

1927 Fifth Avenue  
San Diego, CA 92101-2357  
P 619.308.9333 F 619.308.9334  
www.recon-us.com

525 W. Wetmore Rd., Suite 111  
Tucson, AZ 85705  
P 520.325.9977 F 520.293.3051

1412 W. 6th 1/2 Street  
Austin, TX 78703-5150  
P 512.913.1200 F 512.474.1184



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May 16, 2011

Mr. Glen Laube  
City of Chula Vista  
Planning and Building Department  
276 Fourth Avenue, MS P-101  
Chula Vista, CA 91910

Reference: Year 1 Annual Report for the Chula Vista Cactus Wren Habitat Restoration and Enhancement Program (SANDAG Grant Number 5001130; RECON Number 5296)

## **Introduction**

This first annual report provides background information and summarizes the tasks performed during the first year (August 2009 to August 2010) 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. The information from these reports is summarized below for tasks completed between August 2009 and the end of May 2010. This annual report summarizes the results of the relevé vegetation data that was collected in May 2010 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 (Figure 1), east of Interstate 805, south of State Route 54 and Bonita Road, and north of Otay Lakes Road. 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 (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).

## **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 several years, 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). Populations of coastal cactus wrens have also declined in Preserve areas not yet affected by wildfires, including Salt Creek, Otay River Valley, and the Central City Preserve in Chula Vista. This recent trend of cactus wren population decline has been observed in other regions of southern California as well. 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 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 (*Poliophtila 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.

### **Year 1 Tasks Performed August–November 2009**

Tasks performed during the August–November 2009 period include:

- Establishing bird point counts to serve as a baseline for detecting changes in coastal cactus wren populations that result from the restoration and enhancement program.
- Coordination with City of Chula Vista staff and other cactus wren project managers regarding restoration and enhancement methods.
- Establishing permanent photo points to document changes in the vegetation.
- Implementing the site preparation program.

We describe these tasks in more detail below.

#### **Bird Point Count Methods**

Implementation of the coastal cactus wren restoration and enhancement program began in August 2009. To prepare for field surveys, initial tasks included preparation of project field maps for use during the selection of point count locations and for selecting sites for shrub thinning and weeding activities. During the month of August 2009, prior to shrub thinning and dethatching, 25 bird point count locations were established for the censusing of coastal cactus wrens and other bird populations in the vicinity of the vegetation thinning areas located in Rice Canyon and adjacent Preserve open space. Point count locations were recorded using a handheld global positioning system (GPS) unit so that the points can be relocated for repeat surveys. Point count surveys were conducted by RECON biologists Erin McKinney and Beth Procsal during the week of August 10. RECON biologists surveyed for 10 minutes at each point location, recording birds that were detected and identified either visually or by call.

Two coastal cactus wrens were observed in Rice Canyon at the same point location, but no other individuals were detected during the point count surveys. Another sensitive bird species, coastal California gnatcatcher, was observed at eight point locations.

### **Restoration Planning and Coordination**

During the week of August 17, RECON senior biologist Mark Dodero and RECON field crew directors visited each of the proposed restoration sites to discuss the logistics and restoration methods to be used during the implementation of the vegetation-thinning program.

In coordination with City staff, a PowerPoint presentation was prepared for use during the San Diego Association of Governments cactus wren project managers meeting held at the County of San Diego office on September 9, 2009. Each project manager provided an overview of their project location and the issues associated with their restoration site. The project managers group also discussed general restoration and enhancement methods that were to be used.

During the week of September 14, RECON biologists met in the field with the City of Chula Vista open space staff and City project manager Glen Laube to discuss the logistics of the restoration program. That same week, RECON biologists Mark Dodero and Anna Bennett began marking shrubs for removal at each restoration site prior to the field crews beginning work. Using a GPS unit, 32 permanent photo point locations were selected and recorded.

### **Site Preparation Dethatching and Shrub Removal**

RECON field crews began the vegetation-thinning program the week of September 21 under the supervision of RECON biologists. Chainsaws, loppers, and machetes were used to cut branches of shrubs selected for removal. Shrubs were removed to reduce direct competition with coast cholla (*Cylindropuntia prolifera*) for light and water, and also to reduce the risk of catastrophic fire. The openings created by the thinning program will also increase potential open ground foraging areas for the coastal cactus wren.

The shrubs selected for thinning were primarily lemonadeberry and jojoba (*Simmondsia chinensis*). California sagebrush (*Artemisia californica*) were occasionally removed as well when they were deemed to present a potential fire risk to the cholla patches, as determined by the project biologist. Vegetation (i.e. cut branches) generated by the thinning program were carried downslope in large burlap bundles from the open space to the access road in Rice Canyon. The cut vegetation was then placed into green waste dumpsters for removal from the site.

The vegetation thinning and removal program continued through October 16, and shrubs were removed around approximately 45 nesting sized cholla patches in Rice Canyon and adjacent canyons. The total acreage of vegetation removed was approximately 4.12 acres. Dethatching of weed-dominated areas was also performed during the week of October 12. Approximately 2.5 acres of weeds at 20 different sites were cut using weed whips. The cut material was raked into piles and removed from the site. The approximate locations of the vegetation thinning and weeding areas are shown in Figure 4.

### **Year 1 Tasks Performed December 2009–February 2010**

Tasks performed from December 2009 through February 2010 included continued implementation of the site preparation program, planting of cactus cuttings to enlarge cholla patches, and maintenance to control non-native weeds. These tasks are described in more detail below.

#### **Site Preparation – Shrub Removal**

RECON field crews continued the vegetation-thinning program in December and January under the supervision of RECON biologists. During December and January, an additional 1.63 acres of

shrubs were cleared around seven cholla patches. These shrub-thinning areas included several large stands of cholla in Rice Canyon (see Figure 4). Through February 2010, the total acreage of vegetation removed adjacent to cholla stands was approximately 5.75 acres.

### **Weed Control**

After winter rains had germinated weed seeds, glyphosate was used to control non-native annuals in dethatch and shrub thinning areas and in locations that were immediately adjacent to these sites. Non-native species that were controlled included primarily annual grasses such as wild oat (*Avena* spp), black mustard (*Brassica nigra*), crown daisy (*Chrysanthemum coronarium*), and filaree (*Erodium* spp.). Herbicide was applied by licensed applicators

### **Cactus Planting**

Cactus planting began in early December 2009. Cholla cuttings were taken from existing cholla patches and were distributed in previously weeded areas or adjacent to existing cholla stands to enlarge the patch size. Cholla segments were either placed horizontally in contact with the soil surface or a small hole was excavated and the base of the cutting was placed in the soil. In areas where weeds were cut and no nesting sized cholla were present, larger cholla stems were planted. These larger stems, approximately two to three feet tall, were planted to encourage wrens to nest in those areas.

## **Year 1 Tasks Performed March 2010 through May 2010**

Tasks performed from March 2010 through May 2010 included continued implementation of the site preparation program, including spraying of cut shrubs to prevent regrowth and to control non-native weeds. In addition, monitoring tasks included repeating the bird point counts and completing relevé vegetation sampling. These tasks are described in more detail below.

### **Site Preparation – Shrub Spraying**

Prior to the start of the bird breeding season, native shrubs were removed to reduce direct competition with coast cholla for light and water and to decrease the risk of catastrophic fire killing the cholla. The openings created by the thinning program also increased potential open ground foraging areas for the coastal cactus wren. RECON field crews continued the vegetation control program through the spring under the supervision of RECON biologists. Native shrubs that had been previously cut and showed signs of regrowth were sprayed with herbicide.

### **Weed Control**

Glyphosate-based herbicide was used to control non-native annuals in dethatch and shrub thinning areas and in locations that were immediately adjacent to these sites. Herbicide was applied by licensed applicators. Late seasonal rains continued into April, which caused additional weeds to germinate, requiring additional spraying efforts. The non-native species that were controlled included annual grasses such as wild oat and Mediterranean grass (*Schismus barbatus*), as well as other weeds including black mustard, tocolote (*Centaurea melitensis*), crown daisy, and filaree.

### **Cactus and other Native Plant Growth**

Near normal rainfall in 2009–2010 was conducive for the cactus cuttings planted in the fall and winter to root and begin growth. Existing cholla patches in shrub treatment areas also exhibited new growth as well. In some dethatch areas, cholla plants that had appeared to be dead prior to the implementation of weed control efforts began to show new growth. With continued weed control efforts, it is anticipated that these plants will recover. Over time, these areas will fill in with dense cholla growth that will benefit the coastal cactus wren by providing additional nesting areas.

Shrub clearing areas supported populations of annual natives such as cryptantha (*Cryptantha* sp.), Indian tobacco (*Nicotiana* sp.) and Nuttall's snapdragon (*Antirrhinum nuttallianum*) (Photographs 1-3). Perennial subshrubs such as wishbone plant (*Mirabilis laevis* var. *crassifolia*) grew well in recently opened areas (Photograph 4). These species acted like fire-following annuals that germinate and grow for the first few years after a fire moves through. Sensitive plant species that benefited from the shrub thinning includes coast barrel cactus (*Ferocactus viridescens*) and snake cholla (*Cylindropuntia californica*) both MSCP covered species (Photographs 5-6).

### **Vegetation and Bird Point Count Monitoring**

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 species estimated. A total of 26 vegetation treatment areas were sampled by RECON biologists Anna Bennett and Beth Proscal. Twenty of the vegetation study plots were located at shrub thinning sites, and five were located at weed dethatching areas. The results of the vegetation sampling efforts are presented below in the Results section.

Repeat bird point counts were conducted by RECON biologists Beth Proscal and Erin McKinney at 26 stations. Originally, 25 point-count locations were established in the fall of 2009. One additional point-count location was added this spring at a new vegetation treatment area. Also, six of the point locations needed to be adjusted in the field to correspond to the as-built shrub and dethatch treatment sites. Bird species were observed and recorded during a 10-minute period at each point location. The bird point counts originally sampled in August 2009 were repeated in May 2010 after areas were shrubs and weeds had been cleared. The results of the bird point count data are summarized below in the Results section.

### **Year 1 Tasks Performed June 2010 through August 2010**

#### **Maintenance**

RECON biologists monitored the RECON crews during maintenance activities. Remains of late season weeds that had been previously sprayed were removed as necessary and composted on-site. Vegetation thinning areas were revisited, and cut shrubs that were resprouting and smaller shrub seedlings were sprayed with herbicide to prevent them from regrowing. In thinning areas, the primary resprouting shrubs included jojoba and lemonadeberry. This spray program will reduce the long-term vegetation maintenance around nesting sized cactus patches.

#### **Monitoring and Reporting**

Organization, review, and data entry for vegetation relevé data was completed. A handout was prepared for the annual cactus wren grant summary meeting that was held in September 2010. The handout included a summary text description and photos for presentation at the annual meeting held at the County of San Diego offices. In addition to preparation of the handout, the third quarterly summary report was also prepared that included photos, figures, and a description of the work completed from March through May 2010.

### **Year 1 Vegetation Sampling Results**

Table 1 lists the species observed at the shrub thinning areas in and around Rice Canyon. Table 2 lists the species observed at the weed dethatch areas in and around Rice Canyon.

#### **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%

- Cholla between 1 and 3 feet in height: 13%
- Cholla over 3 feet in height: 77%
- Average total cover (shrub and herbaceous): 26%
- Average bare ground: 74%
- Average total cover of cholla: 14%
- Average percent cholla cover out of the total cover: 67%
- A total of 97 species were recorded at the shrub thinning locations: 76 native species and 21 non-native species
- Average non-native cover: 3.2%
- Average non-native cover out of the total cover: 8%

**The following results are from the five relevé dethatch locations:**

- Average cholla height at the weed dethatch locations:
  - Cholla less than 1 foot: 93%
  - Cholla between 1 and 3 feet in height: 4%
  - Cholla over 3 feet in height: 5%
- Average total cover (shrub & herbaceous): 5%
- Average bare ground: 95%
- Average total cover of cholla: 3%
- Average % cholla cover out of total cover: 50%
- A total of 35 species were recorded in the dethatch areas: 21 native and 14 non-native species
- Average total non-native cover: 0.77%
- Average non-native cover out of total cover: 28%

**Year 1 Bird Point Count Results**

In August 2009, 16 species of birds were detected during the point count monitoring compared to 13 species during the May 2010 point counts. No cactus wrens were detected during the May 2010 point counts, although on more than one occasion during the spring of 2010, a cactus wren was incidentally heard calling from the same general locations where the birds were detected in August 2009.

Coastal California gnatcatchers were detected at two point locations in May 2010, compared to eight in August 2009. Based on previous research of seasonal changes in gnatcatcher vocalizations, the birds are often less vocal from April to June, primarily during the egg-laying,

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incubation, and nestling phases (Preston K.L., M.A. Grishaver, and P.J. Mock 1998). This may account for fewer observations of coastal California gnatcatchers during the May 2010 surveys.

The following species of birds were the ten most commonly observed (in descending order) during the August 2009 point counts:

Anna's hummingbird (*Calypte anna*)  
House finch (*Carpodacus mexicanus frontalis*)  
California towhee (*Pipilo crissalis*)  
Bushtit (*Psaltriparus minimus minimus*)  
California quail (*Callipepla californica californica*)  
Bewick's wren (*Thryomanes bewickii*)  
Wrentit (*Chamaea fasciata henshawi*)  
Lesser goldfinch (*Carduelis psaltria hesperophilus*)  
Coastal California gnatcatcher  
California thrasher (*Toxostoma redivivum redivivum*)

The following species of birds were the ten most commonly observed (in descending order) during the May 2010 point counts:

House finch  
California towhee  
Wrentit  
Northern mockingbird (*Mimus polyglottos polyglottos*)  
Anna's hummingbird  
Lesser goldfinch  
Mourning dove (*Zenaida macroura marginella*)  
Bewick's wren  
Coastal California gnatcatcher  
California quail

## Discussion

Through the end of February 2010, a total of approximately 5.75 acres of shrubs were thinned around existing cholla patches. Approximately 2.48 acres of dried weedy areas were dethatched using weed whips. Cholla cuttings were planted in all of the dethatch 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.

Photographs 7A-B and 9A-B are paired photos that show changes to dethatch and shrub thinning locations over time.

As expected shrub thinning locations had significantly more native annual cover from species such as cryptantha, Indian tobacco, and Nuttall's snapdragon than the dethatch sites that were dominated by weeds prior to implementation. Seeds of these native annual species will be collected in 2011 and redistributed to increase cover in dethatch areas formerly dominated by weeds such as black mustard.

As expected, the average cholla height was higher (over three feet) in the shrub thinning areas compared to the newly planted dethatch areas, where the cholla height average was less than one foot. Based on the observed growth of the cholla cuttings during the first season, over time we anticipate that the cholla will continue to increase in size and density, and annual native cover will increase as seeds are dispersed into dethatch areas after the second season of weed treatment.

We are encouraged by the rapid growth of cholla and prickly pear cuttings that have been planted in the first year. The ongoing maintenance program will continue to reduce non-native species cover and competition with native plants such as coast cholla.

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**Future Restoration and Enhancement Tasks**

Weeds will be controlled each season as needed to prevent seed set. Additional cholla cuttings will be planted as needed in areas that need more cactus cover. Native annual seed will be collected and redistributed in dethatch areas that have little native annual cover. Vegetation sampling and bird point counts will be repeated in the spring of 2011.

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

Sincerely,



Mark Dodero  
Senior Biologist

MWD:sjg

Enclosure(s)

**References Cited**

Preston K.L., M.A. Grishaver, and P.J. Mock  
1998 California Gnatcatcher vocalization behavior. *Western Birds* 29: 258-268.

Sensitive  
Of note

TABLE 1  
PLANT SPECIES OBSERVED AT RICE CANYON CUT SHRUB PATCHES

Scientific Name	Common Name	Origin
<b>LYCOPODS</b>		
<b>SELAGINELLACEAE</b>		
<i>Selaginella cinerascens</i> A.A. Eaton	<b>SPIKE-MOSS FAMILY</b> ashy spike-moss	N
<b>PTERIDACEAE</b>		
<i>Pentagramma triangularis</i> (Kaulf.) Yatsk. Windham & E. Wollenw.	<b>BRAKE FAMILY</b> silverback fern	N
<b>ANGIOSPERMS: DICOTS</b>		
<b>AMARANTHACEAE</b>		
<i>Atriplex canescens</i> (Pursh) Nutt.	<b>AMARANTH FAMILY</b> fourwing saltbush, shad-scale	N
<i>Chenopodium album</i> L.	lamb's quarters, pigweed	I
<i>Dysphania</i> [=Chenopodium] <i>ambrosioides</i> (L.) Mosyakin & Clemants	Mexican tea	I
<i>Salsola tragus</i> L.	Russian thistle, tumbleweed	I
<b>ANACARDIACEAE</b>		
<i>Rhus integrifolia</i> (Nutt.) Benth. & Hook. f. ex Rothr.	<b>SUMAC OR CASHEW FAMILY</b> lemonadeberry	N
<b>APIACEAE (UMBELLIFERAE)</b>		
<i>Apiastrum angustifolium</i> Nutt.	<b>CARROT FAMILY</b> wild-celery	N
<i>Daucus pusillus</i> Michx.	rattlesnake weed	N
<b>ASTERACEAE</b>		
<i>Artemisia californica</i> Less.	<b>SUNFLOWER FAMILY</b> California sagebrush	N
<i>Baccharis pilularis</i> DC.	coyote brush	N
<i>Bahiopsis</i> [= <i>Viguiera</i> ] <i>laciniata</i> (A. Gray) E.E. Schilling & Panero	San Diego County viguiera	N
<i>Centaurea melitensis</i> L.	tocolote, star-thistle	I
<i>Chaenactis glabriuscula</i> DC.	yellow pincushion	N
<i>Conyza canadensis</i> (L.) Cronquist	horseweed	N
<i>Cotula australis</i> (Sieber ex Spreng.) Hook. f.	Australian brass-buttons	I
<i>Deinandra</i> [= <i>Hemizonia</i> ] <i>fasciculata</i> (DC.) Greene	golden tarplant	N
<i>Encelia californica</i> Nutt.	common encelia	N
<i>Glebionis coronaria</i> (L.) Spach [= <i>Chrysanthemum coronarium</i> ]	garland, crown daisy	I
<i>Gnaphalium bicolor</i> Bioletti	bicolored cudweed	N
<i>Gnaphalium californicum</i> DC.	green everlasting	N
<i>Helianthus annuus</i> L.	common sunflower	N
<i>Helminthotheca</i> [= <i>Picris</i> ] <i>echioides</i> (L.) Holub	bristly ox-tongue	I

TABLE 1  
 PLANT SPECIES OBSERVED AT RICE CANYON CUT SHRUB PATCHES  
 (continued)

Scientific Name	Common Name	Origin
<i>Heterotheca grandiflora</i> Nutt.	telegraph weed	N
<i>Lactuca serriola</i> L.	prickly lettuce	I
<i>Pseudognaphalium beneolens</i> [= <i>Gnaphalium canescens</i> ssp. <i>beneolens</i> ] (Davidson) Anderb.	fragrant everlasting	N
<i>Rafinesquia californica</i> Nutt.	California chicory	N
<i>Sonchus asper</i> (L.) Hill ssp. <i>asper</i>	prickly sow thistle	I
<i>Sonchus oleraceus</i> L.	common sow thistle	I
<i>Stephanomeria</i> sp.	stephanomeria	N
<i>Stylocline gnaphaloides</i> Nutt.	everlasting nest straw	N
<b>BORAGINACEAE</b>	<b>BORAGE FAMILY</b>	
<i>Amsinckia</i> sp.	fiddleneck	N
<i>Cryptantha</i> sp.	cryptantha	N
<i>Emmenanthe penduliflora</i> Benth.	whispering bells	N
<i>Eucrypta chrysanthemifolia</i> (Benth.) Greene	eucrypta	N
<i>Phacelia</i> sp.	phacelia	N
<i>Phacelia cicutaria</i> Greene var. <i>hispidata</i> (A. Gray) J.T. Howell	caterpillar phacelia	N
<i>Pholistoma racemosum</i> (Nutt. ex A. Gray) Constance	pholistoma	N
<b>BRASSICACEAE (CRUCIFERAE)</b>	<b>MUSTARD FAMILY</b>	
<i>Deschurainia pinnata</i> (Walter) Britton	tansy-mustard	N
<i>Hirschfeldia incana</i> (L.) Lagr.-Fossat	short-pod mustard	I
<i>Isomeris arborea</i> Nutt.	bladderpod	N
<i>Lepidium</i> sp.	peppergrass	N/I
<i>Sisymbrium irio</i> L.	London rocket	I
<b>CACTACEAE</b>	<b>CACTUS FAMILY</b>	
<i>Cylindropuntia californica</i> [= <i>Opuntia parryi</i> ] (Torr. & A. Gray) F.M. Knuth	snake cholla	N
<i>Cylindropuntia</i> [= <i>Opuntia</i> ] <i>prolifera</i> (Engelm.) F.M. Knuth	coastal cholla	N
<i>Ferocactus viridescens</i> (Torr. & A. Gray) Britton & Rose	San Diego barrel cactus	N
<i>Mammillaria dioica</i> K. Brandegee	fish-hook cactus	N
<i>Opuntia littoralis</i> (Engelm.) Cockerell.	shore cactus	N
<i>Opuntia oricola</i> Philbr.	chaparral prickly-pear	N
<b>CONVOLVULACEAE</b>	<b>MORNING-GLORY FAMILY</b>	
<i>Calystegia macrostegia</i> (Greene) Brummitt	morning-glory	N

TABLE 1  
 PLANT SPECIES OBSERVED AT RICE CANYON CUT SHRUB PATCHES  
 (continued)

Scientific Name	Common Name	Origin
<b>CRASSULACEAE</b>	<b>STONECROP FAMILY</b>	
<i>Crassula connata</i> (Ruiz & Pav.) A. Berger	pygmy-weed	N
<i>Dudleya edulis</i> (Nutt.) Moran	lady fingers	N
<i>Dudleya pulverulenta</i> (Nutt.) Britton & Rose	chalk lettuce, chalk dudleya	N
<b>CUCURBITACEAE</b>	<b>GOURD FAMILY</b>	
<i>Marah macrocarpus</i> (Greene) Greene	wild cucumber	N
<b>EUPHORBIACEAE</b>	<b>SPURGE FAMILY</b>	
<i>Chamaesyce</i> sp.	spurge	N/I
<i>Stillingia linearifolia</i> S. Watson	linear-leaf stillingia	N
<b>FABACEAE (LEGUMINOSAE)</b>	<b>LEGUME FAMILY</b>	
<i>Astragalus trichopodus</i> (Nutt.) A. Gray var. <i>lonchus</i> (M.E. Jones) Barneby	coast locoweed	N
<i>Lotus strigosus</i> (Nutt.) Greene	Bishop's lotus	N
<i>Melilotus indicus</i> (L.) All.	sourclover	I
<b>GENTIANACEAE</b>	<b>GENTIAN FAMILY</b>	
<i>Zeltnera</i> [= <i>Centaurium</i> ] <i>venusta</i> (A. Gray) G. Mans.	canchalagua	N
<b>GERANIACEAE</b>	<b>GERANIUM FAMILY</b>	
<i>Erodium botrys</i> (Cav.) Bertol.	long-beak filaree	I
<i>Erodium cicutarium</i> (L.) L'Hér. ex Aiton	red stemmed filaree	I
<b>LAMIACEAE</b>	<b>MINT FAMILY</b>	
<i>Marrubium vulgare</i> L.	horehound	I
<i>Salvia columbariae</i> Benth.	chia	N
<b>MALVACEAE</b>	<b>MALLOW FAMILY</b>	
<i>Malacothamnus</i> sp.	chaparral mallow	N
<b>MYRSINACEAE</b>		
<i>Anagallis arvensis</i> L.	scarlet pimpernel, poor-man's weatherglass	I
<b>NYCTAGINACEAE</b>	<b>FOUR O'CLOCK FAMILY</b>	
<i>Mirabilis laevis</i> [= <i>californica</i> ] (Benth.) Curran var. <i>crassifolia</i> (Choisy) Spellenb.	wishbone bush	N
<b>ONAGRACEAE</b>	<b>EVENING-PRIMROSE FAMILY</b>	
<i>Camissonia bistorta</i> (Torr. & A. Gray) P.H. Raven	California sun cup	N
<i>Camissonia californica</i> (Torr. & A. Gray) P.H. Raven	false-mustard	N

TABLE 1  
 PLANT SPECIES OBSERVED AT RICE CANYON CUT SHRUB PATCHES  
 (continued)

Scientific Name	Common Name	Origin
<b>PHRYMACEAE [=SCROPHULARIACEAE]</b>		
<i>Mimulus aurantiacus</i> Curtis	<b>HOPSEED FAMILY</b> low bush monkey-flower	N
<i>Mimulus brevipetes</i> Benth.	hillside monkey-flower	N
<b>PLANTAGINACEAE</b>		
<i>Antirrhinum nuttallianum</i> Benth. ex A. DC.	<b>PLANTAIN FAMILY</b> Nuttall snapdragon	N
<b>POLEMONIACEAE</b>		
<i>Eriastrum saphirinum</i> (Eastw.) H. Mason. <i>Navarretia hamata</i> Greene	<b>PHLOX FAMILY</b> sapphire woolly-star hooked navarretia	N N
<b>POLYGONACEAE</b>		
<i>Chorizanthe polygonoides</i> Torr. & A. Gray var. <i>longispina</i> (Goodman) Munz	<b>BUCKWHEAT FAMILY</b> knotweed spineflower	N
<i>Chorizanthe procumbens</i> Nutt.	prostrate spineflower	N
<i>Eriogonum fasciculatum</i> Benth.	California buckwheat	N
<i>Pterostegia drymarioides</i> Fisch. & C.A. Mey.	California thread-stem	N
<b>RANUNCULACEAE</b>		
<i>Clematis pauciflora</i> Nutt.	<b>BUTTERCUP FAMILY</b> ropevine	N
<b>RESEDACEAE</b>		
<i>Oligomeris linifolia</i> (Vahl ex Hornem.) J.F. Macbr.	<b>MIGNONETTE FAMILY</b> narrowleaf oligomeris	N
<b>SIMMONDSIACEAE</b>		
<i>Simmondsia chinensis</i> (Link) C.K. Schneid.	<b>JOJOBA FAMILY</b> jojoba, goat nut	N
<b>SOLANACEAE</b>		
<i>Lycium californicum</i> Nutt.	<b>NIGHTSHADE FAMILY</b> California box-thorn, California lycium	N
<i>Nicotiana glauca</i> Graham	tree tobacco	I
<i>Nicotiana quadrivalvis</i> Pursh	Indian tobacco	N
<i>Physalis crassifolia</i>	Greene's ground-cherry	N
<i>Solanum americanum</i> Mill.	white nightshade	N
<b>URTICACEAE</b>		
<i>Urtica urens</i> L.	<b>NETTLE FAMILY</b> dwarf nettle	I

TABLE 1  
 PLANT SPECIES OBSERVED AT RICE CANYON CUT SHRUB PATCHES  
 (continued)

Scientific Name	Common Name	Origin
<b>ANGIOSPERMS: MONOCOTS</b>		
<b>AGAVACEAE</b>	<b>AGAVE FAMILY</b>	
<i>Chlorogalum parviflorum</i> S. Watson	smallflower soap plant	N
<i>Yucca schidigera</i> Ortgies	Mohave yucca	N
<b>ASPHODELACEAE</b>	<b>ASPHODEL FAMILY</b>	
<i>Asphodelus fistulosus</i> L.	hollow-stem asphodel	I
<b>LILIACEAE</b>	<b>LILY FAMILY</b>	
<i>Calochortus splendens</i> Benth.	lilac mariposa	N
<b>POACEAE (GRAMINEAE)</b>	<b>GRASS FAMILY</b>	
<i>Bromus madritensis</i> L. ssp. <i>rubens</i> (L.) Husnot	red brome	I
<i>Melica imperfecta</i> Trin.	California melic	N
<i>Muhlenbergia microserma</i> (DC.) Kunth	littelseed muhly	N
<i>Nassella lepida</i> (Hitcch.) Barkworth	foothill needlegrass	N
<i>Nassella pulchra</i> (Hitcch.) Barkworth	purple needlegrass	N
<i>Schismus barbatus</i> (L.) Thell.	Mediterranean schismus	I

**SOURCES:** Jepson Online Interchange <<http://ucjeps.berkeley.edu/interchange.html>> (2009); K. N. Brenzel (editor), *Sunset Western Garden Book* (Sunset Publishing, Menlo Park, CA, 2001); John P. Rebman and Michael G. Simpson, *Checklist of the Vascular Plants of San Diego County*, 4th ed. (San Diego Natural History Museum, San Diego, CA, 2006); USDA Plants Database <<http://plants.usda.gov/>> (2008).

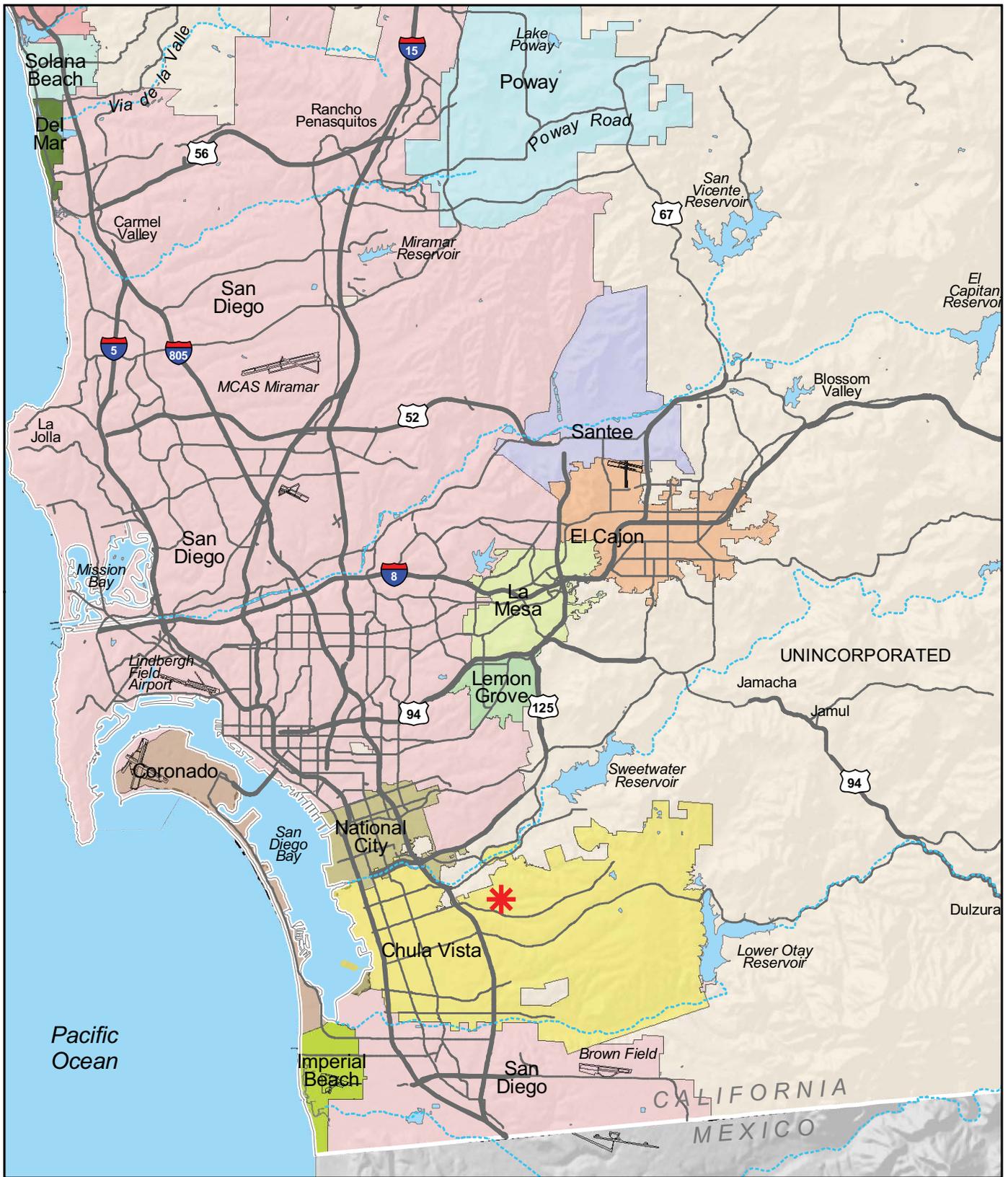
TABLE 2  
PLANT SPECIES OBSERVED AT RICE CANYON DETHATCH PATCHES

Scientific Name	Common Name	Origin
<b>LYCOPODS</b>		
<b>SELAGINELLACEAE</b>		
<i>Selaginella cinerascens</i> A.A. Eaton	SPIKE-MOSS FAMILY ashy spike-moss	N
<b>ASTERACEAE</b>		
<i>Artemisia californica</i> Less.	SUNFLOWER FAMILY California sagebrush	N
<i>Baccharis pilularis</i> DC.		N
<i>Bahiopsis</i> [= <i>Viguiera</i> ] <i>laciniata</i> (A. Gray) E.E. Schilling & Panero	coyote brush	N
<i>Centaurea melitensis</i> L.	San Diego County viguiera	N
<i>Deinandra</i> [= <i>Hemizonia</i> ] <i>fasciculata</i> (DC.) Greene	tocolote, star-thistle	I
<i>Encelia californica</i> Nutt.	golden tarplant	N
<i>Glebionis coronaria</i> (L.) Spach [= <i>Chrysanthemum coronarium</i> ]	common encelia	N
<i>Isocoma menziesii</i> (Hook. & Arn.) G.L. Nesom var. <i>decumbens</i>	garland, crown daisy	I
<b>BORAGINACEAE</b>		
<i>Cryptantha</i> sp.	decumbent goldenbush	N
<b>BRASSICACEAE (CRUCIFERAE)</b>		
<i>Brassica nigra</i> (L.) W.D.J. Koch	BORAGE FAMILY cryptantha	N
<i>Hirschfeldia incana</i> (L.) Lagr.-Fossat	MUSTARD FAMILY black mustard	I
<i>Isomeris arborea</i> Nutt.	short-pod mustard	I
<b>CACTACEAE</b>		
<i>Cylindropuntia</i> [= <i>Opuntia</i> ] <i>prolifera</i> (Engelm.) F.M. Knuth	bladderpod	N
<i>Ferocactus viridescens</i> (Torr. & A. Gray) Britton & Rose	CACTUS FAMILY coastal cholla	N
<i>Mammillaria dioica</i> K. Brandegee	San Diego barrel cactus	N
<i>Opuntia littoralis</i> (Engelm.) Cockerell.	fish-hook cactus	N
<b>EUPHORBIACEAE</b>		
<i>Chamaesyce</i> sp.	shore cactus	N
<i>Chamaesyce maculata</i> (L.) Small	SPURGE FAMILY prostrate spurge	N/I
<b>FABACEAE (LEGUMINOSAE)</b>		
<i>Astragalus trichopodus</i> (Nutt.) A. Gray var. <i>lonchus</i> (M.E. Jones) Barneby	spotted spurge	I
<i>Melilotus</i> sp.	LEGUME FAMILY coast locoweed	N
<i>Melilotus indicus</i> (L.) All.	clover	I
	sourclover	I

TABLE 2  
 PLANT SPECIES OBSERVED AT RICE CANYON DETHATCH PATCHES  
 (continued)

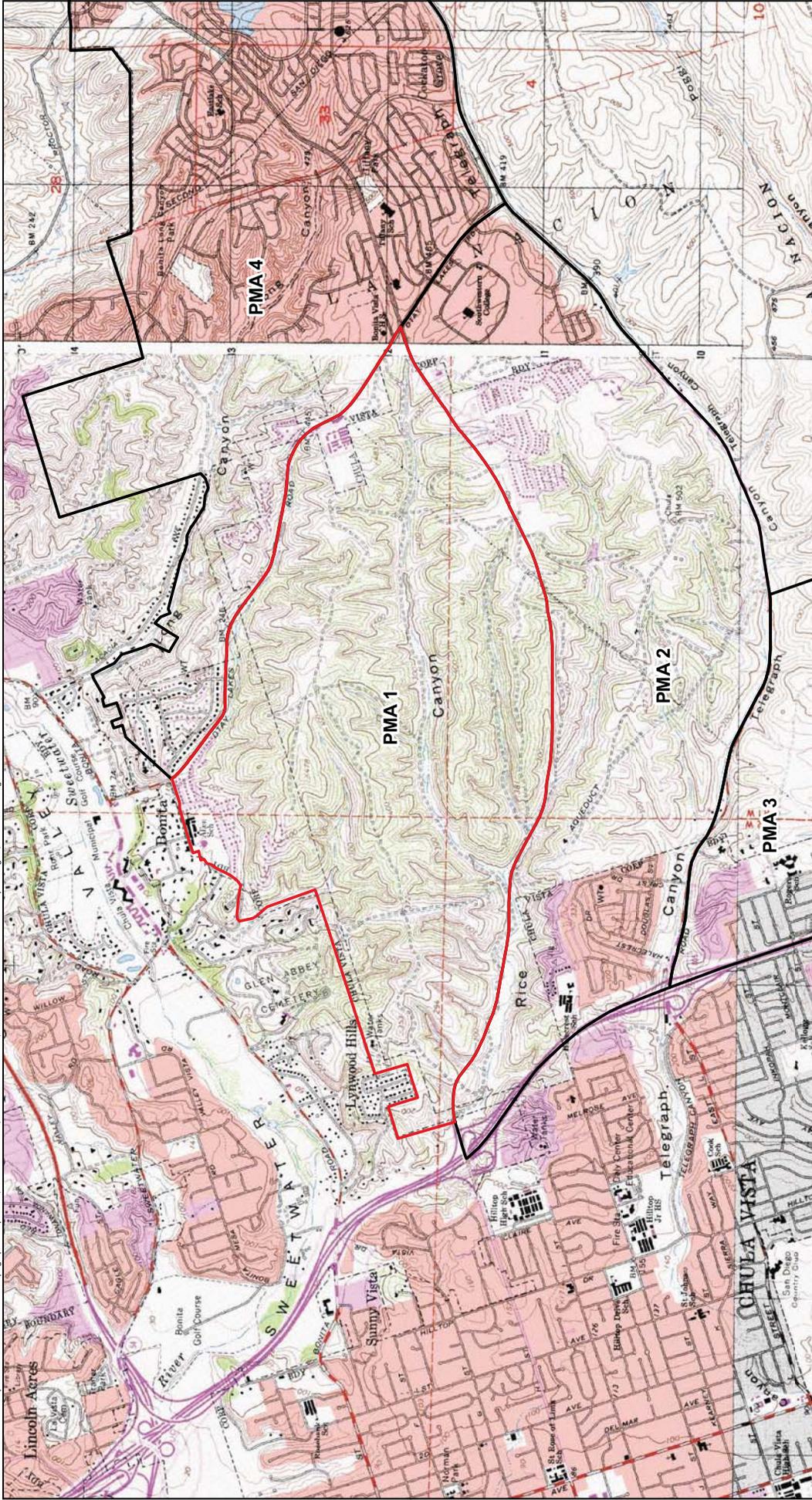
Scientific Name	Common Name	Origin
<b>GENTIANACEAE</b>		
<i>Zeltnera</i> [=Centaurium] <i>venusta</i> (A. Gray) G. Mans.	<b>GENTIAN FAMILY</b> canchalagua	N
<b>GERANIACEAE</b>		
<i>Erodium botrys</i> (Cav.) Bertol.	<b>GERANIUM FAMILY</b> long-beak filaree	I
<i>Erodium cicutarium</i> (L.) L'Hér. ex Aiton	red stemmed filaree	I
<b>LAMIACEAE</b>		
<i>Marrubium vulgare</i> L.	<b>MINT FAMILY</b> horehound	I
<b>MALVACEAE</b>		
<i>Malva parviflora</i> L.	<b>MALLOW FAMILY</b> cheeseweed, little mallow	I
<b>ONAGRACEAE</b>		
<i>Camissonia bistorta</i> (Torr. & A. Gray) P.H. Raven	<b>EVENING-PRIMROSE FAMILY</b> California sun cup	N
<b>SIMMONDSIACEAE</b>		
<i>Simmondsia chinensis</i> (Link) C.K. Schneid.	<b>JOJOBA FAMILY</b> jojoba, goat nut	N
<b>SOLANACEAE</b>		
<i>Datura wrightii</i> Regel	<b>NIGHTSHADE FAMILY</b> Jimson weed, thorn-apple, tolguaacha	N
<b>ANGIOSPERMS: MONOCOTS</b>		
<b>AGAVACEAE</b>		
<i>Yucca schottigera</i> Ortgies	<b>AGAVE FAMILY</b> Mohave yucca	N
<b>ASPHODELACEAE</b>		
<i>Asphodelus fistulosus</i> L.	<b>ASPHODEL FAMILY</b> hollow-stem asphodel	I
<b>POACEAE (GRAMINEAE)</b>		
<i>Bromus madritensis</i> L. ssp. <i>rubens</i> (L.) Husnot	<b>GRASS FAMILY</b> red brome	I
<i>Nassella lepida</i> (Hitchc.) Barkworth	foothill needlegrass	N
<i>Schismus barbatus</i> (L.) Thell.	Mediterranean schismus	I

**SOURCES:** Jepson Online Interchange <<http://ucjeps.berkeley.edu/interchange.html>> (2009); K. N. Brenzel (editor), *Sunset Western Garden Book* (Sunset Publishing, Menlo Park, CA, 2001); John P. Rebman and Michael G. Simpson, *Checklist of the Vascular Plants of San Diego County*, 4th ed. (San Diego Natural History Museum, San Diego, CA, 2006); USDA Plants Database <<http://plants.usda.gov/>> (2008).



 Project 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

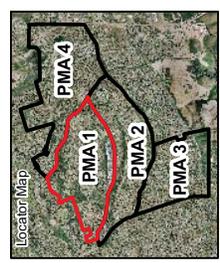
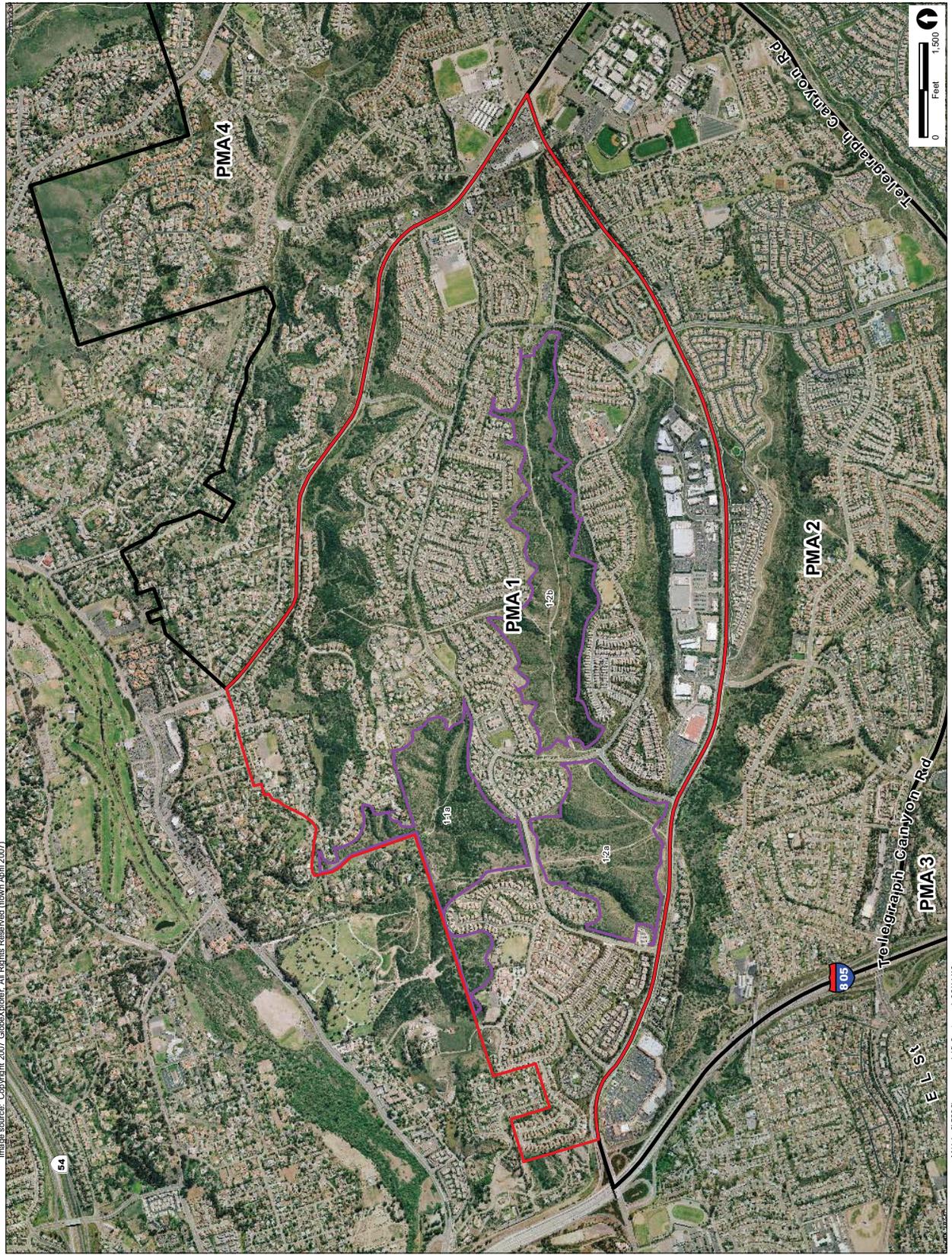
PMA 1

Other PMAs

FIGURE 2

Project Location on USGS Map

Image source: Copyright 2007, Google/Google, All Rights Reserved (from April 2007)



- Preserve Management Areas
- PMA 1
  - Other PMAs
  - PMA Subunits

FIGURE 3  
Preserve Management Subunits  
Selected for Restoration

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**FIGURE 4**  
Cactus Wren Habitat Restoration  
and Enhancement Locations



**PHOTOGRAPH 1**  
Cryptantha (*Cryptantha* sp.) growing at  
Shrub Thinning Sites



**PHOTOGRAPH 2**  
Native Indian Tobacco (*Nicotiana quadrivalvis*)  
growing at Enhancement Sites



**PHOTOGRAPH 3**  
Nuttall's Snapdragon (*Antirrhinum nuttallianum*)  
Growing in Openings Created by Shrub Thinning



**PHOTOGRAPH 4**  
Flowering Wishbone Plant  
(*Mirabilis laevis* var. *crassifolia*)



PHOTOGRAPH 5  
Coast Barrel Cactus (*Ferocactus viridescens*)  
Benefits from Shrub Thinning, Which Increases Light



**PHOTOGRAPH 6**

Narrow Endemic Snake Cholla (*Cylindropuntia californica* var. *californica*)  
also Benefits from Shrub Thinning



PHOTOGRAPH 7a  
Weed Dethatch Area, Rice Canyon, December 2009



PHOTOGRAPH 7b  
Weed Dethatch Area, Rice Canyon after Planting, August 2010



PHOTOGRAPH 8a  
Weed Dethatch Area, Rice Canyon, with Existing Cholla, May 2008



PHOTOGRAPH 8b  
Weed Dethatch Area, Rice Canyon, with Existing Cholla, August 2010



PHOTOGRAPH 9a  
Shrub Thinning Area, Rice Canyon, with Existing Cholla, September 2009



PHOTOGRAPH 9b  
Shrub Thinning Area, Rice Canyon, with Existing Cholla, August 2010