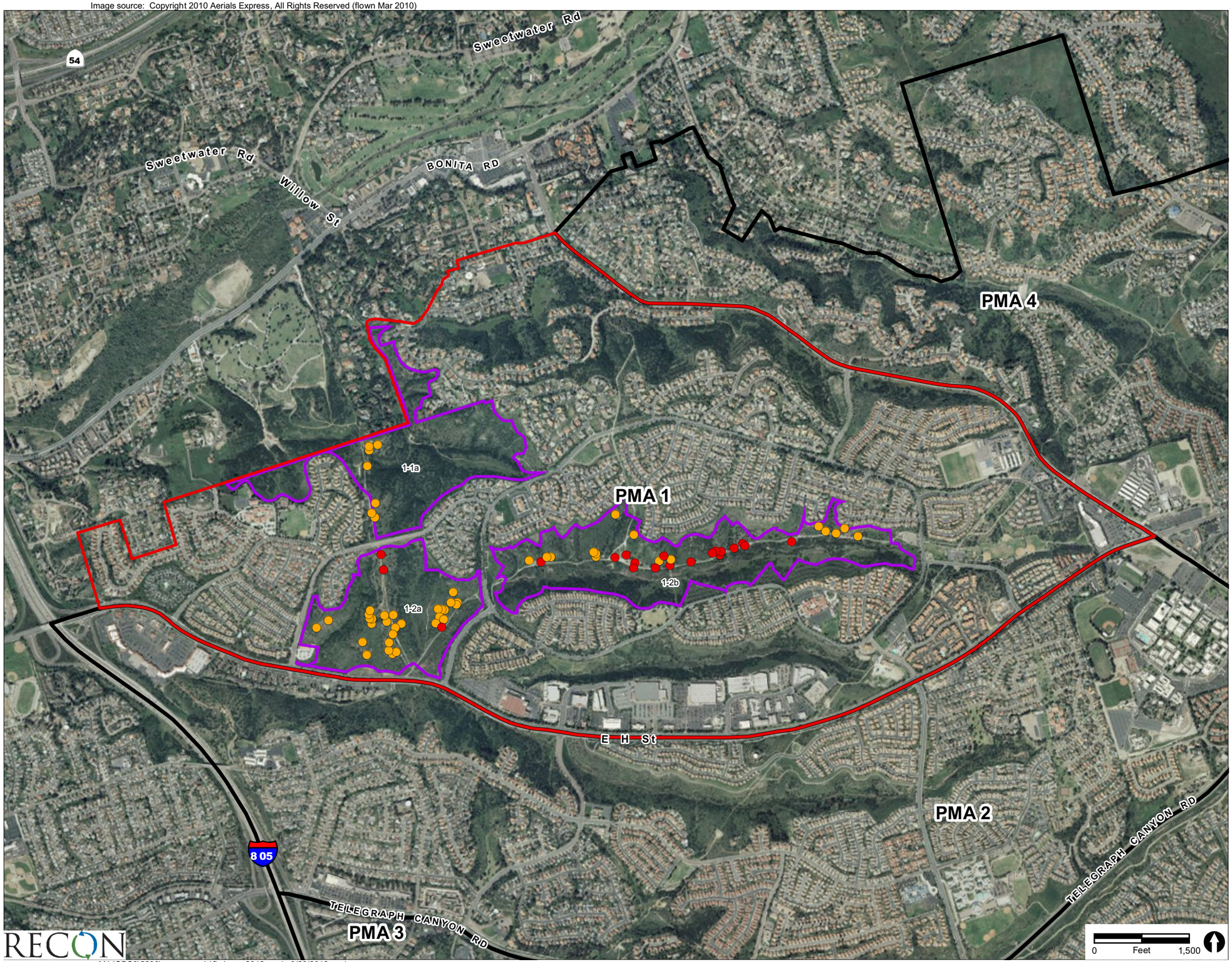
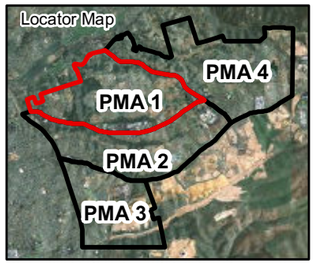
Image source: Copyright 2010 Aerials Express, All Rights Reserved (flown Mar 2010)





Preserve Management Areas

- PMA 1
- Other PMAs
- PMA Subunits
- Dethatch Areas
- Cut Areas

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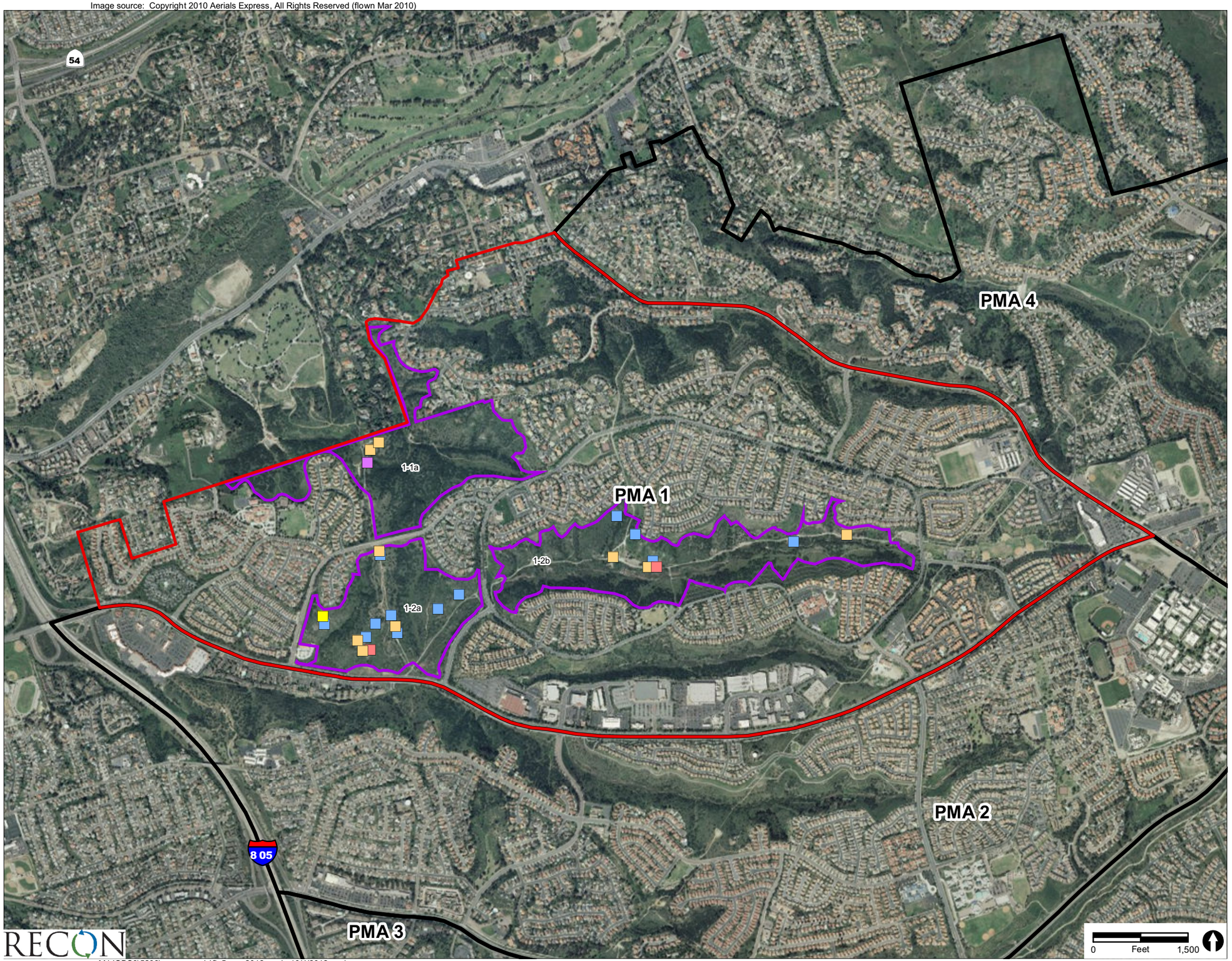
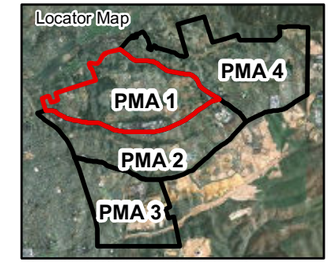
FIGURE 4

Cactus Wren Habitat Restoration and Enhancement Locations

Image source: Copyright 2010 Aerials Express, All Rights Reserved (flown Mar 2010)





Preserve Management Areas

- PMA 1
- Other PMAs
- PMA Subunits
- Cactus Wren
- Cactus Wren Nest
- Coastal California Gnatcatcher
- Orange-throated Whiptail
- Red Diamond Rattlesnake

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FIGURE 5

Locations of Sensitive Species

PHOTOGRAPH 1
RECON Field Crews Spraying Weeds December 2011

PHOTOGRAPH 2
Non-native Mediterranean Schismus
(*Schismus barbatus*) Immediately after Spraying

PHOTOGRAPH 3
Dethatch Area After Weed Control January 2012

PHOTOGRAPH 4
RECON Field Crews Spraying Weeds April 2012

PHOTOGRAPH 5
Hollow-stem Asphodel (*Asphodelus fistulosus*) Uprooted by RECON Crews

PHOTOGRAPH 6
New Stem Growth Adds Significant Weight to Older Cholla

PHOTOGRAPH 7
Stems of Some Older Cholla Have Broken Under Heavy Weight

PHOTOGRAPH 8
Selected Plants Were Trimmed to Reduce Weight of Branches

PHOTOGRAPH 9
Stems Produced by Trimming Were Redistributed

PHOTOGRAPH 10
Terra Nova South Repair Area

PHOTOGRAPH 11
Terra Nova North Repair Area

PHOTOGRAPH 12
Non-native Snails at Terra Nova South Repair Area

PHOTOGRAPH 13
Shrub Cut Area with Numerous New Plants from Cuttings

PHOTOGRAPH 14
Shrub Cut Area with Numerous
New Plants from Cuttings

PHOTOGRAPH 15
Shrub Cut Area with Dense Cholla Growth

PHOTOGRAPH 16
Shrub Cut Area Supports Native Grasses

PHOTOGRAPH 17
Numerous Cholla Cuttings Continue to Expand in Size

PHOTOGRAPH 18
Cholla Cuttings Flowering As They Mature

PHOTOGRAPH 19
Cholla Cuttings Growing Rapidly
with Low Weed Competition

PHOTOGRAPH 20
Native Cactus and Sweat Bees Visit Cactus Flowers

PHOTOGRAPH 21
Prickly Pear Fruits Provide Food for Cactus Wrens and Other Wildlife

PHOTOGRAPH 22
Mature Cholla after Trimming to Reduce Stem Weight

PHOTOGRAPH 23
Cleveland's Cryptantha (*Cryptantha clevelandii*)
Frequently Grows with Coast Cholla

PHOTOGRAPH 24
Nuttall's snapdragon (*Antirrhinum nuttallianum*) with Cholla

PHOTOGRAPH 25
Caterpillar Phacelia (*Phacelia cicultaria var. hispida*) in Habitat

PHOTOGRAPH 26
Closeup of Caterpillar Phacelia
(*Phacelia cicultaria* var. *hispida*)

PHOTOGRAPH 27
Coastal Bird's-foot Trefoil (*Acmispon maritimus*)

PHOTOGRAPH 28
Canchalagua (*Zeltnera (=Centaurium) venusta*)

PHOTOGRAPH 29
Whispering Bells (*Emmenanthe penduliflora*)

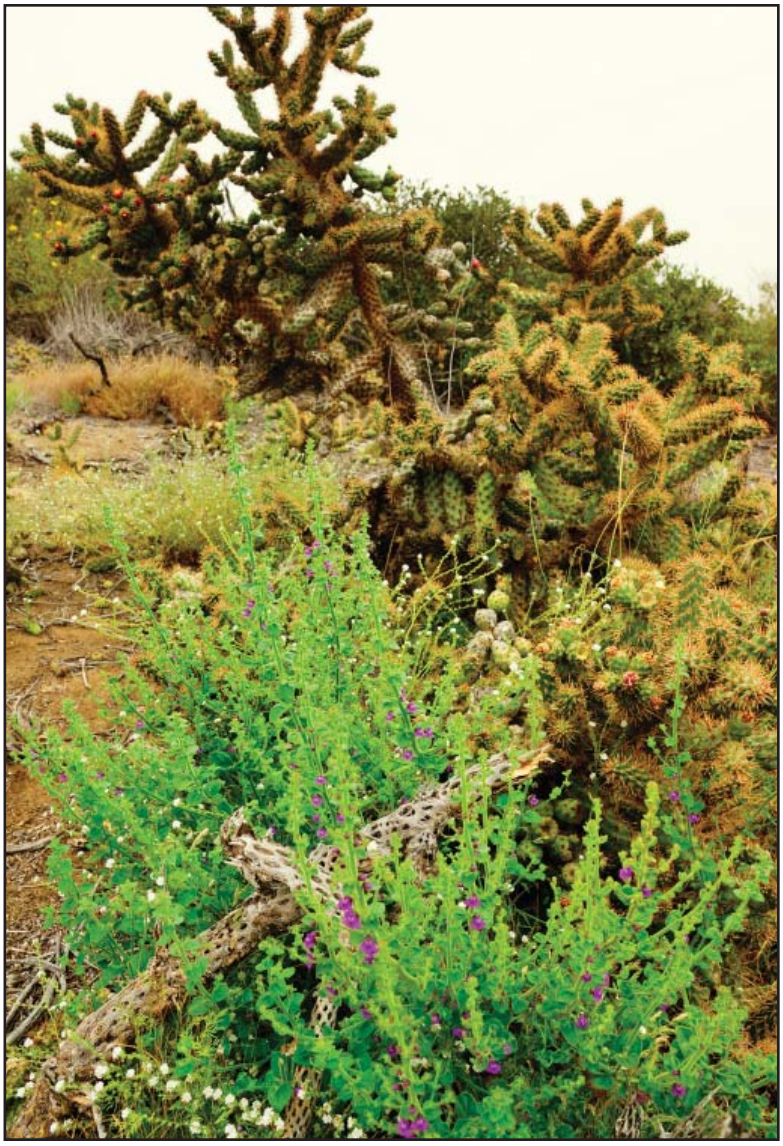
PHOTOGRAPH 30
Sapphire Wooly-star (*Eriastrum sapphirinum*)

PHOTOGRAPH 31
Coastal California Gnatcatcher (*Polioptila californica californica*) Frequently Found in Restoration Areas

PHOTOGRAPH 32
Mourning Doves (*Zenaida macroura*) Often Nest in Coast Cholla

PHOTOGRAPH 33
Red Diamond Rattlesnake (*Crotalus ruber*),
a California Species of Special Concern

PHOTOGRAPH 34
Funnel Web Spiders of the Family
Agelinidae Catch Prey in Cholla Patches



PHOTOGRAPH 35
Coast Cholla and Native Annuals
Dominate the Shrub Thinning Areas

RECON

ATTACHMENT 2

ATTACHMENT 2
PLANT SPECIES OBSERVED AT SHRUB CUT PATCHES

Scientific Name	Common Name	Origin
LYCOPODS		
SELAGINELLACEAE	**SPIKE-MOSS FAMILY**	
**Selaginella cinerascens* A.A. Eaton	ashy spike-moss	N
FERNS		
PTERIDACEAE	**BRAKE FAMILY**	
Pentagramma triangularis (Kaulf.) Yatsk. Windham & E. Wollenw.	goldback fern	N
ANGIOSPERMS: MONOCOTS		
AGAVACEAE	**AGAVE FAMILY**	
Yucca schidigera Ortgies	Mohave yucca	N
ASPHODELACEAE	**ASPHODEL FAMILY**	
Asphodelus fistulosus L.	hollow-stem asphodel	I
LILIACEAE	**LILY FAMILY**	
Calochortus splendens Benth.	lilac mariposa	N
POACEAE (GRAMINEAE)	**GRASS FAMILY**	
Aristida purpurea Nutt.	Three-awn	N
Bromus madritensis L. ssp. *rubens* (L.) Husnot	red brome	I
Cortaderia selloana (Schult. & Schult. f.) Asch. & Graebn.	pampas grass	I
Festuca [=*Vulpia*] *myuros* L.	Rat-tail fescue	I
Melica imperfecta Trin.	California melic	N
Muhlenbergia microsperma (DC.) Kunth	littleseed muhly	N
Polypogon monspeliensis (L.) Desf.	annual beard grass	I
Schismus barbatus (L.) Thell.	Mediterranean schismus	I
Stipa [=*Nassella*] *lepida* (Hitchc.) Barkworth	foothill needlegrass	N
Stipa [=*Nassella*] *pulchra* (Hitchc.) Barkworth	purple needlegrass	N
ANGIOSPERMS: DICOTS		
AMARANTHACEAE	**AMARANTH FAMILY**	
Amaranthus albus L.	tumbleweed	I
Dysphania [=*Chenopodium*] *ambrosioides* (L.) Mosyakin & Clemants	Mexican tea	I
ANACARDIACEAE	**SUMAC OR CASHEW FAMILY**	
Rhus integrifolia (Nutt.) Benth. & Hook. f. ex Rothr.	lemonadeberry	N
APIACEAE (UMBELLIFERAE)	**CARROT FAMILY**	
Apiastrum angustifolium Nutt.	wild-celery	N

ATTACHMENT 2
PLANT SPECIES OBSERVED AT SHRUB CUT PATCHES
(Continued)

Scientific Name	Common Name	Origin
Daucus pusillus Michx.	rattlesnake weed	N
ASTERACEAE	**SUNFLOWER FAMILY**	
Artemisia californica Less.	California sagebrush	N
Baccharis pilularis DC.	coyote brush	N
Bahiopsis [=*Viguiera*] *laciniata* (A. Gray) E.E. Schilling & Panero	San Diego County viguiera	N
Centaurea melitensis L.	tocalote, Maltese star-thistle	I
Chaenactis glabriuscula DC.	yellow pincushion	N
Cirsium occidentale (Nutt.) Jeps. var. *occidentale*	cobwebby thistle	N
Cotula australis (Sieber ex Spreng.) Hook. f.	Australian brass-buttons	I
Deinandra [=*Hemizonia*] *fasciculata* (DC.) Greene	golden tarplant	N
Encelia californica Nutt.	common encelia	N
Erigeron [=*Conyza*] *bonariensis* (L.) Cronquist	flax-leaf fleabane	I
Erigeron [=*Conyza*] *canadensis* (L.) Cronquist	horseweed	N
Glebionis coronaria (L.) Spach [=*Chrysanthemum coronarium*]	garland, crown daisy	I
Gutierrezia californica (DC.) Torr. & A. Gray	California matchweed	N
Helianthus annuus L.	common sunflower	N
Helminthotheca [=*Picris*] *echioides* (L.) Holub	bristly ox-tongue	I
Heterotheca grandiflora Nutt.	telegraph weed	N
Hypochaeris glabra L.	smooth cat's-ear	I
Lactuca serriola L.	prickly lettuce	I
Pseudognaphalium biolettii Anderb.	bicolor cudweed	N
Pseudognaphalium californicum (DC.) Anderb.	green everlasting	N
Pseudognaphalium canescens [=*Gnaphalium canescens* ssp. *canescens*] (DC.) Anderb.	everlasting cudweed	N
Rafinesquia californica Nutt.	California chicory	N
Sonchus asper (L.) Hill ssp. *asper*	prickly sow thistle	I
Sonchus oleraceus L.	common sow thistle	I
Stylocline gnaphaloides Nutt.	everlasting nest straw	N
BORAGINACEAE	**BORAGE FAMILY**	
Amsinckia menziesii (Lehm.) A. Nelson & J.F. Macbr.	rancher's fireweed	N
Cryptantha clevelandii Greene	Cleveland cryptantha	N
Cryptantha intermedia (A. Gray) Greene	nievitas cryptantha	N
Emmenanthe penduliflora Benth.	whispering bells	N
Eucrypta chrysanthemifolia (Benth.) Greene	eucrypta	N
Phacelia cicutaria Greene var. *hispida* (A. Gray) J.T. Howell	caterpillar phacelia	N
Pholistoma auritum (Lindl.) Lilja var. *auritum*	fiesta flower	N
Pholistoma racemosum (Nutt. ex A. Gray) Constance	San Diego fiesta flower	N

ATTACHMENT 2
PLANT SPECIES OBSERVED AT SHRUB CUT PATCHES
(Continued)

Scientific Name	Common Name	Origin
BRASSICACEAE (CRUCIFERAE)	**MUSTARD FAMILY**	
Brassica nigra (L.) W.D.J. Koch	black mustard	I
Descurainia pinnata (Walter) Britton	pinnate tansy-mustard	N
Hirschfeldia incana (L.) Lagr.-Fossat	short-pod mustard	I
Sisymbrium irio L.	London rocket	I
CACTACEAE	**CACTUS FAMILY**	
**Cylindropuntia californica* (Torr. & A. Gray) F.M. Knuth var. *californica*	snake cholla	N
Cylindropuntia [=*Opuntia*] *prolifera* (Engelm.) F.M. Knuth	coastal cholla	N
**Ferocactus viridescens* (Torr. & A. Gray) Britton & Rose	San Diego barrel cactus	N
Mammillaria dioica K. Brandegee	fish-hook cactus	N
Opuntia littoralis (Engelm.) Cockerell.	shore cactus	N
Opuntia oricola Philbrick	chaparral prickly-pear	N
CARYOPHYLLACEAE	**PINK FAMILY**	
Silene antirrhina L.	sleepy catchfly	N
CHENOPODIACEAE	**GOOSEFOOT FAMILY**	
Atriplex canescens (Pursh) Nutt.	fourwing saltbush, shad-scale	N
**Atriplex pacifica* A. Nelson	south coast saltbush	N
Chenopodium album L.	lamb's quarters, pigweed	I
Chenopodium murale L.	nettle-leaved goosefoot	I
Salsola tragus L.	Russian thistle, tumbleweed	I
CLEOMACEAE	**SPIDERFLOWER FAMILY**	
Peritoma [=*Isomeris*] *arborea* Nutt.	bladderpod	N
CONVOLVULACEAE	**MORNING-GLORY FAMILY**	
Calystegia macrostegia (Greene) Brummitt	morning-glory	N
Croton [=*Eremocarpus*] *setiger* Hook.	dove weed	N
CRASSULACEAE	**STONECROP FAMILY**	
Crassula connata (Ruiz & Pav.) A. Berger	pygmy-weed	N
Dudleya edulis (Nutt.) Moran	lady fingers	N
Dudleya pulverulenta (Nutt.) Britton & Rose	chalk lettuce, chalk dudleya	N
CUCURBITACEAE	**GOURD FAMILY**	
Marah macrocarpus (Greene) Greene	wild cucumber	N
EUPHORBIACEAE	**SPURGE FAMILY**	
Chamaesyce micromera (Boiss.) Wooton & Standl.	prostrate spurge	N
Chamaesyce polycarpa (Benth.) Millsp.	spurge	N
Stillingia linearifolia S. Watson	Narrow-leaved stillingia	N

ATTACHMENT 2
PLANT SPECIES OBSERVED AT SHRUB CUT PATCHES
(Continued)

Scientific Name	Common Name	Origin
FABACEAE (LEGUMINOSAE)	**LEGUME FAMILY**	
Acmispon glaber (Vogel) Brouillet [=*Lotus scoparius*]	deerweed	N
Acmispon maritimus (Torr. & A. Gray) D.D. Sokoloff [=*Lotus salsuginosus*]	Coastal bird's-foot trefoil	N
Acmispon micranthus (Torr. & A. Gray) Brouillet [=*Lotus hamatus*]	grab lotus	N
Acmispon strigosus (Nutt.) Brouillet [=*Lotus strigosus*]	bishop's/strigose lotus	N
Astragalus trichopodus (Nutt.) A. Gray var. *lonchus* (M.E. Jones) Barneby	coast locoweed	N
Lupinus bicolor Lindl.	miniature lupine	N
Medicago polymorpha L.	California bur clover	I
Melilotus indicus (L.) All.	sourclover	I
GENTIANACEAE	**GENTIAN FAMILY**	
Zeltnera [=*Centaurium*] *venusta* (A. Gray) G. Mans.	canchalagua	N
GERANIACEAE	**GERANIUM FAMILY**	
Erodium cicutarium (L.) L'Hér. ex Aiton	red stemmed filaree	I
LAMIACEAE	**MINT FAMILY**	
Marrubium vulgare L.	horehound	I
Salvia columbariae Benth.	chia	N
MYRSINACEAE		
Anagallis arvensis L.	scarlet pimpernel, poor-man's weatherglass	I
NYCTAGINACEAE	**FOUR O'CLOCK FAMILY**	
Mirabilis laevis [=*californica*] (Benth.) Curran var. *crassifolia* (Choisy) Spellenb.	wishbone bush	N
ONAGRACEAE	**EVENING-PRIMROSE FAMILY**	
Camissoniopsis [=*Camissonia*] *bistorta* (Torr. & A. Gray) P.H. Raven	California sun cup	N
Eulobus californicus [=*Camissonia californica*] (Torr.& A. Gray) P.H. Raven	false-mustard	N
PHRYMACEAE [=SCROPHULARIACEAE]	**HOPSEED FAMILY**	
Mimulus aurantiacus Curtis	bush monkey-flower	N
Mimulus brevipes Benth.	hillside monkey-flower	N
Mimulus guttatus DC.	common monkey-flower	N
PLANTAGINACEAE	**PLANTAIN FAMILY**	
Antirrhinum nuttallianum Benth. ex A. DC.	Nuttall snapdragon	N
POLEMONIACEAE	**PHLOX FAMILY**	
Eriastrum sapphirinum (Eastw.) H. Mason.	sapphire woolly-star	N
Navarretia hamata Greene	hooked navarretia	N
POLYGONACEAE	**BUCKWHEAT FAMILY**	
Chorizanthe procumbens Nutt.	prostrate spineflower	N
**Chorizanthe polygonoides* Torr. & A. Gray var. *longispina* (Goodman) Munz	knotweed spineflower	N
Eriogonum fasciculatum Benth.	California buckwheat	N

ATTACHMENT 2
PLANT SPECIES OBSERVED AT SHRUB CUT PATCHES
(Continued)

Scientific Name	Common Name	Origin
Pterostegia drymarioides Fisch. & C.A. Mey.	California thread-stem	N
RANUNCULACEAE	**BUTTERCUP FAMILY**	
Clematis pauciflora Nutt.	ropevine	N
RESEDACEAE	**MIGNONETTE FAMILY**	
Oligomeris linifolia (Vahl ex Hornem.) J.F. Macbr.	narrowleaf oligomeris	N
RUBIACEAE	**MADDER OR COFFEE FAMILY**	
Galium aparine L.	goose grass, stickywilly	N
SIMMONDSIACEAE	**JOJOBA FAMILY**	
Simmondsia chinensis (Link) C.K. Schneid.	jojoba, goat nut	N
SOLANACEAE	**NIGHTSHADE FAMILY**	
**Lycium californicum* Nutt.	California box-thorn, California lycium	N
Nicotiana clevelandii A. Gray	Cleveland tobacco	N
Nicotiana glauca Graham	tree tobacco	I
Physalis crassifolia Benth.	Greene's ground cherry	N
Solanum americanum Mill.	white nightshade	N
THEMIDACEAE	**BRODIAEA FAMILY**	
Dichelostemma capitatum (Benth.) A.W. Wood	blue dicks	N
URTICACEAE	**NETTLE FAMILY**	
Parietaria hespera Hinton var. *californica* Hinton	California pellitory	N
Urtica urens L.	dwarf nettle	I

Nomenclature from: University of California 2012; Brenzel 2001; Rebman and Simpson 2006; U.S. Department of Agriculture 2008.

ORIGIN
N = Native to locality
I = Introduced species from outside locality

* = Sensitive plant species

ATTACHMENT 3

ATTACHMENT 3
PLANT SPECIES OBSERVED AT DETHATCH PATCHES

Scientific Name	Common Name	Origin
ANGIOSPERMS: MONOCOTS		
AGAVACEAE	**AGAVE FAMILY**	
Yucca schidigera Ortgies	Mohave yucca	N
ASPHODELACEAE	**ASPHODEL FAMILY**	
Asphodelus fistulosus L.	hollow-stem asphodel	I
POACEAE (GRAMINEAE)	**GRASS FAMILY**	
Bromus madritensis L. ssp. *rubens* (L.) Husnot	red brome	I
Schismus barbatus (L.) Thell.	Mediterranean schismus	I
ANGIOSPERMS: DICOTS		
ANACARDIACEAE	**SUMAC OR CASHEW FAMILY**	
Malosma laurina Nutt. ex Abrams	laurel sumac	N
Rhus integrifolia (Nutt.) Benth. & Hook. f. ex Rothr.	lemonadeberry	N
APIACEAE (UMBELLIFERAE)	**CARROT FAMILY**	
Apiastrum angustifolium Nutt.	wild-celery	N
Foeniculum vulgare Mill.	fennel	I
ASTERACEAE	**SUNFLOWER FAMILY**	
Artemisia californica Less.	California sagebrush	N
Baccharis pilularis DC.	coyote brush	N
Centaurea melitensis L.	tocalote, Maltese star-thistle	I
Encelia californica Nutt.	common encelia	N
Glebionis coronaria (L.) Spach [=*Chrysanthemum coronarium*]	garland, crown daisy	I
**Isocoma menziesii* (Hook. & Arn.) G.L. Nesom var. *decumbens* (Greene) G.L. Nesom	decumbent goldenbush	N
Laennecia [=*Conyza*] *coulteri* A. Gray	fleabane	N
Pseudognaphalium biolettii Anderb.	bicolor cudweed	N
Pseudognaphalium californicum (DC.) Anderb.	green everlasting	N
Pseudognaphalium canescens [=*Gnaphalium canescens* ssp. *canescens*] (DC.) Anderb.	everlasting cudweed	N
Sonchus asper (L.) Hill ssp. *asper*	prickly sow thistle	I
BORAGINACEAE	**BORAGE FAMILY**	
Amsinckia menziesii (Lehm.) A. Nelson & J.F. Macbr.	rancher's fireweed	N
Cryptantha intermedia (A. Gray) Greene	nievitas cryptantha	N
Heliotropium curassavicum L.	Chinese pusley	N

ATTACHMENT 3
PLANT SPECIES OBSERVED AT DETHATCH PATCHES
(Continued)

Scientific Name	Common Name	Origin
BRASSICACEAE (CRUCIFERAE)	**MUSTARD FAMILY**	
Brassica nigra (L.) W.D.J. Koch	black mustard	I
Hirschfeldia incana (L.) Lagr.-Fossat	short-pod mustard	I
CACTACEAE	**CACTUS FAMILY**	
Cylindropuntia [=*Opuntia*] *prolifera* (Engelm.) F.M. Knuth	coastal cholla	N
Mammillaria dioica K. Brandegee	fish-hook cactus	N
Opuntia littoralis (Engelm.) Cockerell.	shore cactus	N
CHENOPODIACEAE	**GOOSEFOOT FAMILY**	
Chenopodium album L.	lamb's quarters, pigweed	I
Salsola tragus L.	Russian thistle, tumbleweed	I
CLEOMACEAE	**SPIDERFLOWER FAMILY**	
Peritoma [=*Isomeris*] *arborea* Nutt.	bladderpod	N
CRASSULACEAE	**STONECROP FAMILY**	
Crassula connata (Ruiz & Pav.) A. Berger	pygmy-weed	N
EUPHORBIACEAE	**SPURGE FAMILY**	
Chamaesyce maculata (L.) Small	spotted spurge	I
Chamaesyce micromera (Boiss.) Wooton & Standl.	prostrate spurge	N
Chamaesyce polycarpa (Benth.) Millsp.	spurge	N
FABACEAE (LEGUMINOSAE)	**LEGUME FAMILY**	
Astragalus trichopodus (Nutt.) A. Gray	coast locoweed	N
Melilotus indicus (L.) All.	sourclover	I
GERANIACEAE	**GERANIUM FAMILY**	
Erodium cicutarium (L.) L'Hér. ex Aiton	red stemmed filaree	I
Erodium moschatum (L.) L'Hér. ex Aiton	white stemmed filaree	I
LAMIACEAE	**MINT FAMILY**	
Marrubium vulgare L.	horehound	I
MALVACEAE	**MALLOW FAMILY**	
Malva parviflora L.	cheeseweed, little mallow	I
MONTIACEAE	**MONTIA FAMILY**	
Calandrinia ciliata (Ruiz & Pav.) DC.	red maids	N
MYRSINACEAE		
Anagallis arvensis L.	scarlet pimpernel, poor-man's weatherglass	I
ONAGRACEAE	**EVENING-PRIMROSE FAMILY**	
Camissoniopsis [=*Camissonia*] *bistorta* (Torr. & A. Gray) P.H. Raven	California sun cup	N

ATTACHMENT 3
PLANT SPECIES OBSERVED AT DETHATCH PATCHES
(Continued)

Scientific Name	Common Name	Origin
POLYGONACEAE	**BUCKWHEAT FAMILY**	
Emex spinosa (L.) Campd.	Spiny three-corner Jack	I
RUBIACEAE	**MADDER OR COFFEE FAMILY**	
Galium aparine L.	goose grass, stickywilly	N
SIMMONDSIACEAE	**JOJOBA FAMILY**	
Simmondsia chinensis (Link) C.K. Schneid.	jojoba, goat nut	N
SOLANACEAE	**NIGHTSHADE FAMILY**	
Datura wrightii Regel	Jimson weed, thorn-apple, tolguacha	N
Nicotiana clevelandii A. Gray	Cleveland tobacco	N
Nicotiana glauca Graham	tree tobacco	I
URTICACEAE	**NETTLE FAMILY**	
Parietaria hespera Hinton var. *californica* Hinton	California pellitory	N

Nomenclature from: University of California 2012; Brenzel 2001; Rebman and Simpson 2006; U.S. Department of Agriculture 2008.

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N = Native to locality
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