Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program

Rare Plant Survey Report 2011

08 June 2012

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Photos by Karyn L. Drennen. (Clockwise from top right) *Allium munzii*, *Centromadia pungens* ssp. *laevis*, *Chorizanthe parryi* var. *parryi*, *Brodiaea filifolia* and *Trichocoronis wrightii* var. *wrightii* (center).

NOTE TO READER:

This report is an account of survey activities conducted by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies (i.e., the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

MSHCP reserve assembly is ongoing and it is expected to take 20 or more years to assemble the final Conservation Area. The Conservation Area includes lands acquired for conservation under the terms of the MSHCP and other lands that have conservation value in the Plan Area (called public or quasi-public lands in the MSHCP). In this report, the term "Conservation Area" refers to the Conservation Area as understood by the Monitoring Program at the time the surveys were planned and conducted.

We would like to thank and acknowledge the land managers in the MSHCP Plan Area, who in the interest of conservation and stewardship facilitate Monitoring Program activities on the lands for which they are responsible. A list of the lands where data collection activities were conducted in 2009 is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies. Partnering organizations and individuals contributing data to our projects are acknowledged in the text of appropriate reports.

While we have made every effort to accurately represent our data and results, it should be recognized that data management and analysis are ongoing activities. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

The primary preparer of this report was the 2011 Botany Program Lead, Karyn Drennen. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the RCA. Further information on the MSHCP and the RCA can be found at www.wrc-rca.org.

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INTRODUCTION

The Western Riverside County MSHCP includes 63 rare plants as Covered Species. For most of these species, the MSHCP requires the confirmation of a number of occurrences, often at specified sites, within the Conservation Area. Unless a given species-specific conservation objective has more rigorous requirements, the Biological Monitoring Program is obligated to survey for the distribution of covered plant species at least once every 8 years with the goal of verifying occupancy at ≥75% of the sites listed in the species objective (Dudek & Associates 2003). Some Covered Species also have "demonstrate-conservation" objectives that require us to document a specific level of conservation. These species are not considered adequately conserved until additional species-specific objectives have been met. Demonstrate-conservation objectives usually require that a minimum number of individuals be confirmed within specified areas or in a minimum number of unique locations.

Information about the historic distribution of covered plant species was consolidated for the MSHCP from a variety of sources including herbarium records, field notes, 'gray literature', and species databases. The status of Covered Species at the recorded locations has required verification due to the varying sources, ages, and precision of the records. In order to ascertain whether species objectives are being met and to determine future long-term monitoring needs, we conducted field surveys to verify historic records for each of the 63 covered plant species during the inventory phase of monitoring. As stipulated by the MSHCP, at the end of the inventory phase we will begin the long-term monitoring phase and return to verified locations to monitor rare plant occurrences at least once every 8 years. The 2011 survey season marks the end of the inventory phase, although we will continue to search for additional occurrences of species with unmet objectives as expansion of the Conservation Area includes appropriate habitat.

Surveys conducted in 2011 built on the activities of previous years. The University of California, Riverside's Center for Conservation Biology (CCB), under a contract from the California Department of Fish and Game (DFG), conducted surveys for 27 covered plant species in 2003 and 2004 (UCR CCB 2005). Biological Monitoring Program staff conducted targeted surveys for 16 Covered Species in 2005, 32 species in 2006, 28 species in 2007, 44 species in 2008, 37 species in 2009, and 34 species in 2010. In 2011, we focused survey efforts on 33 plant species.

The goals for the 2011 rare plant survey were as follows:

Goals and Objectives

1. Verify historical locations and document new locations of covered plant species in the Conservation Area.
    a. Search for target species within all suitable habitats inside selected grid cells until surveyors locate the species of interest or determine that the species was unlikely to be detected.

2. Continue to improve knowledge of covered plant species status within the Conservation Area.

   a. Collect species-specific information at observation sites such as species abundance, vegetative status, and population size.

3. Continue to improve knowledge of covered plant species habitat suitability needs.
   a. Collect habitat information at survey sites to determine covariates associated with species presence.

4. Continue to test and refine protocol for surveying historical locations of covered plant species.
   a. Use observations of plant growth at sentinel sites to determine when to initiate and conclude surveys for target plant species.
   b. Streamline the amount of information collected at survey grid cells to reduce the amount of time spent per survey, and thereby increase the number of grid cells surveyed per person per day.
   c. Improve the resolution of actual area occupied by a given species by estimating the spatial area occupied by an occurrence into 1 of 6 size classes.

METHODS

Protocol Development

The rare plant survey protocol from 2005-2007 was a relevé survey based on a protocol developed by the California Native Plant Society (CNPS 2004). In 2008, we partitioned the Conservation Area into 250 m × 250 m survey grid cells, or "sampling stations", and changed the search method from meander surveys to grid-based surveys. This allowed us to accurately quantify the amount of land covered at a given survey area which is necessary to determine whether an area has been thoroughly surveyed. In 2009 we further refined the protocol with the goal of optimizing the amount of useful information collected relative to the effort spent surveying sites. We discontinued collecting extensive plot-based information in favor of recording coarser information about the sampling station. Subsequently, we began recording only the 3 dominant species in each of 5 functional groups (grasses, native forbs, exotic forbs, shrubs and trees) within 10 m of an occurrence. We also began recording the extent of species occurrences, by patch size, in categories. There were no additional changes to the rare plant survey protocol in 2011 (Appendix A).

Survey Site Selection

Sentinel Surveys

Sentinel sites are locations where we know covered plant species regularly occur. We monitored the growth stages of target species throughout the growing season at sentinel sites to determine the optimal time to begin targeted surveys. We chose sites based on the presence and diversity of recently documented Covered Species and, when possible, selected sites with an elevation and aspect similar to planned target species survey locations. During the 2011 field season, we monitored rare plants at 9 sentinel sites: Warm Springs, Alberhill, the Santa Ana River Corridor, the Hogbacks, San Jacinto River, Garner Valley, the Santa Ana Mountains and 2 locations in the San Jacinto Mountains (Table 1).

Table 1. Sentinel site locations, species, and detections in 2011. Highlighting indicates species detection.

Date	General Area Name	Scientific Name	Common Name
3/2/2011	Warm Springs	*Allium munzii*	Munz's onion
3/2/2011	Warm Springs	*Convolvulus simulans*	Small-flowered morning-glory
3/2/2011	Warm Springs	*Chorizanthe polygonoides* var. *longispina*	Long-spined spine flower
3/2/2011	Warm Springs	*Chorizanthe parryi* var. *parryi*	Parry's spine flower
3/2/2011	Warm Springs	*Harpagonella palmeri*	Palmer's grapplinghook
3/2/2011	Warm Springs	*Microseris douglasii* var. *platycarpha*	Small-flowered microseris
3/8/2011	Alberhill	*Allium munzii*	Munz's onion
3/8/2011	Alberhill	*Convolvulus simulans*	Small-flowered morning-glory
3/8/2011	Alberhill	*Harpagonella palmeri*	Palmer's grapplinghook
3/8/2011	Alberhill	*Hordeum intercedens*	Vernal barley
3/8/2011	Alberhill	*Microseris douglasii* var. *platycarpha*	Small-flowered microseris
3/24/2011	Warm Springs	*Allium munzii*	Munz's onion
3/24/2011	Warm Springs	*Convolvulus simulans*	Small-flowered morning-glory
3/24/2011	Warm Springs	*Erodium macrophyllum*	Round-leaved filaree
4/1/2011	Santa Ana River Corridor	*Phacelia stellaris*	Brand's phacelia
4/4/2011	Warm Springs	*Allium munzii*	Munz's onion
4/4/2011	Warm Springs	*Convolvulus simulans*	Small-flowered morning-glory
5/23/2011	Hogbacks	*Calochortus weedii* var. *intermedius*	Intermediate mariposa lily
6/1/2011	San Jacinto River	*Dodecahema leptoceras*	Slender-horned spine flower
6/8/2011	Garner Valley	*Arabis johnstonii*	Johnston's rock cress
6/8/2011	Garner Valley	*Chorizanthe leptotheca*	Peninsular spine flower
6/8/2011	Garner Valley	*Calochortus palmeri* var. *munzii*	Munz's mariposa lily
6/8/2011	Garner Valley	*Penstemon californica*	California beardtongue
6/10/2011	Hogbacks	*Calochortus weedii* var. *intermedius*	Intermediate mariposa lily
7/5/2011	San Jacinto Mtns (south)	*Deinandra mohavensis*	Mojave tarplant
7/14/2011	Santa Ana Mountains	*Holocarpha virgata* ssp. *elongata*	Graceful tarplant
8/4/2011	San Jacinto Mtns (north)	*Deinandra mohavensis*	Mojave tarplant

Target Species Surveys

We targeted 33 Covered Species at 29 locations from the remaining unmet objectives identified in the MSHCP (Appendix B). Targeted species are also listed in Table 2 of the results section but are not listed here to prevent duplication of a large table. A number of resources guided the selection of survey sites including the MSHCP species accounts (Dudek & Associates 2003), the Consortium of California Herbaria (CCH 2010), the California Natural Diversity Database (CNDDB 2010), and the most current vegetation map of western Riverside County (CDFG et al. 2005). We also used our database and the MSHCP Historical Database, which was created by georeferencing and consolidating available distributional data for all Covered Species throughout the Plan Area (Dudek & Associates 2001).

We began by surveying areas in and around CNDDB polygons (historic point records within the California Natural Diversity Database, buffered by the reported margin of error) focusing on sections that, according to the vegetation map, contained appropriate habitat as defined by the MSHCP species account. When no CNDDB data were available, we based site selection on point data in the Historical Database. Before selecting survey sites, we attempted to correct georeferencing errors that are widespread throughout the database, and then refined the selection based on a combination of recently vouchered specimens from the CCH and presence of appropriate habitat. If information from the database produced no historical observation points or if the surveys were unsuccessful, we focused instead on areas specifically mentioned in the species account or areas containing appropriate habitat. In general, previously unsurveyed areas took precedence over locations targeted during earlier survey efforts; however, if time allowed, we resurveyed sites as well.

We timed surveys based on observations during sentinel site visits. We conducted our first target species surveys of the 2011 season on 3 March and the final survey on 8 September.

Survey Methods

Sentinel Sites

We navigated to points where Monitoring Program biologists or the CCB (2005) documented Covered Species in previous years. Because these records were collected recently and all coordinates were collected using GPS units, we assumed points were highly accurate and, therefore, only searched for the sentinel species in the immediate area of the given point. If located, we recorded the same species-specific information required for target species surveys, as described in the *Western Riverside County MSHCP Biological Monitoring Program Rare Plant Survey Protocol* (Appendix A). If we were unable to locate a sentinel species, we assumed the current environmental conditions and growth stage of that species were not yet suitable for targeted surveys. In these cases, we revisited the site until growth progressed to a point where we could easily detect the species.

We used sentinel site surveys throughout the field season to determine the appropriate survey period for target species. We started sentinel surveys on 2 March

2011, in grassland, coastal sage scrub, and chaparral in the Perris Basin. As the spring and summer progressed, sentinel surveys transitioned to higher elevations in the Santa Ana and San Jacinto Mountains and concluded on 4 August.

Target Species Surveys

For species with baseline distributional objectives, surveyors navigated to and searched assigned 250 m × 250 m grid cells containing historically documented occurrences of targeted plant species. For demonstrate-conservation objectives, we typically conducted surveys around known occurrences queried from the Monitoring Program database. We searched assigned cells until we located all species of interest or surveyed all suitable habitats, as defined in the "Habitat and Habitat Associations" section of the relevant species accounts (Dudek & Associates 2003). Although each survey focused on particular target species, we remained vigilant for all Covered Species. When we found a target species, either as the result of a directed search or incidental to a search for a different species, we recorded species-specific information including: abundance, growth stage, patch size, dominant substrate, dominant vegetation community, and dominant species in 5 functional groups (trees, shrubs, native forbs, exotic forbs, and grasses). Regardless of the outcome of the survey, we documented the search effort and collected information on vegetation community, overall seasonal plant growth, and site disturbance for the area surveyed. We describe survey methods in further detail in the *Western Riverside County MSHCP Biological Monitoring Program Rare Plant Survey Protocol* (Appendix A).

Personnel and Training

In February and March of 2010, members of the rare plant field crew were instructed in identification of common plant families and all 63 covered plant species. Crew members were shown herbarium specimens of target species as well as closely related or potentially confusing species, and were required to become familiar with a variety of habitat types where Covered Species occur. At the end of the training period, crew members were tested to determine if they could correctly identify all 63 covered plant species. There were no new crew members for the 2011 rare plant survey season and personnel re-familiarized themselves with Covered Species by reviewing specimen samples as well as visiting sentinel sites of known species occurrences. The Regional Conservation Authority and California Department of Fish and Game funded Biological Monitoring Program personnel. Staff who conducted surveys for rare plants in 2011 were:

- Karyn Drennen (Project Lead, Biological Monitoring Program)
- Jeff Galvin (Project Lead, Biological Monitoring Program)
- Ana Hernandez (Biological Monitoring Program)
- John Dvorak (Biological Monitoring Program)
- Rose Cook (Biological Monitoring Program)

Data Analysis

In this report, we present results of surveys conducted in 2011 as well as overall progress toward meeting species objectives. To report on total progress towards meeting species objectives, we evaluated our data along with recent data that other agencies have shared with us, including data collected by San Bernardino National Forest (SBNF), the Center for Natural Lands Management (CNLM), and CCB. This analysis is necessarily qualitative given the descriptive nature of the information we collected during surveys.

The species-specific objectives listed in the MSHCP specify a certain number of locations, occurrences, records, and/or localities for each species, and often identify areas where the species have historically occurred. For distributional objectives, the MSHCP uses 3 terms—"location", "locality", and "occurrence"—interchangeably but does not define them. For clarity, when referring to distributional objectives in this report, we will only use the term "occurrence". We define "occurrence" as the unit or group of individuals meeting the criteria for 1 location in the species objective. When species objectives have a one-to-one relationship between number of occurrences and locations where they require confirmation, we have a very clear idea of what constitutes an occurrence. For example, objective 2 for *Mimulus clevelandii* requires that we monitor "the two known [occurrences] of this species on Santiago Peak in the Santa Ana Mountains and on the Northern Slopes of the Agua Tibia Mountains." Other species objectives require documentation of a specified number of known occurrences in the Conservation Area without listing each specific site where conservation of the species will occur. For example, objective 2 for *Penstemon californicus* requires that we monitor "at least 15 occurrences in Aguanga, Blackburn Canyon, and the San Jacinto Mountains." We are unable to apply a single definition of "occurrence" when species objectives do not specify a distinct location for each occurrence. Instead, we define "occurrence" on a case-by-case basis, factoring in, when available, the typical spatial distribution of the species, general ecology, geography, and conservation intent. In addition, we use a combination of a close reading of the MSHCP species account and U.S. Fish and Wildlife Service Biological Opinion (USFWS 2004), as well as the original data points shown in the MSHCP Historical Database, to delineate, to the best of our abilities, the known occurrences to which the objectives refer.

Per the MSHCP, we cannot consider a subset of species adequately conserved until we achieve additional goals beyond the conservation of historic occurrences. In this report, we use the term "demonstrate-conservation objective" to refer to these additional goals. For demonstrate-conservation objectives, the MSHCP uses the term "locality" and defines its minimum dimensions as a quarter section (160 ac). In this report, for the purpose of clarity, we will only use the term "locality" when referring to objectives regardless of extent. The species-specific demonstrate-conservation objectives typically list a minimum number of individuals that must be present for a given occupied site to qualify as a locality, unless a smaller population has been demonstrated to be self-sustaining. We use the highest number of individuals counted in an area in a single day to determine the total number of individuals at a locality and to avoid over-counting individuals. A few species have demonstrate-conservation objectives that only ask for a specific number of localities without regard to the number of individuals at each locality.

RESULTS

We conducted 12 sentinel site surveys at 9 unique sites for 17 species between 2 March and 4 August 2011 (Table 1). We detected the first sentinel species in a vegetative growth phase at Warm Springs on 2 March and in flower at Alberhill on 8 March. We focused target species surveys on annual and herbaceous perennial species in the Perris Basin, from March through June, based on the species growth phase at our sentinel sites. We searched higher elevations for flowering perennial species in March and April and for annual species in May through early September.

We surveyed 295 unique grid cells during target species surveys. Twenty-two of these grids were surveyed twice and 1 was surveyed 3 times, for a total of 319 survey events in 2011. Of those grid cells, we completely surveyed 270 (92%) and partially surveyed another 25 (8%). Grid cells may have been partially surveyed due to inaccessibility, lack of appropriate habitat, or time constraints. Surveys lasted 1-180 min (average = 30 min) depending on the extent of suitable habitat, vegetation structure, and topography. We detected at least 1 covered plant species, although not always the targeted species, in 40 cells (14%).

We detected 21 of the 33 targeted Covered Species and recorded incidental observations of an additional 4 Covered Species in 2011 (Table 2; Figures 1-5). Counting multiple detections of the same species in a single grid cell as 1 detection (i.e., presence/absence in a cell) and including incidental data, we recorded 73 detections of 27 covered plant species during targeted surveys in 2011 (Figures 1-5; Appendix C). We failed to detect 8 target species this year. Combining sentinel visits, targeted surveys and incidental observations, we detected a total of 31 covered plant species in 2011.

We confirmed 17 occurrences of 12 Covered Species that fulfill requirements of a distributional species objective (Appendix D). We also confirmed 3 localities for 2 species that fulfill demonstrate-conservation objectives (Appendix D).

DISCUSSION

The 2011 rare plant survey season marks the end of the inventory phase for the Biological Monitoring Program. Either Monitoring Program biologists or biologists from partner organizations have surveyed for all covered plant species at required historic occurrences currently within conservation. From 2005-2011, we have verified all occurrences for 22 of 59 species, and confirmed that 8 additional species are present at 75% or more of their historical locations, for a total of 31 of the 59 covered plant species with distributional objectives (Appendix C).

Table 2. Summary of target species surveys and detections in 2011.

Survey[a]	Detection[a]	Scientific Name	Common Name
ST	ST	*Allium munzii*	Munz's onion
T	T	*Ambrosia pumila*	San Diego ambrosia
STR	TR	*Arabis johnstonii*	Johnston's rock cress
T	T	*Arctostaphylos rainbowensis*	Rainbow manzanita
T	T	*Astragalus pachypus* var. *jaegeri*	Jaeger's milk-vetch
T	TI	*Atriplex coronata* var. *notatior*	San Jacinto Valley crownscale
T	---	*Atriplex serenana* var. *davidsonii*	Davidson's saltscale
T	---	*Atriplex parishii*	Parish's brittlescale
T	---	*Berberis nevinii*	Nevin's barberry
T	TI	*Brodiaea filifolia*	Thread-leaved brodiaea
S	S	*Calochortus palmeri* var. *munzii*	Munz's marisposa lily
---	I	*Calochortus plummerae*	Plummer's mariposa lily
ST	ST	*Calochortus weedii* var. *intermedius*	Intermediate mariposa lily
---	I	*Caulanthus simulans*	Payson's jewelflower
T	T	*Centromadia pungens* ssp. *laevis*	Smooth tarplant
ST	S	*Chorizanthe leptotheca*	Peninsular spine flower
ST	STI	*Chorizanthe parryi* var. *parryi*	Parry's spineflower
ST	STI	*Chorizanthe polygonoides* var. *longispina*	Long-spined spineflower
T	TI	*Chorizanthe procumbens*	Prostrate spine flower
STR	ST	*Convolvulus simulans*	Small-flowered morning-glory
STR	STRI	*Deinandra mohavensis*	Mojave tarplant
ST	S	*Dodecahema leptoceras*	Slender-horned spine flower
T	---	*Dudleya multicaulis*	Many-stemmed dudleya
ST	ST	*Erodium macrophyllum*	Large-leaved filaree
ST	STI	*Harpagonella palmeri*	Palmer's grapplinghook
T	---	*Heuchera hirsutissima*	Shaggy-haired alumroot
ST	S	*Holocarpha virgata* ssp. *elongata*	Graceful tarplant
STR	---	*Hordeum intercedens*	Vernal barley
T	---	*Juglans californica* var. *californica*	California black walnut
T	TI	*Lasthenia glabrata* ssp. *coulteri*	Coulter's goldfields
---	I	*Lilium humboldtii* ssp. *ocellatum*	Ocellated Humboldt lily
---	I	*Lilium parryi*	Lemon lily
ST	TI	*Microseris douglasii* var. *platycarpha*	Small-flowered microseris
T	---	*Mimulus clevelandii*	Cleveland bush monkey flower
T	TI	*Navarretia fossalis*	Spreading navarretia
ST	S	*Penstemon californicus*	California beardtongue
S	S	*Phacelia stellaris*	Brand's phacelia
T	T	*Romneya coulteri*	Coulter's matilija poppy
T	T	*Trichocoronis wrightii* var. *wrightii*	Wright's trichocoronis

[a] S = sentinel site, T = targeted search, R = revisited occurrence, I = incidental observation, "---" = none.

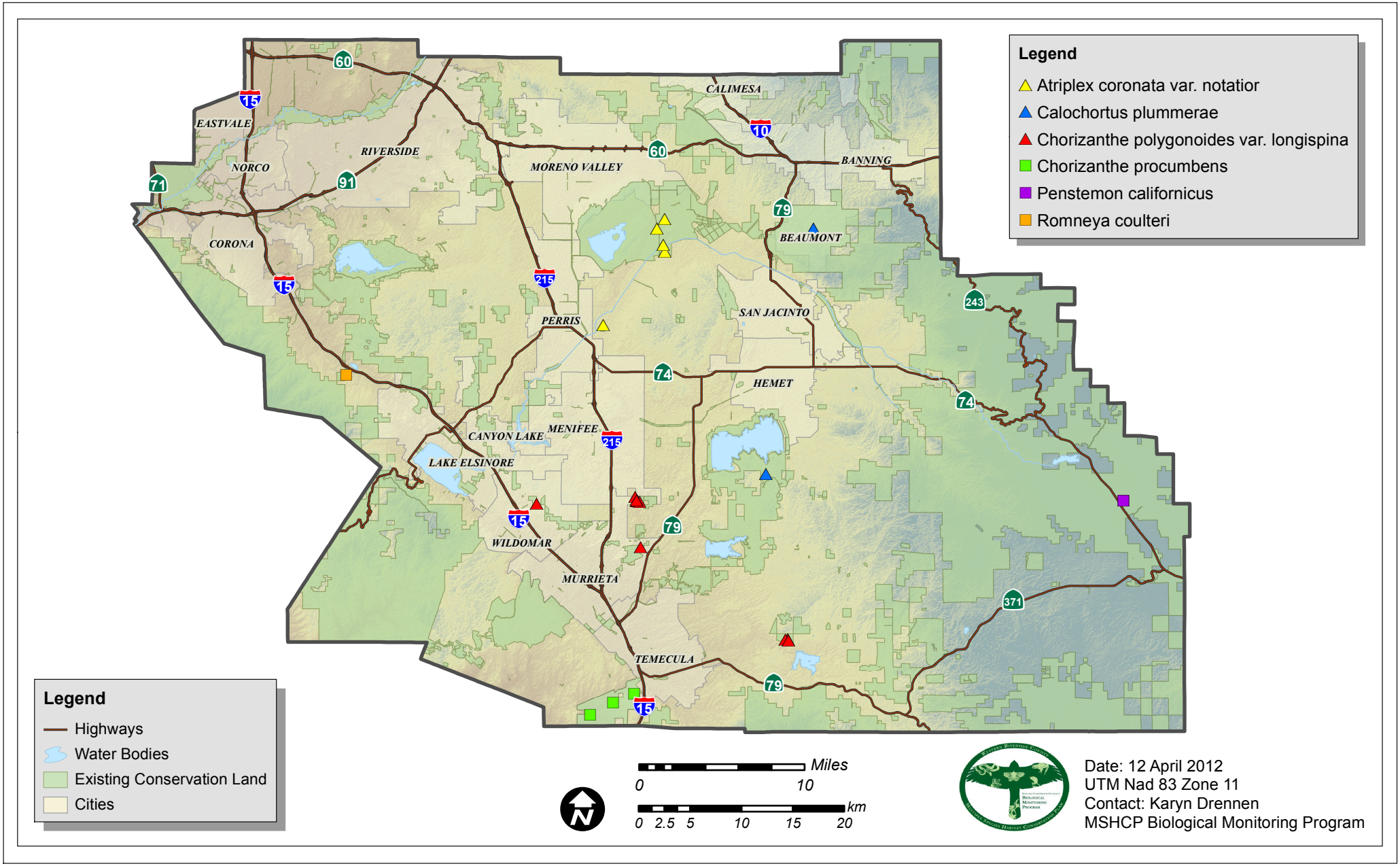

Figure 1. Covered plant species detected in the Conservation Area in 2011 (Map 1 of 5) .

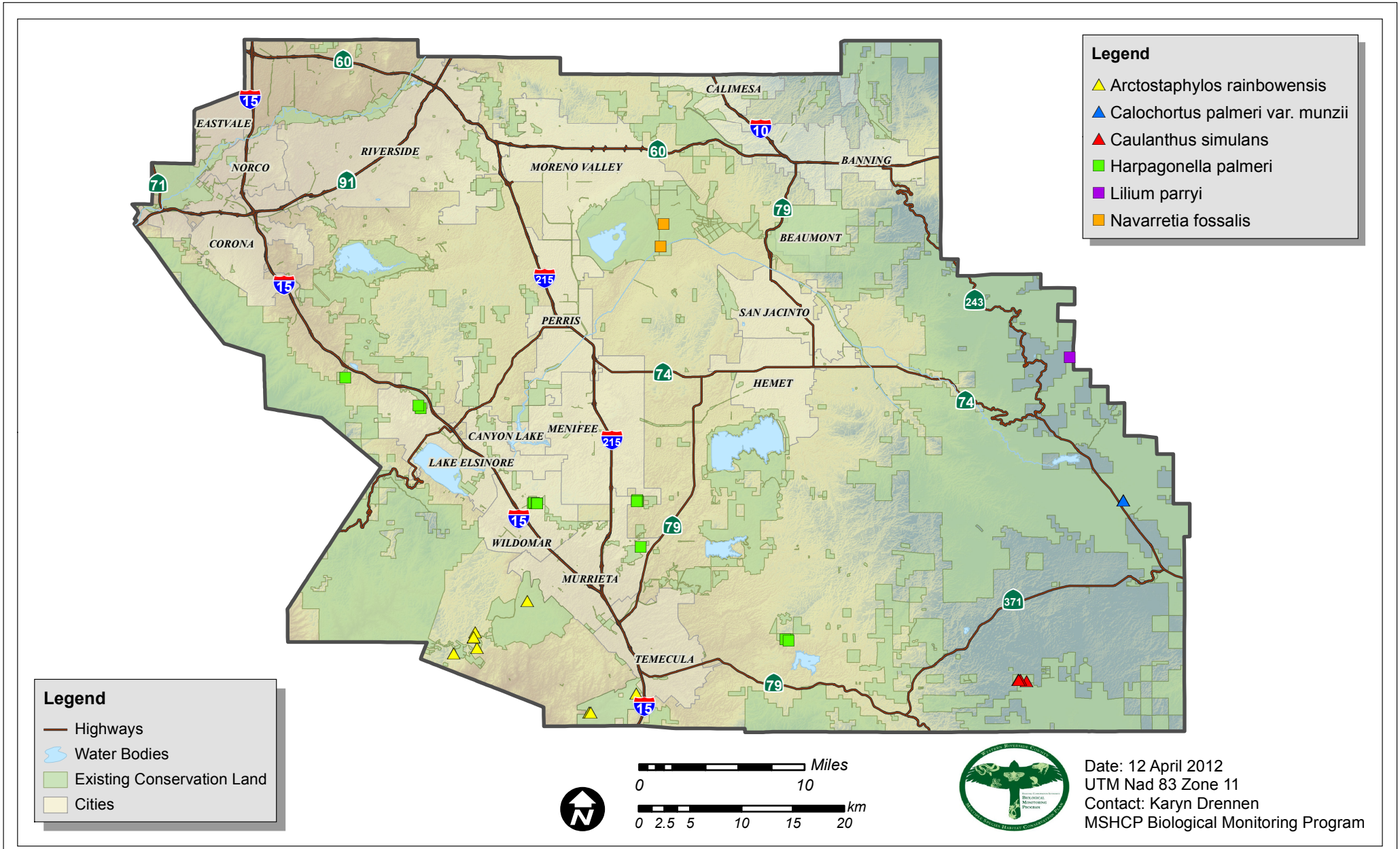

Figure 2. Covered plant species detected in the Conservation Area in 2011 (Map 2 of 5).

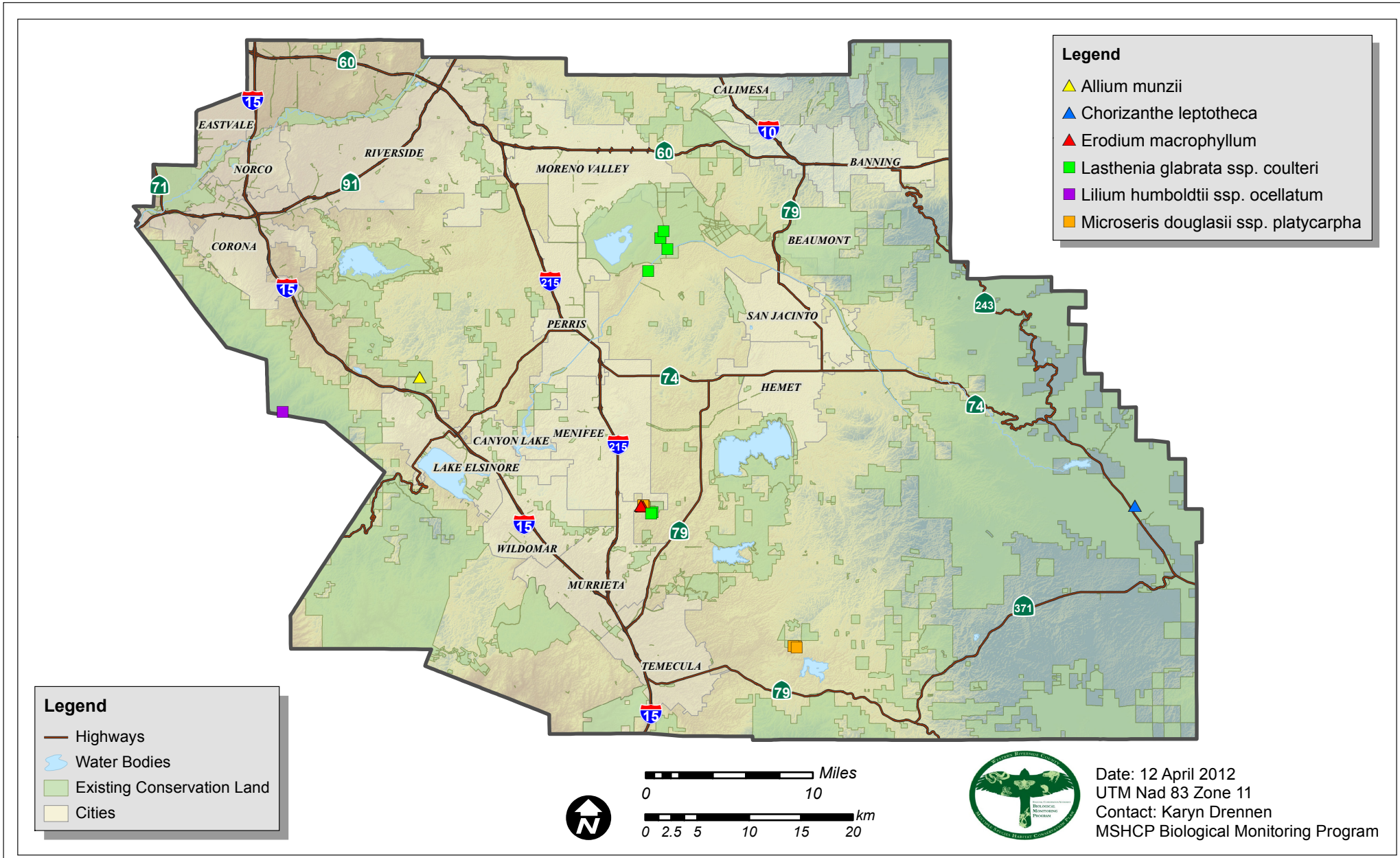

Figure 3. Covered plant species detected in the Conservation Area in 2011 (Map 3 of 5).

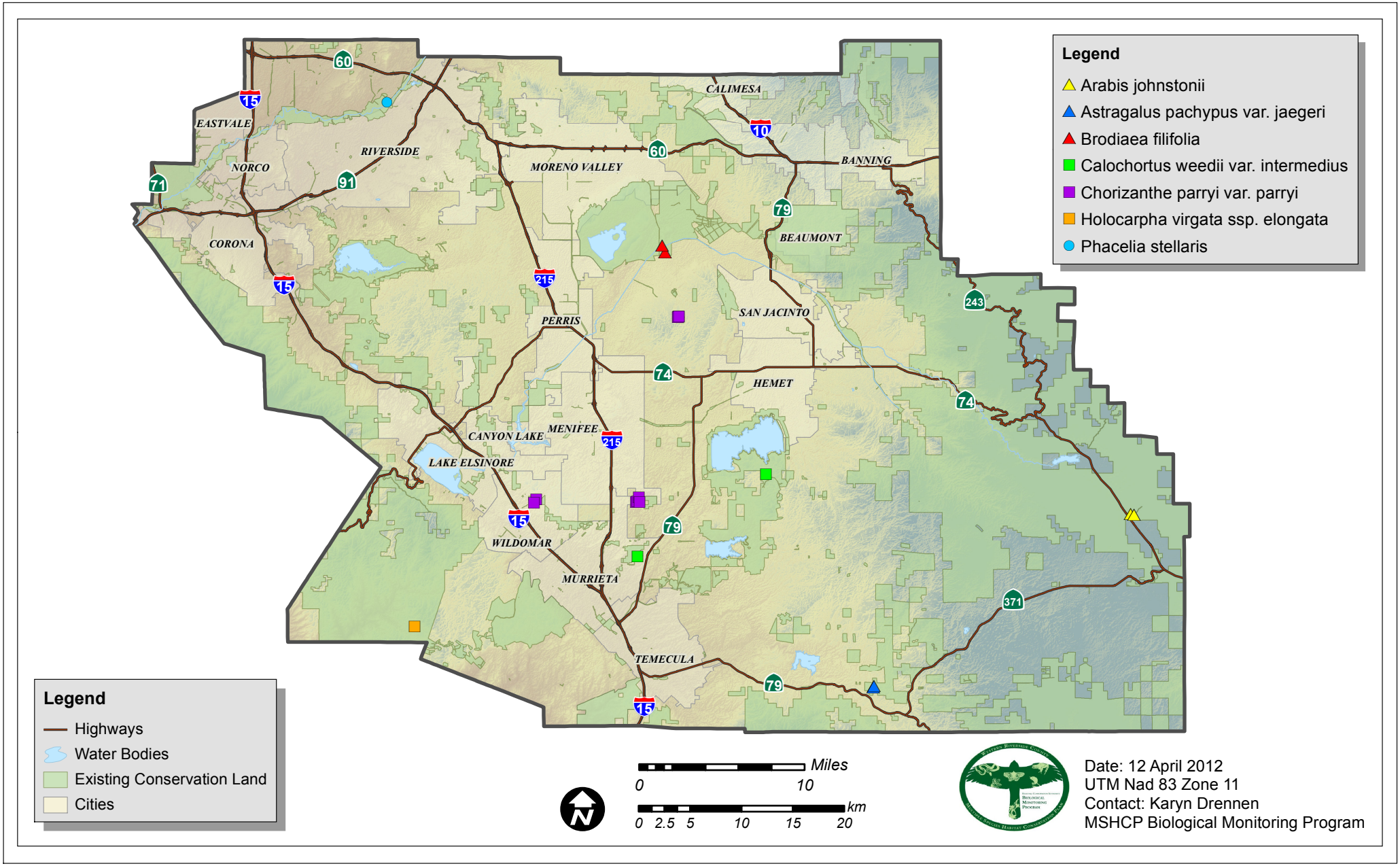

Figure 4. Covered plant species detected in the Conservation Area in 2011 (Map 4 of 5).

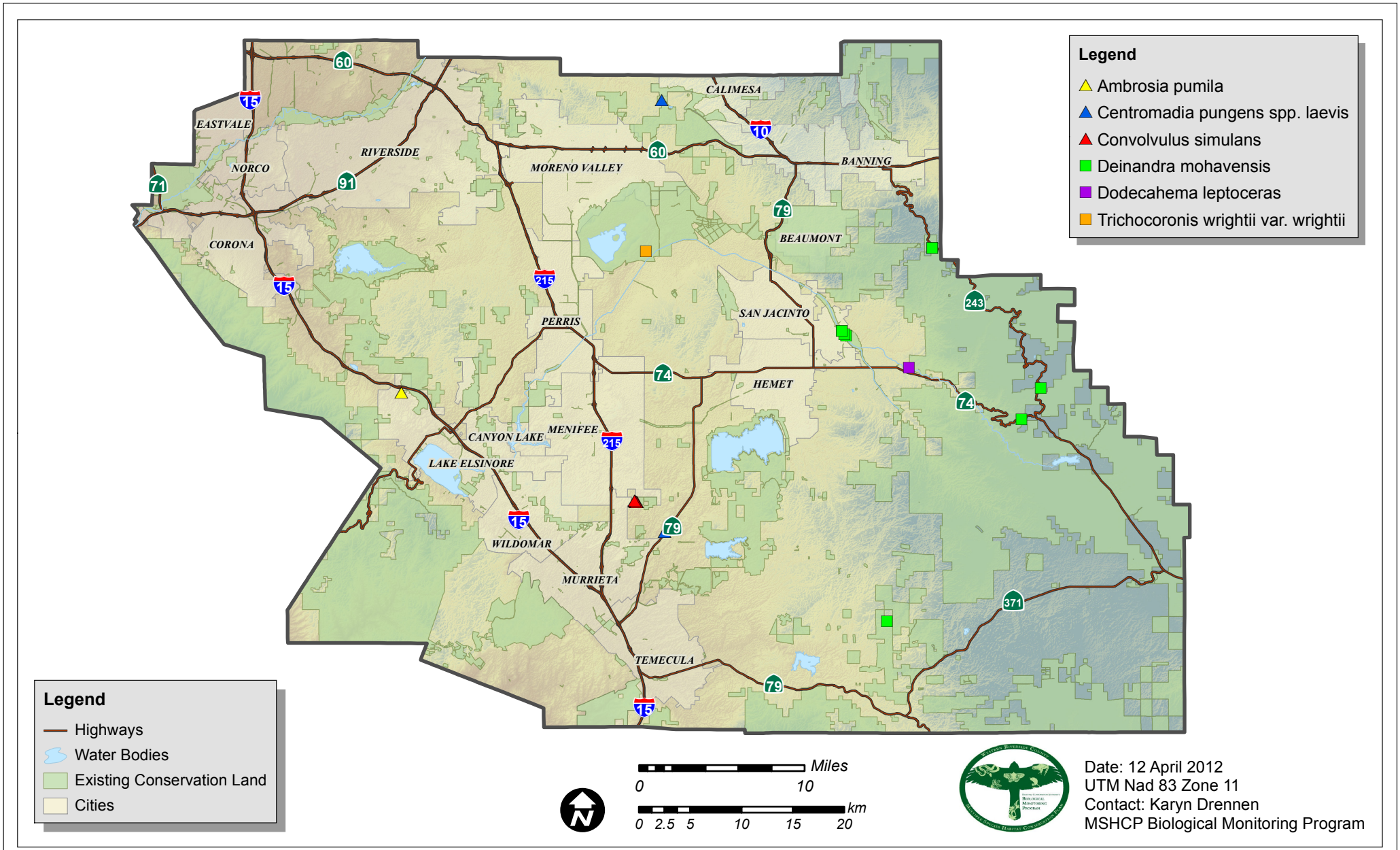

Figure 5. Covered plant species detected in the Conservation Area in 2011 (Map 5 of 5).

We have also confirmed all localities for 10 of the 13 species with "demonstrate-conservation" objectives (Appendix D). We have confirmed 342 of 476 (72%) required occurrences and 122 of 141 (87%) required "demonstrate-conservation" localities based on all data from the Monitoring Program, CCB, and SBNF.

Because 2011 was at the end of the inventory phase and the more straightforward historic occurrences were already confirmed, we spent greater effort searching for questionable and/or vague historic records and searching habitat adjacent to unconfirmed occurrences. This resulted in a lower rate of detections than in 2010 (73 detections/319 surveys = 23% detection rate in 2011; 155 detections/372 surveys = 42% detection rate in 2010). However, we were able to confirm some occurrences that were thought to be unattainable. For example, we found *Deinandra mohavensis* at Wilson Valley/Sage, far from its core habitat in the San Jacinto Mountains. This population was found within a CNDDB polygon for a questionably-identified species record; we do not know if *D. mohavensis* was the questionable species. We also found *Trichocoronis wrightii* var. *wrightii* for the first time at the San Jacinto Wildlife Area after 5 seasons and 61 previously unsuccessful grid surveys. This appears to be a highly sensitive species with very specific ecological requirements.

We maintain an annually updated summary of survey status and progress towards meeting species-specific objectives (Appendix E). We confirmed additional required occurrences for *Allium munzii* northeast of Alberhill, *Astragalus pachypus* var. *jaege*ri in Wilson Valley/Sage, *Calochortus weedii* var. *intermedius* in Crown Valley, and *Centromadia pungens* ssp. *laevis* in French Valley in 2011. We searched for but were unable to detect *Dodecahema leptoceras* in Railroad Canyon, near Alberhill, Temescal Canyon, and south of Hemet, in Cactus Valley. Much of the habitat is altered or severely degraded. We searched for *Holocarpha virgata* ssp. *elongata* in the Cleveland National Forest along San Mateo Creek near the historic record to expand our effort for this species beyond the Santa Rosa Plateau and Tenaja Corridor, but were unsuccessful in that effort as well.

Additionally, we completed both distributional and demonstrate-conservation objectives for *Microseris douglassii* var. *platycarpha* and found an occurrence of the federally endangered *Ambrosia pumila* near (although not within) a required historic location (Appendix C and D).

In 2011, we continued to survey for *A. rainbowensis*, as recommended in the 2010 Rare Plant Survey Report, timing surveys for the peak of the flowering or fruiting period in order to better distinguish this species from *A. glandulosa*. Despite difficult field surveys in thick chaparral, we are making considerable progress in meeting objectives for this species.

Recommendations for Future Surveys

Moving forward into the long-term monitoring phase in 2012, we will continue to be vigilant for all Covered Species during each survey effort, as part of the MSHCP objective is to determine the distribution of Covered Species throughout the Conservation Area. Monitoring surveys should begin with reconfirming species presence at locations listed in the oldest Monitoring Program and partner agency (CCB, CNLM & SBNF)

records. Additionally, we should continue to search for target species with unmet objectives as appropriate habitat is added to the Conservation Area and coordinate these efforts in conjunction with on-going surveys whenever possible.

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Appendix A. Rare plant survey protocol.

Western Riverside County MSHCP
Biological Monitoring Program
Rare Plant Survey Protocol
March 6, 2010

INTRODUCTION

There are 63 plant species covered by the Western Riverside County MSHCP. For most of these species, the MSHCP requires the confirmation of a number of occurrences, often at specified sites, within the Conservation Area. Unless a given species-specific conservation objective has more rigorous requirements, the Biological Monitoring Program is obligated to survey for the distribution of covered plant species at least once every 8 years, with the goal of verifying occupancy at ≥75% of the sites listed in the species objective. Some covered plant species also have a species objective that requires a specific level of conservation be demonstrated. These species are not considered adequately conserved by the MSHCP until the terms of the species objective (usually a specified number of locations with a minimum number of individuals of the species in question) have been met.

Historic distribution information for covered plant species was consolidated for the MSHCP from a variety of sources including herbarium records, field notes, gray literature, and species databases. The current status of covered plant species at the recorded locations needs to be verified due to the varying sources, ages, and precision of the records. In order to ascertain whether species objectives are being met and to determine future long-term monitoring needs, we plan to field-verify historic records for each of the 63 covered plant species during the first 5-8 years of the permit. As stipulated by the MSHCP, at the end of this Inventory Phase we will return to verified locations to monitor the occurrences at least once every 8 years. We will continue to search for additional occurrences as reserve lands are acquired or, in the case of species that have not been found at the required number of locations, as additional information about habitat suitability and potentially suitable locations are acquired.

The University of California, Riverside Center for Conservation Biology (UCR CCB), under a contract from the California Department of Fish and Game, conducted surveys for 27 covered plant species in 2003 and 2004 (UCR CCB 2005). Monitoring Program biologists conducted targeted surveys for 16 covered plant species in 2005, 32 species in 2006, 28 species in 2007, 44 species in 2008, 37 species in 2009, and 34 species in 2010. In 2011 we will focus our surveys on 33 Covered Species. The goals for the 2011 rare plant surveys are as follows:

Goals and Objectives

1. Verify historical locations and document new locations of covered plant species in the Conservation Area.
    a. Divide the Conservation Area into 250 m × 250 m grid cells.

   b. Search for target species within all suitable habitats inside selected grid cells until surveyors locate the species of interest or determine that the species was unlikely to be detected.
2. Continue to improve knowledge of covered plant species status within the Conservation Area.
   a. Collect species-specific information at observation sites such as species abundance, phenology, and population size.
3. Continue to improve knowledge of covered plant species habitat suitability needs.
   a. Collect habitat information at survey sites to determine covariates associated with species presence.
4. Continue to test and refine protocol for surveying historical locations of covered plant species.
   a. Use phenological progression of plants at sentinel sites to make decisions about when to initiate and conclude surveys for target plant species.
   b. Reduce amount of information collected at survey grid cells to reduce amount of time spent per survey and therefore increase the number of grid cells that can be surveyed per person per day.
   c. Improve the resolution of actual area occupied by a given species by estimating the spatial area occupied by an occurrence into one of 4 size classes.

METHODS

Survey Design

We will conduct surveys for covered plant species throughout most of the spring, summer and fall depending on rainfall, other seasonal variants, and current status towards meeting Species Objectives. Surveys will take place during each species' peak flowering or fruiting time unless the target species is easily identifiable in sterile form (such as for many shrubs and trees). Sentinel sites will be established at locations with known occurrences of covered plant species in order to help time surveys appropriately. Focused surveys for these species will begin once the species are documented in peak phenology at a sentinel site. Even with the use of sentinel sites, we cannot declare a survey absence to be a true absence because a species may not have been detected at a site due to local or regional differences in seasonality, or because observers failed to detect the species. Rare plant surveys are aimed at recording species presence, not determining true absence.

Known locations of target species of interest will be chosen and visited on an approximately biweekly basis at sentinel sites. Sentinel sites will be chosen based on known presence of species of interest and overlap between species records, so that one visit can collect information about the status of several species. When the time is deemed phenologically appropriate based on findings at sentinel sites, surveyors will begin targeted searches for species of interest. Each survey will involve thoroughly searching

all appropriate habitat for species of interest within a 250 m × 250 m sampling station. An initial station will be chosen to survey when there is a species record within the station from the MSHCP Historical Database. Points in the Database were derived from herbarium records, CNDDB information and other records. Additional distributional information will be added to the Database from sources such as regional HCPs and land managers' records as needed to further direct searches and meet species objectives. If the species of interest is not detected in the initial station, the survey effort will be expanded to include searches in surrounding stations that contain suitable habitat.

Field Methods

We will choose sentinel sites to inform us of the current phenological state of species of interest and to make generalizations about species of interest that do not have sentinel sites. Sentinel sites are composed of one or more sampling stations with occurrences of covered plant species documented in the last 5 years. Surveyors will be given coordinates for 1 or more species known from the sentinel site. There should be little error in the coordinates for sentinel sites; therefore, surveyors will confine themselves to searching the immediate area around the coordinates for each of the species of interest to determine presence/absence of each species. For each species at a sentinel site, surveyors will record their assessment of the site for the species, choosing from "found", "early", "late", "dry", or "other". Surveyors will record the standard survey information for the sentinel site, and, if a target species is detected, record the standard species-specific information (Described below). To avoid over-collection of plant material at the sentinel sites, surveyors will never make a plant collection at a sentinel site unless specifically directed to do so by the Botany Program Lead.

For target surveys, each surveyor will be assigned at least 1 sampling station to survey in a day. For each station, surveyors will receive a list of target species, as well as the coordinates for any MSHCP Historic Database points of interest that fall within the station. Surveyors will also be given coordinates for covered plant species previously found in the station. Surveyors will thoroughly search the station for target species in those species' appropriate habitats. They will also document the presence of any other covered plant species that they find that has not been previously recorded in the sampling station. At the end of the survey effort, surveyors will determine whether the survey was "complete" or "incomplete." It will seldom be possible for surveyors to be absolutely confident that target species are not present in a sampling station. Surveyors will consider a survey to be complete if they have searched appropriate habitat across the breadth of the sampling station. Considering a survey complete before all target species are found means that the sampling station will have lower priority for future surveys, not that the species of interest is definitely not in the sampling station. Surveys will be considered incomplete when surveyors are not able to survey all appropriate habitat within the sampling station. Surveyors may return to the station to complete the survey at a later date.

Surveyors will list all of the species they targeted in their search and record an assessment of either "found" or "unknown." Surveyors will not record species as other categories, such as "early" or "late" because information on survey timing will be dependent on sentinel site survey results. Regardless of whether or not covered plant

species are found, surveyors will collect information about their search effort and the general area. Surveyors will record the time searched in minutes; a brief site description, including dominant species; vegetation communities searched; site impacts, including their relative intensity and details on the exact nature of the impact; and the dominant phenology of the herbaceous, shrub and tree layers.

Species-specific information will be take for all covered plant species found during targeted plant surveys, unless a species has previously been documented in the sampling station. When a covered plant species is found, surveyors will search the area surrounding the occurrence to determine the spatial extent and total number of individuals in the occurrence. For species that are difficult to detect, surveyors may want to walk in a slowly widening spiral around the found occurrence or along a series of transects in order to make sure that all individuals are found. Only one occurrence record should be recorded for species that are continuously distributed, even if the species occurs in low densities. Only one occurrence should be recorded for species found in small patches that are common in the landscape. If species occur in small patches that would be difficult to relocate in subsequent years, surveyors should record separate occurrence information for each patch. Once surveyors have determined the bounds of the species occurrence, they can record species-specific information, including: UTMs at the center of the occurrence, slope in degrees, aspect in degrees, abundance, patch size within 4 size classes (1= <10 m², 2= 10 m² - <100 m², 3= 100 m² = <1000 m², 4= >1,000 m ²), phenology (e.g. vegetative, flowering, senescent) of the target species, substrate, vegetation communities, and the 3 dominant species within 5 functional groups (trees, shrubs, native-forbs, exotic-forbs, and grasses). Surveyor will take at least 1 photograph of the target species and 1 of surrounding habitat. If the size of the occurrence, distribution of individuals, and overall detectability is appropriate, surveyors will record an exact count for abundance. If an exact count would be prohibitively time-consuming or difficult, surveyors will record abundance as 1 of 5 size classes (1= <25, 2= 25 - <100, 3= 100 - <250, 4= 250 - <1000, 5 = >1000). Surveyors will always record an exact count if one is required to meet a demonstrate conservation objective.

Surveyors will occasionally be asked to revisit sites in order to collect additional information about covered plant species. Surveyors may be asked to revisit sites in order to make a collection of the species so that the species can be definitively identified. Surveyors may also be asked to visit sites to look for the presence of a certain number of individuals of the species in order to meet Demonstrate Conservation objectives. For these visits, surveys will select a purpose of "revisit" and survey evaluation of "N/A." Surveyors will make a note of the reason for the revisit and record the survey information and species-specific information as described above. Surveyors should always record UTMs, number of individuals and phenological information for the species of interest and can decide what additional information to record about the species.

Field Procedure

1) **Preparation:** Before going into the field, surveyors will upload station corner-points to a handheld GPS unit using DNRGarmin. (S:\Projects\Plants\RarePlants\2010 Surveys\DNRGarmin). Equipment and survey maps are located on the desks in the plant hallway. Survey and vehicle assignments will be posted on the white board located in the old mammal room.

2) **Sentinel Site Visits:** Surveyors will navigate to and survey in the area of the confirmed occurrences within the sentinel site. We assume that these points are very accurate, so surveyors will only search within the immediate area of the confirmed occurrences.
   - **a)** For all sentinel site visits, regardless of the outcome, surveyors will record general site information, including: observer initials; survey type; station ID; survey evaluation (incomplete, complete, or N/A); date; search time in minutes; a description of the general area, including dominant species; target species, including an assessment; phenology of the sentinel site for 3 functional groups (herbaceous, shrub, and tree); vegetation communities present in the sentinel site; and site impacts.
     - **i)** Target Species Assessment: The surveyor will record an assessment code for each of the target species. The target species receives an "F" if it is found within the sentinel site, an "E" if it is too early in the season for the species to be detected, an "L" if it is too late in the season for the species to be detected, a "D" if the species is unlikely to be detected because of drought conditions, and an "O" if there is another reason why the species is not detectable.
   - **b)** Surveyors will record species-specific information for all covered plant species found during sentinel site visits. Once the surveyor has determined the bounds of the species occurrence, they can record species-specific information, including: UTMs, slope in degrees, aspect in degrees, abundance (exact or estimate), patch size, phenology, photo ID, specimen ID, habitat photo ID, notes, substrate, vegetation communities, site impacts, and the 3 most dominant species within 5 functional groups (trees, shrubs, native forbs, exotic forbs, and grasses).
3) **Targeted Surveys:** For each station, surveyors will be given a list of target species, as well as the coordinates for any MSHCP Historic Database points and previously confirmed target species points that fall within the station. Surveyors will thoroughly search the station for target species in those species' appropriate habitats. In addition, surveyors will document the presence of any previously undocumented covered plant species that they find in the sampling station.
   - **a)** For all target surveys, regardless of the outcome, surveyors will record general site information, including: observer initials; survey type; station ID; survey evaluation (incomplete, complete, or N/A); date; search time in minutes; a description of the general area, including dominant species; target species, including an assessment (U= unknown or F= found); phenology of the sentinel site for 3 functional groups (herbaceous, shrub, and tree); vegetation communities present in the survey station; and site impacts.
     - **i)** Survey Evaluation: It will seldom be possible for surveyors to be absolutely confident that target species are not present in a sampling station. Surveyors can consider a survey to be completed if they have searched all appropriate habitat across the breadth of the sampling station. If a surveyor is unable to survey all habitats they believe to be appropriate, they should record "incomplete".

ii) Search Time: The search time is only the time spent surveying for the target species and does not include time spent taking site-specific or species-specific information. Search time will be recorded in minutes.

iii) General Description**:** Surveyors will use this space to briefly describe the habitat within the survey station. This description will include dominant species, major topographic features, hydrologic features, and anything else the surveyors feels is relevant to the survey.

iv) Target Species: The list of target species will only include those species that the surveyor was specifically instructed to survey for. If another covered species is detected, the surveyor will take species specific information, but will not record it as a target species. The surveyor will record an assessment code for each of the target species. The target species receives an "F" if it is found within the survey station or a "U" if it was not detected. The assessment codes "E", "L", "D", and "O" are not used for target surveys.

v) Vegetation Communities Surveyed: Surveyors will record all vegetation communities that were surveyed within the sentinel site. Communities listed in bold are a coarser classification than the other listed communities. Surveyors will only use the coarser classification if a finer classification is not applicable.

vi) Plant Growth: Surveyors will record the condition/plant growth of the herbaceous, shrub, and tree layers as: "early", most individuals vegetative; "peak", most individuals in flower; "late", most plants in fruit or beginning to desiccate; "drought", sparse and/or stunted vegetation growth associated with unusually dry conditions; or "not applicable", layer not present in sampling station.

vii) Site Impacts: Surveyor will list all site impacts present in the survey stations using their numeric codes (Appendix A1 and A2). For each impact, the surveyor will record the intensity of the impact ("L" for low intensity, "M" for medium intensity, or "H" for high intensity), as well as a brief description of each impact. For example, if *Bromus diandrus* is the dominant species within the station, the surveyor would record an impact code of "5" (competition from exotics), an impact intensity of "H", and a description identifying the exotic species.

b) Surveyors will record species-specific information for all covered plant species found during targeted plant surveys, unless a species has previously been documented in the sampling station. Once the surveyor has determined the bounds of the species occurrence, they can record species-specific information, including: UTMs, slope in degrees, aspect in degrees, abundance (exact or estimate), patch size, phenology, photo ID, specimen ID, habitat photo ID, notes, substrate, vegetation communities, site impacts, and the 3 most dominant species within 5 functional groups (i.e. grass, native forb, exotic forb, shrub, tree).

i) UTMs: Surveyor will always record UTMs in NAD83 at the center of the occurrence. Determining where the center of the occurrence is located will require the surveyor to known the extent of the occurrence.

ii) Slope: Surveyors will use a clinometer to measure the average inclination in degrees of the terrain where the plant species grows.

iii) Aspect: Surveyors will use a declinated compass to determine the aspect in the direction of the slope. If the slope is 0, then there is no aspect.

iv) Count Exact: If the size of the occurrence, distribution of individuals, and overall detectability is appropriate, Surveyors will record an exact count for abundance. Surveyors will always record an exact count if one is required to meet a demonstrate conservation objective.

v) Count Est.: If an exact count would be prohibitively time-consuming or difficult, surveyors will record abundance as one of 5 size classes (Table #).

vi) Patch Size: Surveyors will record patch size using the following codes (Table 1).

Table 1. Definitions of categories for number of individuals and estimated area.

Category	Number of individuals, "Count Est"	Estimated area, "Patch Size"
1	<25	<10 m²
2	25 to <100	10 m² to <100 m²
3	100 to <250	100 m² to <1000 m²
4	250 to <1000	≥1,000 m²
5	≥1000	--

vii) Plant Growth: For woody species, surveyors will record the percent of individuals that are seedlings, saplings, vegetative adults, flowering adults, and fruiting adults. For woody shrubs, surveyors will consider "saplings" to be very young, pre-reproductive individuals that are not first year seedlings. For herbaceous perennials and annual species, surveyors will record percent of individuals that are vegetative, flowering, fruiting, and desiccated. For both measures, percents should add up to 100 and each individual will only be recorded as one category. Surveyors will consider individuals that are both flowering and fruiting as whichever category is dominant for that individual. Individuals in bud are considered flowering and individuals with dispersed fruit that are not desiccated are considered in fruit.

viii) Photo ID: Surveyor will record Initials and jpg numbers for each photograph taken of the target species. The jpeg number is show in the top-right corner of the cameras review screen; surveyor will not record any leading zeroes. Surveyors should take several photos of each species they are recording as a separate occurrence, including photographs showing fruit, flowers and other distinguishing characteristics. Surveyors should include a ruler or other device in photos to show size of plants.

ix) Collection ID: Surveyor will record initials and a collection number(s) for any specimen taken of the target species. Surveyors will follow plant collection guidelines when making collections of covered plant species (Appendix A2) and will only make a collection when specifically told to do so by the Botany Program Lead.

x) Habitat Photo ID: Surveyor will take at least 1 photograph documenting the habitat surrounding the species occurrence. The surveyor will record their initials and the jpeg number without any leading zeroes. The species of interest should be flagged if it is not clearly visible in the photograph so that its relationship to the surrounding area can be seen.

xi) Notes: Surveyors will record any information that can help assess the health of the occurrence or further explain the species' habitat preferences. Surveyors will also record a description of the spatial extent of the species, such as "along an approximately 50 m length of the stream." The surveyor will not record the dominant species; that information is recorded elsewhere.

xii) Substrate: Surveyors will record the surface substrate(s) upon which the covered species is growing. Surveyors can choose one or more of the following: cliff, gravel (fragments between 2 mm and 7.5 cm), litter, log, moss, rock, bare soil (fragments <2mm), or water. Specific soil information can be recorded in the notes section.

xiii) Vegetation community: Surveyors will record all vegetation communities in which the target species is growing.

xiv) Site Impacts: Surveyors will record this in the same way they do for the survey site assessment, except, they will only list impacts that directly influence the occurrence.

xv) Dominant Species: Surveyors will record the 3 most dominant species within 5 functional groups (tree, shrub, grass, native forb and non-native forb species) occurring within 10 m of the occurrence. Surveyors will record the full, scientific name of the dominant species and not the 6-letter code.

4) **Site Revisits**: Surveyors will occasionally revisit a site in order to collect additional information about covered plant species including specimens of unidentified species.

a) Surveyors should always record UTMs, number of individuals and phenology information for the species of interest and can decide what additional information to record about the species.

b) Surveyors will record the survey evaluation as "N/A".

5) **Office Tasks:** After returning from the field, surveyors will upload all photographs referenced on data sheets, properly label them (yearmonthday_initials_Jpeg#), enter them in the database (S:\Databases\RarePlantSurveys.mdb), and file them in the appropriate data photos folder (S:\Projects\Data_Photos\RarePlants\2011). Surveyors will also place all completed data sheets in the black letter tray next to the plant lead's desk and return all permits and maps to their labeled folder in the filing cabinet at the entrance to the plant hallway.

Equipment:

- Clinometer
- Clipboard
- Declinated compass
- Digital camera
- Field forms
- Field plant press with newspaper
- Flags or flagging
- Pruning shears
- GPS unit
- Plant identification aids

- Topographic maps
- Two-way radio
- Weed digger

DATA ANALYSIS

The species-specific objectives listed in the MSHCP specify a certain number of locations, occurrences, records, and/or localities for each species, and often include a list of areas where the species should be found. The term "population" is avoided in the species objectives for rare plants and also in this report due to the difficulty of determining what constitutes a population. For distributional objectives the MSHCP uses, but does not define, the terms: location, locality, and occurrence. Throughout the species accounts, when referring to distributional objectives, those 3 terms are often used interchangeably. We define "occurrence" as the unit to describe a group of individuals meeting the criteria for one location in the species objective. When species objectives have a one-to-one relationship between number of occurrences and locations where they are to be found, we have a very clear idea of what constitutes an occurrence. For example, objective 2 for *Mimulus clevelandii* requires that we "Include within the MSHCP Conservation Area the two known [Occurrences] of this species on Santiago Peak in the Santa Ana Mountains and on the Northern Slopes of the Agua Tibia Mountains." Other species objectives require a specified number of known occurrences to be included in the Conservation Area without listing each specific site where the species will be conserved. For example, objective 2 for *Penstemon californicus* requires that we "Include within the MSHCP Conservation Area at least 15 occurrences in Aguanga, Blackburn Canyon, and the San Jacinto Mountains." When distinct locations for each occurrence are not specified, we are unable to apply a single definition of 'occurrence'. Instead, we define 'occurrence' on a case-by-case basis, factoring in, when available, the typical spatial distribution of the species, general ecology, geography, and conservation intent. In addition, we use a combination of a close reading of the MSHCP species account and Fish and Wildlife Service Biological Opinion (USFWS 2004), as well as the original data points shown in the MSHCP Historical Database, to delineate, to the best of our abilities, the known occurrences to which the objectives refer.

In the MSHCP, some species are not considered adequately conserved until additional goals, beyond the conservation of historic occurrences, are met. For demonstrate-conservation objectives, the MSHCP uses the term "locality" and defines its minimum dimensions as 1 quarter section. In this report, for the purpose of clarity, the term "locality" will only be used when referring to demonstrate-conservation objectives. The species-specific objective typically lists a minimum number of individuals that must be present for a given occupied site to qualify as a locality, unless a smaller population has been demonstrated to be self-sustaining. We use the highest number of individuals counted in an area in a single day to determine the total number of individuals at a locality to avoid over-counting individuals. A few species have demonstrate-conservation objectives that only ask for a specific number of localities without regard to the number of individuals at each locality.

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Appendix A1. Rare Plant Survey Form 1

Observer Initials: _____ Add. observers: _____

Survey Type: Grid Sentinel Revisit **Station ID (Grid or Site ID): _____**

Survey evaluation: Incomplete Complete N/A **Date: _____ Search time: _____ min**

General area description, including dominant species: _____

_____

_____

_____

Target species:

Species	Assessment	Explanation

Assessment: **E**arly, **L**ate, **D**ry, **N**o appropriate habitat**, U**nknown, **O**ther**, F**ound

Vegetation Community surveyed (circle all): Dunes Scrubland Chaparral CSS
Grass/Herb Alkali playa Meadow Native grassland Non-native grassland Vernal pool
Riparian Riparian scrub Riparian woodland **Marsh**
Broad-leaved woodland Coniferous woodland Rock Field

Phenology **Site Impacts**

Layer	Dominant Phenology
Herb	
Shrub	
Tree	

Dominant phenology:
E- early, P- peak, L- late,
D-drought, N- Not applicable
(layer not present)

Impact	Intensity	Brief Description

Site Impact Intensity: L- low, M- medium, H- high

Appendix A2. Rare Plant Survey Form 2

Observer Initials: _____ Add. observers: _____ Date: _____ Station: _____

Species	**UTME**	**UTMN**	**Slope**	**Aspect**
	0 __ __ __ __ __ __	__ __ __ __ __ __ __	o	o

# of indivs.	**Exact/ Est?**	**Patch size**	**% Seed.**	**% Sapl'g**	**% Veg. Adult**	**% Flower**	**% Fruit**	**% Desic.**	**Photo ID**	**Specimen ID**

Habitat photo ID: _____

Notes: _____

_____

_____**Recheck:**_____**Revisit:**_____

Substrate (list all): _____

Veg. Community (list all): _____

Site impacts (Impact/Intensity/Note):
1)____/____/_____

2) ____/____/_____

3) ____/____/_____

4)____/____/_____

5) ____/____/_____

Dominant trees: _____/ _____/ _____

Dominant shrubs: _____/ _____/ _____

Dominant native forbs: _____/ _____/ _____

Dominant exotic forbs: _____/ _____/ _____

Dominant grasses: _____/ _____/ _____

Patch size: **1**- <10 m² (r=1.78 m), **2**- 10 m² - <100 m² (r=5.64 m), **3**- 100 m²- <1,000 m² (r=17.84 m), **4** ≥ 1,000 m²
Count Classes: **1**- <25, **2**- 25 - <100, **3**- 100 - <250, **4**- 250 - <1000, **5**- >1000
Veg. Community- see first page
Surface Substrate**:** Cliff Gravel Litter Log Moss Rock Soil Water

Appendix B. Areas surveyed, target species, and survey periods in 2011.

Area Name	Target Species	First Survey	Last Survey
Aguanga	*Astragalus pachypus* var. *jaegeri* *Dodecahema leptoceras*	5/19/2011	5/19/2011
Alberhill	*Ambrosia pumila* *Convolvulus simulans* *Dodecahema leptoceras* *Harpagonella palmeri* *Hordeum intercedens* *Microseris douglasii* var. *platycarpha*	3/8/2011	9/7/2011
Badlands	*Berberis nevinii* *Chorizanthe parryi* var. *parryi*	4/27/2011	5/26/2011
Cactus Valley	*Dodecahema leptoceras*	6/1/2011	6/3/2011
Estelle Mountain	*Allium munzii*	4/12/2011	4/12/2011
French Valley	*Centromadia pungens* var. *laevis*	6/14/2011	6/14/2011
Garner Valley	*Arabis johnstonii* *Calochortus palmeri* var. *munzii* *Chorizanthe leptotheca* *Penstemon californicus*	6/8/2011	6/8/2011
Hogbacks	*Allium munzii* *Calochortus weedii* var. *intermedius* *Centromadia pungens* var. *laevis* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Erodium macrophyllum* *Harpagonella palmeri*	4/7/2011	6/10/2011
Lake View Mountains	*Chorizanthe parryi* var. *parryi*	4/19/2011	4/19/2011
Menifee	*Allium munzii* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Convolvulus simulans* *Erodium macrophyllum* *Harpagonella palmeri* *Microseris douglasii* var. *platycarpha*	4/4/2011	4/5/2011
Multi-Species Reserve	*Calochortus weedii* var. *intermedius*	6/28/2011	6/28/2011
Murrieta	*Centromadia pungens* var. *laevis* *Chorizanthe polygonoides* var. *longispina*	6/6/2011	6/6/2011
Nuevo	*Atriplex coronata* var. *notatior* *Atriplix parishii* *Atriplex serenana* var. *davidsonii* *Brodiaea filifolia* *Hordeum intercedens* *Lasthenia glabrata* ssp. *coulteri* *Navarretia fossalis* *Trichocoronis wrightii* var. *wrightii*	4/1/2011	7/29/2011
Oak Mountain	*Allium munzii* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Convolvulus simulans* *Erodium macrophyllum* *Harpagonella palmeri* *Microseris douglasii* var. *platycarpha*	4/14/2011	4/14/2011

Area Name	Target Species	First Survey	Last Survey
Potrero Valley	*Chorizanthe parryi* var. *parryi*	4/27/2011	4/27/2011
San Jacinto Mountains	*Arabis johnstonii* *Astragalus pachypus* var. *jaegeri* *Deinandra mohavensis* *Heuchera hirsutissima* *Penstemon californicus*	6/8/2011	8/12/2011
San Jacinto Valley	*Deinandra mohavensis* *Dodecahema leptoceras* *Navarretia fossalis* *Trichocoronis wrightii* var. *wrightii*	5/5/2011	7/29/2011
San Jacinto Wildlife Area	*Navarretia fossalis* *Trichocoronis wrightii* var. *wrightii*	5/5/2011	8/2/2011
San Timoteo Canyon	*Centromadia pungens* var. *laevis*	5/26/2011	5/26/2011
Santa Ana Mountains	*Allium munzii* *Arctostaphylos rainbowensis* *Centromadia pungens* var. *laevis* *Chorizanthe leptotheca* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Chorizanthe procumbens* *Convolvulus simulans* *Dodecahema leptoceras* *Dudleya multicaulis* *Erodium macrophyllum* *Harpagonella palmeri* *Holocarpha virgata* ssp. *elongata* *Juglans californica* var. *californica* *Microseris douglasii* var. *platycarpha* *Mimulus clevelandii* *Romneya coulteri*	3/11/2011	9/8/2011
Santa Ana River Corridor	*Phacelia stellaris*	4/1/2011	4/1/2011
Santa Margarita	*Arctostaphylos rainbowensis*	4/21/2011	5/4/2011
Temecula Valley	*Arctostaphylos rainbowensis*	4/18/2011	4/18/2011
Temescal Wash	*Allium munzii* *Centromadia pungens* var. *laevis* *Chorizanthe leptotheca* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Chorizanthe procumbens* *Convolvulus simulans* *Dodecahema leptoceras* *Dudleya multicaulis* *Erodium macrophyllum* *Harpagonella palmeri* *Mimulus clevelandii*	3/31/2011	5/3/2011
Tenaja Corridor	*Arctostaphylos rainbowensis*	3/3/2011	4/12/2011
Warm Springs	*Allium munzii* *Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Convolvulus simulans* *Erodium macrophyllum* *Harpagonella palmeri* *Lasthenia glabrata* ssp. *coulteri* *Microseris douglasii* var. *platycarpha*	3/2/2011	4/5/2011

Area Name	Target Species	First Survey	Last Survey
Wasson Canyon	*Dodecahema leptoceras*	6/2/2011	6/2/2011
Wildomar	*Chorizanthe parryi* var. *parryi* *Chorizanthe polygonoides* var. *longispina* *Harpagonella palmeri* *Microseris douglasii* var. *platycarpha*	4/6/2011	4/13/2011
Wilson Valley/Sage	*Astragalus pachypus* var. *jaegeri* *Deinandra mohavensis*	4/18/2011	8/26/2011

Appendix C. Summary of species objectives and survey needs for covered plant species. Bolded text indicates species that have at least 75% of their distributional occurrences confirmed.

	2011 Detections				Required Occurrences			
Species Name	**Grids Surveyed**	**Targeted[1]**	**Incidental**	**Total**	**MSHCP Defined**	**2011 Observed**	**Total Observed[2]**	**% Occurrences Confirmed**
Allium marvinii	0	0	0	0	No Distributional Objective			
***Allium munzii*[3]**	**26**	**2**	**0**	**2**	**13**	**1**	**10**	**77%**
Ambrosia pumila	3	1	0	1	2	0	1	50%
Arabis johnstonii[3]	4	2	0	2	7	0	5	71%
Arctostaphylos rainbowensis[3]	46	8	1	9	15	3	10	67%
Astragalus pachypus var. *jaegeri*[3]	4	2	0	2	7	0	4	57%
Atriplex coronata* var. *notatior	**8**	**2**	**4**	**6**	**4**	**1**	**3**	**75%**
Atriplex parishii	5	0	0	0	3	0	0	0%
Atriplex serenana var. *davidsonii*	5	0	0	0	3	0	2	66%
Berberis nevinii	4	0	0	0	3	0	1	33%
Brodiaea filifolia	5	1	0	1	10	0	5	50%
Brodiaea orcuttii	0	0	0	0	NA	0	NA	NA
Calochortus palmeri* var. *munzii	**1**	**1**	**0**	**1**	**10**	**0**	**10**	**100%**
Calochortus plummerae	**1**	**1**	**1**	**2**	**7**	**0**	**7**	**100%**
Calochortus weedii var. *intermedius*	2	2	0	2	3	1	2	67%
Caulanthus simulans	0	0	4	4	No Distributional Objective			
Ceanothus ophiochilus	0	0	0	0	3	0	2	67%
Centromadia pungens ssp. *laevis*	18	2	0	2	27	1	13	48%
Chorizanthe leptotheca	1	1	0	1	No Distributional Objective			
Chorizanthe parryi* var. *parryi	**19**	**7**	**2**	**9**	**20**	**1**	**17**	**85%**

[1] Grid-level detections from 2011 targeted surveys and incidental observations. Detections do not necessarily meet required occurrences.

[2] Data collected by Biological Monitoring Program (2005-2011), San Bernardino National Forest (2002-2007), Center for Natural Lands Management (2006), Center for Conservation Biology (2003-2004, 2006).

[3] See Appendix E for detailed description of species-specific objectives.

Appendix C. Cont.

	2011 Detections				Required Occurrences			
Species Name	**Grids Surveyed**	**Targeted[1]**	**Incidental**	**Total**	**MSHCP Defined**	**2011 Observed**	**Total Observed[2]**	**% Occurrences Confirmed**
Chorizanthe polygonoides* var. *longispina	**11**	**10**	**1**	**11**	**32**	**0**	**32**	**100%**
Chorizanthe procumbens	**4**	**1**	**2**	**3**	**14**	**2**	**11**	**79%**
Convolvulus simulans	**12**	**6**	**0**	**6**	**8**	**1**	**6**	**75%**
Deinandra mohavensis	**47**	**4**	**4**	**8**	**5**	**1**	**4**	**80%**
Dodecahema leptoceras	35	1	0	1	11	0	4	36%
Dudleya multicaulis[3]	14	3	0	3	19	3	7	37%
Dudleya viscida	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**100%**
Eriastrum densifolium ssp. sanctorum	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**100%**
Erodium macrophyllum[3]	9	3	0	3	8	1	5	63%
Eryngium aristulatum* var. *parishii	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**100%**
Galium angustifolium* ssp. *jacinticum	**0**	**0**	**0**	**0**	**8**	**0**	**8**	**100%**
Galium californicum ssp. primum	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**100%**
Harpagonella palmeri	**17**	**15**	**1**	**16**	**24**	**2**	**20**	**83%**
Heuchera hirsutissima[4]	13	0	0	0	2	0	1	50%
Holocarpha virgata* ssp. *elongata	**12**	**1**	**0**	**1**	**8**	**0**	**7**	**88%**
Hordeum intercedens	6	5	2	7	4	1	2	50%
Hulsea vestita* ssp. *callicarpha	**0**	**0**	**0**	**0**	**12**	**0**	**12**	**100%**
Juglans californica var. *californica*[3]	6	0	0	0	7	0	4	57%
Lasthenia glabrata ssp. *coulteri*	11	4	2	6	20	1	13	65%
Lepechinia cardiophylla	0	0	0	0	7	0	4	57%

[1] Grid-level detections from 2011 targeted surveys and incidental observations. Detections do not necessarily meet required occurrences.

[2] Data collected by Biological Monitoring Program (2005-2011), San Bernardino National Forest (2002-2007), Center for Natural Lands Management (2006), Center for Conservation Biology (2003-2004, 2006).

[3] See Appendix E for detailed description of species-specific objectives.

[4] Some uncertainty regarding species-level identification. See species-specific information in Appendix E.

Appendix C. Cont.

Species Name	2011 Detections				Required Occurrences			
	Grids Surveyed	Targeted[1]	Incidental	Total	MSHCP Defined	2011 Observed	Total Observed[2]	% Occurrences Confirmed
Lilium humboldtii* ssp. *ocellatum	**0**	**0**	**1**	**1**	**4**	**0**	**4**	**100%**
Lilium parryi	**0**	**0**	**1**	**1**	**7**	**0**	**7**	**100%**
Limnanthes gracilis* var. *parishii	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**100%**
Microseris douglasii* var. *platycarpha	**15**	**5**	**1**	**6**	**8**	**2**	**8**	**100%**
Mimulus clevelandii	**3**	**0**	**0**	**0**	**2**	**0**	**2**	**100%**
Mimulus diffusus	0	0	0	0	18	0	11	61%
***Monardella macrantha* ssp. *hallii*[3]**	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**100%**
Muhlenbergia californica[3]	0	0	0	0	NA	0	NA	NA
Myosurus minimus* ssp. *apus	**0**	**0**	**0**	**0**	**5**	**0**	**5**	**100%**
Nama stenocarpum	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**100%**
Navarretia fossalis	20	1	1	2	13	1	6	46%
Navarretia prostrata	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**100%**
Orcuttia californica	0	0	0	0	3	0	2	67%
Oxytheca caryophylloides	**0**	**0**	**0**	**0**	**5**	**0**	**5**	**100%**
Penstemon californicus	12	1	0	1	14	0	5	36%
Phacelia stellaris	1	1	0	1	2	0	1	50%
Polygala cornuta* ssp. *fishae	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**100%**
***Potentilla rimicola*[4]**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**100%**
Quercus engelmannii	**0**	**0**	**0**	**0**	**33**	**0**	**25**	**76%**
Romneya coulteri	1	1	0	1		No Distributional Objective		
Satureja chandleri	0	0	0	0	7	0	3	43%
Sibaropsis hammittii	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**100%**
Trichocoronis wrightii var. *wrightii*	33	1	0	1	4	1	1	25%
Totals	**434**	**95**	**28**	**123**	**476**	**24**	**343**	**72%**

[1] Grid-level detections from 2011 targeted surveys and incidental observations. Detections do not necessarily meet required occurrences.

[2] Data collected by Biological Monitoring Program (2005-2011), San Bernardino National Forest (2002-2007), Center for Natural Lands Management (2006), Center for Conservation Biology (2003-2004, 2006).

[3] See Appendix E for detailed description of species-specific objectives.

[4] Some uncertainty regarding species-level identification. See species-specific information in Appendix E.

Appendix D. Summary of demonstrate-conservation objectives for 13 covered plant species from 2005-2011.

	Objective		Confirmed Localities		
Species	**Localities**	**Individuals per Locality**	**2011[a]**	**Total**	**% of Total**
*Arctostaphylos rainbowensis**	10	50	2	5	50%
Calochortus plummerae	6	500	0	6	100%
Chorizanthe leptotheca	10	1000	0	10	100%
Chorizanthe parryi var. *parryi*	10	1000	0	10	100%
Deinandra mohavensis	4	N/A[b]	0	4	100%
Holocarpha virgata ssp. *elongata*	10	1000	0	10	100%
Hulsea vestita ssp. *callicarpha*	16	50	0	16	100%
Microseris douglasii var. *platycarpha**	10	1000	1	10	100%
Muhlenbergia californica	10	50	0	0	0%
Oxytheca caryophylloides	10	1000	0	10	100%
Polygala cornuta var. *fishiae*	10	50	0	10	100%
Potentilla rimicola	5	N/A[c]	0	1	20%
Romneya coulteri	30	N/A[c]	0	30	100%
Total	141	-	3	122	87%

[a] Asterisk (*) indicates target species in 2011.
[b] Demonstrate-conservation objective calls for 100 ac occupied per locality.
[c] Demonstrate-conservation objective does not specify number of individuals per locality.

Appendix E. Summary of species-specific objectives and 2011 survey status for covered plant species.

Species-specific objectives and survey efforts for each covered plant species are detailed here. For each species we list the species-specific objectives defined in the MSHCP species accounts, summarize the results of survey efforts through the last year the species was targeted or observed, and suggest alternatives to interpreting the objectives given the sources of the historic records and our observations of each species. Species-specific objectives for plants are particularly problematic as many are based on old, inaccurate or unverifiable records, may be constrained to a very specific location within the Conservation Area without regard to the ecological/landscape context in which they occur.

Progress toward meeting species-specific objectives is also appended, as a table, to each annual report.

***Allium marvinii,* Yucaipa onion**

This species does not have a distributional objective listed in the MSHCP. However, in 2008, surveyors encountered an occurrence of 3000 individuals at the Potrero unit of the San Jacinto Wildlife Area (UCR205445) and in 2009, incidental to a vegetation survey, we encountered an occurrence of 101 individuals on BLM land just north of the Soboba Indian Reservation (UCR205446). We did not survey for or detect this species during the 2011 survey season.

***Allium munzii,* Munz's onion**

Objective 2 for this species requires the inclusion of at least 13 occurrences within Temescal Valley and the southwestern portion of the Plan Area, including the following Core Areas: Harford Springs Park, privately owned EO 5 population in Temescal Valley, Alberhill, DiPalma Rd, Estelle Mountain, Domenigoni Hills, Lake Skinner, Bachelor Mountain, Elsinore Peak, Scott Road, North Peak, northeast of Alberhill (EO 16), and 1 unspecified location. Based on the species account and cited CNDDB occurrences, we consider this objective to require the inclusion of single occurrences at Estelle Mountain, the Domenigoni Hills, Lake Skinner, Scott Road, Alberhill, DePalma Road, Bachelor Mountain, CNDDB EO05, northeast of Alberhill, North Peak, Elsinore Peak, Harford Springs County Park, and 1 more unique occurrence. Prior to 2011, we confirmed single occurrences at Harford Springs Park, Alberhill (UCR217516), Estelle Mountain, Domenigoni Hills (UCR217543), Lake Skinner, Bachelor Mountain, Elsinore Peak, Scott Road, and North Peak. In 2011, we surveyed the area northeast of Alberhill and confirmed an additional occurrence of *A. munzii*. Currently, the historic occurrence at DePalma Road is completely outside of the Conservation Area. We have confirmed 10 of 13 (77%) occurrences.

***Ambrosia pumila,* San Diego ambrosia**

Objective 2 for this species requires the inclusion of at least 2 of the 3 known occurrences: Alberhill Creek at Nichols Road and Skunk Hollow. In 2005, the CNLM confirmed an occurrence near Skunk Hollow. In 2011, we did not survey for this species at Alberhill Creek near Nichols Road because this occurrence is not currently included in the Conservation Area. However, we did confirm an occurrence of *A. pumila* at Alberhill

Creek near Lake Street. This occurrence is in the Conservation Area but does not meet the current required objective. Therefore, including CNLM data, we have confirmed 1 of 2 (50%) occurrences.

***Arabis johnstonii*, Johnston's rock cress**

Objective 2 for this species requires the inclusion of two Core Areas, including at least 17 of the known occurrences in Garner Valley and Mountain Springs. Seven of the known occurrences are from the CNDDB; 6 are located in Garner Valley and 1 is near San Jacinto Peak. The remaining 10 occurrences are based on herbarium records and the UCR CCB database, and are located in the immediate area of—or have precision buffers overlapping—the referenced CNDDB occurrences. Based on this, we interpret the objective to require the inclusion of the 6 CNDDB occurrences in Garner Valley and the one near San Jacinto Peak. In 2011, we surveyed for *A. johnstonii* in the remaining unconfirmed location of Garner Valley but were unable to detect this occurrence. A new occurrence was detected nearby, but falls into the adjacent objective area, which has already been met. Based on our interpretation of the objective, we have confirmed 5 of 7 (71%) occurrences.

***Arctostaphylos rainbowensis*, Rainbow manzanita**

Objective 2 for this species requires the inclusion of 15 of the known occurrences at San Mateo Canyon Wilderness, Gavilan Mountain, Santa Margarita Ecological Reserve, Santa Rosa Plateau, Temecula, Wildomar, Margarita Peak, and Pechanga. A few inconsistencies in the species account make a direct reading of the objective difficult. Namely, the incidental take section of the species account states that the Temecula and Pechanga occurrences will not be conserved, even though those occurrences are specifically mentioned in the objective. The "conservation levels" section of the species account provides a clearer accounting of the objective. Therefore, based on this section, we interpret the objective to require the inclusion of 9 occurrences near the Santa Rosa Plateau, 3 in the Santa Ana Mountains, 2 in the Agua Tibia Mountains, and 1 at the Santa Margarita Ecological Reserve.

Prior to 2011, we confirmed 2 occurrences in Santa Ana Mountains (UCR189582 and UCR189791), 1 at the Santa Margarita Ecological Reserve (UCR189556), 1 in the Agua Tibia Mountains, and 3 near the Santa Rosa Plateau (UCR189797). In 2011, we confirmed 3 additional occurrences of this species for a total of 10 of 15 (67%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities with at least 50 individuals each. In 2010, we confirmed 3 localities from the Santa Rosa Plateau west to San Mateo Canyon and in 2011 we confirmed 2 more localities at the Santa Margarita Ecological Reserve. We have confirmed 5 of 10 (50%) localities.

***Astragalus pachypus* var. *jaegeri*, Jaeger's milk-vetch**

Objective 2 for this species requires the inclusion of the seven known occurrences in Aguanga Valley, the San Jacinto Mountains, Potrero Creek, Sage, Temecula Canyon and the core location at Vail Lake and the base of the Agua Tibia Mountains. The species account references 2 CNDDB occurrences at Vail Lake, 1 in the Santa Margarita

Ecological Reserve, 1 near Sage, 1 at Potrero Creek, 1 near Aguanga, and 1 in the Agua Tibia Mountains, as well as 11 historic locations that are clustered near or have precision buffers that overlap the CNDDB records. We therefore interpret the objective to require the inclusion of the 7 CNDDB records. Prior to 2011, we confirmed single occurrences in the Agua Tibia Mountains, the San Jacinto Mountains, and Potrero Creek. In 2011, we confirmed an occurrence of *Astragalus pachypus* var. *jaegeri* near Sage Road in Wilson Valley, which is likely to be the occurrence geo-referenced to the town of Sage. Of the remaining three occurrences, Vail Lake and Aguanga are out of the Conservation Area and the Temecula Canyon record is from the 1880s within a large and vaguely geo-referenced area. We have confirmed 4 of 7 (57%) occurrences.

***Atriplex coronata* var. *notatior*, San Jacinto Valley crownscale**

Objective 2 for this species requires the inclusion of the Alberhill Creek occurrence as well as three Core Areas, located along the San Jacinto River from the vicinity of Mystic Lake southwest to the vicinity of Perris and in the upper Salt Creek drainage west of Hemet. We interpret this objective to require the inclusion of four occurrences: Alberhill Creek, San Jacinto Wildlife Area, San Jacinto River south of the Ramona Expressway, and upper Salt Creek. Prior to 2011, we confirmed occurrences of *Atriplex coronata* at the Davis Unit of the San Jacinto Wildlife Area and on the western shore of Mystic Lake and at Salt Creek on the Playa West of Hemet. In 2011, we confirmed a third occurrence near the San Jacinto River in Nuevo. Currently, the historic occurrences near Alberhill Creek are outside of the Conservation Area. We have confirmed 3 of 4 (75%) occurrences.

***Atriplex parishii*, Parish's brittlescale**

Objective 2 for this species requires the inclusion of the three known occurrences in the upper Salt Creek drainage on the Playa West of Hemet. In 2011, we surveyed 5 stations in the vicinity of Nuevo but did not detect this species. We have confirmed 0 of 3 occurrences.

***Atriplex serenana* var. *davidsonii*, Davidson's saltscale**

Objective 2 for this species requires the inclusion of the three known occurrences of *Atriplex serenana* var. *davidsonii* at Salt Creek, the San Jacinto River and the San Jacinto Wildlife Area**.** Prior to 2011, we confirmed an occurrence at the San Jacinto Wildlife Area and near Salt Creek west of the Hemet Airport. In 2011, we surveyed five stations in the vicinity of Nuevo, near the San Jacinto River, but did not detect this species. We have confirmed 2 of 3 (66%) occurrences.

***Berberis nevinii*, Nevin's barberry**

Objective 2 for this species requires the inclusion of the known occurrences in the San Timoteo/Badlands area, Jurupa Hills, and Agua Tibia/Vail Lake area. Based on the species account and the MSHCP Historical Database, we interpret this objective to require the inclusion of occurrences near San Timoteo/Badlands, the Jurupa Hills, and the Agua Tibia/Vail Lake area. Prior to 2010, we confirmed a number of occurrences on Oak Mountain (UCR189589) and on the northern edge of the Agua Tibia Mountains (UCR217657). In 2010, we surveyed 20 stations in the hills east of Mystic Lake, but did not detect this species. Currently, the historic occurrence near the Jurupa Hills is

completely outside the Conservation Area and, according to the biological opinion, was destroyed by recent development. A very small portion of the precision buffer surrounding the historic occurrence in the Badlands is within the Conservation Area, and we have surveyed all of it. In 2011, we surveyed 4 more stations with potential habitat near the Badlands record but were unable to detect *B. nevinii*. We have confirmed 1 of 3 (33%) occurrences.

***Brodiaea filifolia,* thread-leaved brodiaea**

Objective 2 for this species requires the inclusion of the Core Areas located at Goetz Road (EO1), Perris Valley airport (EO2), Tenaja Road (EO3), Mesa de Colorado (EO5), Hemet vernal pools (EO26), South [San Jacinto Wildlife Area] (EO27), Squaw Mountain (EO29), Santa Rosa Ranch (EO30), Slaughterhouse (EO31), North [San Jacinto Wildlife Area] (EO43) and Redondo Mesa (EO 52). Prior to 2010, we confirmed CNDDB occurrences near the Santa Rosa Plateau (EO3, EO30, EO5, and EO31) and at the Davis unit of the San Jacinto Wildlife Area (EO43). In 2010, because of recent taxonomic changes to *B. filifolia,* we revisited the 4 previously confirmed occurrences at the Santa Rosa Plateau to confirm their identity. Of the 4 occurrences we confirmed *B. filifolia* within 3 of the CNDDB polygons (EO05, EO30, and EO31). At the remaining occurrence, EO03, we only detected *B. santarosae*, a recently described and closely related species. Additionally, we detected this species within CNDDB occurrence EO27 near the southern boundary of the San Jacinto Wildlife Area. The remaining occurrences are currently not in the Conservation Area. In 2011, we detected an additional occurrence in the San Jacinto Wildlife area as an incidental observation; however, it did not meet any additional occurrence objectives. Not including EO03, we have confirmed 5 of 10 (50%) occurrences.

***Brodiaea orcuttii,* Orcutt's brodiaea**

Objective 1 for this species requires the inclusion of 1 occurrence at Miller Mountain within the San Mateo Wilderness Area; a complex of about 5 occurrences on Mesa de Burro, Mesa de Colorado, and Mesa de la Punta on the Santa Rosa Plateau within the Santa Rosa Plateau Preserve; and 1 occurrence along the San Jacinto River. Prior to 2011, we only surveyed for *B. orcuttii* as part of vernal pool surveys and were unable to confirm any occurrences. Chester et al. (2007) suggest that previously identified occurrences of *B. orcuttii* in Riverside County may actually consist of a newly described species, *B. santarosae.* In 2011, we did not survey for this species. We have confirmed 0 of 7 occurrences.

***Calochortus palmeri* var. *munzii,* Munz's mariposa lily**

Objective 2 for this species requires the inclusion of 10 of the known occurrences within the San Jacinto Mountains, including Garner Valley. Prior to 2011, we confirmed 8 occurrences throughout the San Jacinto Mountains from Alvin Meadows west of Idyllwild to Bull Canyon trailhead south of Garner Valley (UCR189812). Another 2 occurrences have been confirmed using data from the U.S. Forest Service. Including Forest Service data, we have confirmed 10 of 10 (100%) occurrences.

***Calochortus plummerae,* Plummer's mariposa lily**

Objective 2 for this species requires the inclusion of at least eight of the known occurrences (near Hemet Lake within Garner Valley within the San Jacinto Mountains, the Jurupa Hills, Reche Canyon, along Highway 74 in the San Jacinto Mountains and west of Oak Glen Conservation Camp within the San Bernardino Mountains). We interpret this objective to require the inclusion of single occurrences in the Jurupa Hills; in the vicinity of Reche Canyon/Boxsprings; along Highway 74, in the San Jacinto Mountains; at the Southwestern Riverside County Multiple Species Reserve; in Garner Valley; west of Oak Glen Conservation Camp; and 2 occurrences in the vicinity of the Badlands/San Timoteo Canyon. The historic point near Garner Valley is actually based on a voucher for *Calochortus palmeri* var. *munzii* and not *C. plummerae*, therefore we do not consider that occurrence to be part of the objective. Prior to 2011, we confirmed one occurrence along Highway 74, two in the Badlands, one at Lake Skinner, one in the Jurupa Hills, one on the southwestern slopes of Box Springs, and one near the Oak Glen Conservation Camp. Not including the occurrence near Hemet Lake, we have confirmed 7 of 7 (100%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of six localities with ≥ 500 individuals each. Prior to 2011, we confirmed localities with over 500 individuals at the Potrero Unit of the San Jacinto Wildlife Area, along Rousse Ridge, at Chimney Flats, in the Jurupa Hills, along Highway 74, and in the Oak Flats area of the San Jacinto Mountains. We have confirmed 6 of 6 (100%) localities for this species.

***Calochortus weedii* var. *intermedius,* intermediate mariposa lily**

Objective 2 for this species requires the inclusion of at least 2 of the known occurrences, in the hills west of Crown Valley and Vail Lake, and possibly a third locality in the Sierra Peak area of the Santa Ana Mountains. Prior to 2010, we confirmed an occurrence near Sierra Peak in the Santa Ana Mountains (UCR217564). In 2010, we confirmed an occurrence east of the Hogbacks, in the Winchester 700 property (UCR217523 and UCR216952). The occurrence near the Hogbacks is not mentioned in the species account so we are not counting it toward the objective. In 2011, we confirmed an occurrence growing and hybridizing with *C. plummerae* in the hills of Crown Valley. This population was found within the Multi- Species Reserve, adjacent to the historical record, which is outside the conservation area, about 325 m outside the CNDDB buffer. The remaining occurrence is currently outside of the Conservation Area. We have confirmed 2 of 3 (67%) occurrences.

***Caulanthus simulans,* Payson's jewelflower**

This species does not have a distributional objective in the MSHCP. Prior to 2011, we detected numerous occurrences of *Caulanthus simulans* near Silverado Ranch (UCR217523 and UCR189560). In 2011, we did not target this species but did detect four more occurrences incidentally in the Durasno Valley area.

***Ceanothus ophiochilus,* Vail Lake ceanothus**

Objective 2 for this species requires the inclusion of at least three core locations in the vicinity of Vail Lake and the Agua Tibia Wilderness area. We interpret this objective

to require the inclusion of occurrences in the vicinity of the 2 CNDDB records at Agua Tibia and the 1 CNDDB record near Vail Lake. Prior to 2011, we confirmed occurrences of *Ceanothus ophiochilus* at the 2 locations in the Agua Tibia Wilderness. Because the remaining CNDDB occurrence is outside of the Conservation Area, we did not survey for this species in 2011. We have confirmed 2 of 3 (67%) occurrences.

***Centromadia pungens* ssp. *laevis*, smooth tarplant**

Objective 2 for this species requires the inclusion of at least 29 of the known occurrences of this species at Antelope Valley, Temescal Canyon, Lake Elsinore, Murrieta Creek, French Valley, Lakeview Mountains, Lake Skinner, Diamond Valley Lake, Sycamore Canyon Park, Alberhill Creek, Lake Matthews, the Santa Ana River, and the core locations at the San Jacinto Wildlife Area, the middle segment of the San Jacinto River, and Upper Salt Creek. The species account mentions substantially more historic occurrences than are listed in the objective, and the USFWS Biological Opinion (2004) states that the populations at Lake Matthews and Diamond Valley Lake are most likely extirpated. Therefore, we interpret the objective to require the inclusion of at least 27 of the known occurrences of this species at Antelope Valley; Temescal Canyon; South of Lake Elsinore; Murrieta Creek; French Valley; Lakeview Mountains; Lake Skinner; Sycamore Canyon Park; Alberhill Creek; Northwest of Hemet; the Gavilan Hills; North of the Tres Cerritos Hills; Potrero Creek; Clinton Keith east of the Deer Creek development; the Santa Ana River; and multiple occurrence in the core locations at the San Jacinto Wildlife Area, the middle segment of the San Jacinto River, and Upper Salt Creek. Prior to 2010, we confirmed 1 occurrence at Lake Skinner, 1 at Murrieta Creek, 3 at the San Jacinto Wildlife Area (UCR189808 and UCR189803), 1 at Salt Creek, 2 in the Badlands, 1 at Harford Springs County Park (UCR217565), 1 along Potrero Creek (UCR217656), and 1 at Sycamore Canyon (UCR217501). In 2010, we confirmed 3 occurrences along Murrieta Creek (UCR217652), 1 along near the Deer Creek development, 1 north of the Tres Cerritos Hills (UCR217639), 1 at the San Jacinto Wildlife Area, 1 along the drainage north of Diamond Valley Lake (UCR217662), and 1 in the Hidden Valley Wildlife Area. In 2011, we confirmed 1 occurrence in French Valley. The objectives for this species require additional clarification to determine how many of the location requirements have been met.

***Chorizanthe leptotheca*, peninsular spine flower**

Objective 2 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities with 1000 individuals each. Prior to 2011, we confirmed 3 localities in the San Jacinto Mountains: Juan Diego Flats, Garner Valley and west of the 371-74 junction; 4 localities in Bautista Canyon, 1 east of Dripping Springs Campground, 2 west of Durasno Valley, and 1 along Rousse Ridge. Additionally, the UCR CCB confirmed a locality with more than 1000 individuals along Highway 74, near the Cranston Ranger Station, and we confirmed occurrences of less than 1000 individuals each in Bee Canyon and Temescal Canyon. We have confirmed 12 localities, 2 more than required (120%).

***Chorizanthe parryi* var. *parryi*, Parry's spine flower**

Objective 2 for this species requires inclusion of 20 occurrences of *Chorizanthe parryi* var. *parryi*, including locations throughout the Vail Lake area and in the vicinity of

Lake Matthews, Gavilan Hills, Antelope Valley, Rawson Canyon, Santa Rosa Hills, Reche Canyon, Wilson Valley, Juniper Flats, Gilman Hot Springs Road and Diamond Valley Lake. The objective does not require the inclusion of *known* occurrences; therefore, we interpret this objective to require confirmation of the species at each of the 11 locations mentioned and confirmation of additional occurrences anywhere in the Conservation Area. Prior to 2011, we confirmed 1 occurrence at Harford Springs County Park, 1 in Crown Valley, 1 at the Potrero Unit of the San Jacinto Wildlife Area, 1 in Cactus Valley, 1 at Kabian Park, 1 on the McElhinney/Stimmel property, 2 in Rawson Canyon, 3 near Lake Skinner, 2 in Wilson Valley, 1 in the Sedco Hills, 1 north of Diamond Valley Lake, and 1 on the north side of Lake Matthews. In 2011, we confirmed an occurrence at Juniper Flats. Of the remaining 3 historic occurrences 2 are currently outside of the Conservation Area (Vail Lake and Reche Canyon). We have surveyed for the Gilman Hot Springs occurrence, which is most likely extirpated. We have confirmed 16 of 20 (80%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the confirmation of 10 localities with ≥1000 individuals each. Through 2011, we confirmed single localities with ≥1000 individuals at McElhinney/Stimmel, Bogart County Park, east of the Hogbacks, the Potrero Unit of the San Jacinto Wildlife Area, Harford Springs County Park, and 3 at Lake Skinner. In addition, UCR CCB documented single localities of this species in the Sedco Hills, Lake Skinner, and in the vicinity of Wilson Valley with ≥1000 individuals. We have confirmed 11 of 10 (110%) localities.

***Chorizanthe polygonoides* var. *longispina*, long-spined spine flower**

Objective 2 for this species requires the inclusion of at least 32 occurrences of this species, including the two core locations at Lake Matthews and in the Agua Tibia Mountains. The objective does not specify the inclusion of "known" occurrences; therefore, we assume the 32 occurrences can be anywhere within the Conservation Area as long as 1 is near Lake Matthews and 1 is near the Agua Tibia Mountains. Prior to 2011, we confirmed 1 occurrence at Alberhill, 5 at Lake Skinner, 2 on Oak Mountain, 1 at McElhinney/Stimmel, 2 in Garner Valley, 1 on Elsinore Peak, 1 at Harford Springs County Park, 3 in San Mateo Canyon, 1 near Lake Matthews, 3 at the Santa Rosa Plateau, and 5 near Agua Tibia. In 2006, UCR CCB confirmed single occurrences of this species at Kabian Park and in the Sedco Hills. The CNLM has confirmed 3 occurrences, 1 at Johnson Ranch, 1 near Warm Springs, and 1 at Lincoln Ranch. While we did not target this species in 2011, we detected it 11 times at sentinel sites and incidental to other surveys. Including CCB and CNLM data, we have confirmed 32 of 32 (100%) occurrences.

***Chorizanthe procumbens*, prostrate spine flower**

Objective 2 for this species requires the inclusion of at least 14 of the known occurrences in the Santa Ana Mountains; in the Agua Tibia Mountains including the Core Areas at: Dorland Mountain; west of Beaumont; and the vicinity of French Valley. Based on our analysis of the species account and the MSHCP Historical Database, we interpret this objective to require the inclusion of 2 occurrences in the vicinity of the Agua Tibia Mountains, 1 west of Beaumont, 1 north of Bachelor Mountain (east of French Valley), 5 in the Santa Ana Mountains, and 5 other occurrences distinct from those already

mentioned. Prior to 2011, we confirmed 5 occurrences of this species in the Santa Ana Mountains, 3 in the Agua Tibia Mountains, and 1 at the Santa Rosa Plateau. In 2011, we detected 3 occurrences at the Santa Margarita Ecological Reserve, meeting the last 2 of the 5 unspecified occurrences. We have confirmed 11 of 14 (79%) occurrences.

***Convolvulus simulans*, small-flowered morning-glory**

Objective 2 for this species requires the inclusion of at least 8 of the known occurrences including Vail Lake, Lake Skinner, Lake Matthews, Temescal Canyon, Alberhill, Santa Rosa Plateau, Santa Ana Mountains, and Skunk Hollow. The historic occurrence in the Santa Ana Mountains was improperly georeferenced and is actually the same as the Temescal Canyon occurrence. Prior to 2011, we confirmed single occurrences on Oak Mountain (UCR189581), Lake Skinner, Alberhill, south of Scott Road (UCR205442 and UCR205452), and the Santa Rosa Plateau (UCR189584 and UCR189783) and 2 occurrences at Lake Matthews (UCR217547 and UCR217666). In 2011, we confirmed another occurrence south of Scott Road. We have not confirmed the occurrence at Skunk Hollow and the remaining occurrence in Temescal Canyon is not currently within the Conservation Area. We have confirmed 6 of 8 (75%) occurrences.

***Deinandra mohavensis*, Mojave tarplant**

Objective 2 for this species requires the inclusion of at least 5 of the known occurrences within the San Jacinto Mountains, the foothills of the San Jacinto Mountains, and northeast of Vail Lake. Based on the species account, the CNDDB, and the MSHCP Historical Database, we consider these to include CNDDB occurrences along Highway 243 (EO17, EO10), as well as historic occurrences near Wilson Valley, along 243 north of Pine Cove, and near Mountain Center. Prior to 2010, we confirmed single occurrences at EO17, near Mountain Center, and along 243 north of Pine Cove. In 2011, we confirmed the occurrence in Wilson Valley, northeast of Vail Lake. We have confirmed 4 of 5 (80%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the inclusion of 4 localities occupying 100 ac each. In 2010, we mapped over 100 acres of *D. mohavensis* at each of 5 locations throughout the San Jacinto Mountains: Chimney Flats, Oak Flats, Quinn Flats, Fobes Canyon, and the north end of Garner Valley. We have confirmed 5 of 4 (125%) localities.

***Dodecahema leptoceras*, slender-horned spine flower**

Objective 2 for this species requires inclusion of at least 11 of the known occurrences, including Temescal Canyon, Bautista Canyon, upper San Jacinto River, Agua Tibia Wilderness Area, Alberhill, Alberhill Creek east of Lake Elsinore, Railroad Canyon, Vail Lake, Kolb Creek, and east of State Street south of Hemet. Prior to 2010, we confirmed single occurrences near Bautista Canyon, the Agua Tibia Mountains and 2 occurrences near the San Jacinto River. In 2011, we surveyed 35 stations near Alberhill Creek, Railroad Canyon and south of Hemet, and were unable to locate any additional occurrences. We have confirmed 4 of 11 (36%) occurrences.

***Dudleya multicaulis*, many-stemmed dudleya**

Objective 2 for this species requires the inclusion of at least 26 of the known occurrences, including at Estelle Mountain, Temescal Canyon, the Santa Ana Mountains, Gavilan Hills, Alberhill Creek, and the Prado Basin. The MSHCP Historical Database does not contain locations for 26 unique occurrences and the USFWS Biological Opinion (2004) for this species only recognizes 19 unique records within the Conservation Area. We recommend that this species objective be amended to include only unique, known occurrences of *D. multicaulis*. Based on the MSHCP Historical Database and the USFWS Biological Opinion (2004), we have interpreted the objective to require the inclusion of 8 of the 10 CNDDB occurrences, including 2 on Estelle Mountain, 1 in the San Mateo Canyon Wilderness, 3 in Temescal Creek, 1 on Alberhill Mountain, and 1 in the Prado Basin. In addition, the objective requires the inclusion of 11 additional unique occurrences at Vail Lake, La Paz Canyon, Arroyo del Toro, Bedford Canyon, the Estelle Mountain Reserve, Temescal Canyon, northwest of Lake Elsinore, and the San Mateo Canyon Wilderness. Prior to 2010, we confirmed 2 CNDDB occurrences and 1 historic occurrence on Estelle Mountain and 1 occurrence in the Oak Flat area of San Mateo Canyon. In 2010, we confirmed an occurrence on Alberhill Mountain, and 2 occurrences within the Estelle Mountain Reserve, north of Dawson Canyon. In 2011, we surveyed 14 stations in Temescal Wash and the Santa Ana Mountains but we did not confirm any additional occurrences of this species. The objectives for this species require additional clarification to determine how many of the location requirements have been met.

***Dudleya viscida*, sticky-leaved dudleya**

Objective 2 for this species requires the inclusion of three occurrences within the San Mateo Wilderness Area of the Santa Ana Mountains. Prior to 2011, we confirmed 3 occurrences in the San Mateo wilderness separated from one another by at least 1 km. We have confirmed 3 of 3 (100%) occurrences.

***Eriastrum densifolium* ssp. *sanctorum*, Santa Ana River woolly star**

Objective 2 for this species requires the inclusion of at least three occurrences along the Santa Ana River near the San Bernardino County border. Prior to 2011, we confirmed 3 occurrences of this species along a 2-km stretch of the Santa Ana River, from Mission Blvd to the San Bernardino County Line. We have confirmed 3 of 3 (100%) occurrences.

***Erodium macrophyllum*, round-leaved filaree**

Objective 2 for this species requires the inclusion of 8 out of the 10 known occurrences of round-leaved filaree: 4 occurrences in the Gavilan Hills region and 1 each at Lake Matthews, along Temescal Wash near Lee Lake, at Diamond Valley Lake, and in the foothills of the Agua Tibia Mountains. Of the 8 included occurrences, all 4 in the Gavilan Hills are from the same location south of Lake Matthews. In addition, based on the MSHCP Historical Database, we realize the occurrence in the foothills of the Agua Tibia Mountains is actually located on Oak Mountain and the occurrence at Diamond Valley Lake is actually located on the south side of Bachelor Mountain, just north of Lake Skinner. Therefore, based on the USFWS Biological Opinion (2004) and the Historical Database, we consider this objective to require 8 occurrences, including 5 out of the 7 known occurrences in the Gavilan Hills region, at Lake Matthews, along

Temescal Wash near Lee Lake, at Lake Skinner, on Oak Mountain and 3 other unique occurrences. Prior to 2011, we confirmed 1 occurrence each at Lake Skinner, Oak Mountain, the Gavilan Hills, and just south of Lake Matthews (UCR216951). In 2011, we confirmed an occurrence in Warm Springs. The occurrence in Temescal Canyon is currently out of access. We have confirmed 5 of 8 (63%) unique occurrences.

***Eryngium aristulatum* var. *parishii*, San Diego button-celery**

Objective 2 for this species requires the inclusion of at least four known occurrences on the Santa Rosa Plateau. Prior to 2011, we confirmed 2 occurrences of *E. aristulatum* var. *parishii* on Mesa de Burro and 2 on Mesa de Colorado. We have confirmed 4 of 4 (100%) occurrences.

***Galium angustifolium* ssp. *jacinticum*, San Jacinto Mountains bedstraw**

Objective 2 for this species requires the inclusion of at least 8 of the known occurrences at Lake Fulmor, Dark Canyon, and the Black Mountain area. There are 3 CNDDB records for this species and 6 records in the MSHCP Historical Database. However, all but 2 of the records in the MSHCP Historical Database are virtually identical to the CNDDB polygons. The remaining 2 records are extremely imprecise and may overlap with 2 of the CNDDB records. Therefore, for our analysis, we are only considering the 3 CNDDB records as specific sites to be confirmed and counting any additional, unique occurrences toward the objective. To further complicate matters, the CNDDB occurrence near Black Mountain appears to be poorly georeferenced. After reading the locality information of the voucher the CNDDB record is based on, we determined that the area 1 km northwest was a more likely area for the occurrence to be located. Prior to 2011, we confirmed the CNDDB occurrences at Lake Fulmor, near Black Mountain, and near Stone Creek Camp as well as historic occurrences near Lawler Park, Dark Canyon, along Seven Pines Trail, on Fuller Ridge, and on the southern edge of Pine Cove. We have confirmed 8 of 8 (100%) occurrences.

***Galium californicum* ssp. *primum*, California bedstraw**

Objective 2 for this species requires the inclusion of at least four of the known occurrences in the vicinity of Alvin Meadows between Pine Cove and Idyllwild in the San Jacinto Mountains. Prior to 2011, the San Bernardino National Forest confirmed 4 occurrences near Alvin Meadows. Including U.S. Forest Service data, we have confirmed 4 of 4 (100%) occurrences.

***Harpagonella palmeri*, Palmer's grapplinghook**

Objective 2 for this species requires the inclusion of at least 24 of the known occurrences of this species at Temescal Wash, Alberhill, Lake Elsinore, Antelope Valley, Bachelor Mountain, Vail Lake, Lake Matthews, Harford Springs Park, Cleveland National Forest, Skunk Hollow, and Lake Skinner. Prior to 2010, we confirmed 1 occurrence at Harford Springs Park (UCR217545), 2 at Lake Matthews (UCR217510 and UCR217556), 1 at Alberhill (UCR217542), 5 at Lake Skinner, 2 at Vail Lake/Oak Mountain, 1 at McElhinney/Stimmel, and 2 in the Cleveland National Forest (UCR217554). The CNLM has reported single occurrences at Lincoln Ranch, Warm Springs, and Skunk Hollow. In 2010, we confirmed 1 occurrence east of Dripping Springs, 1 east of the Hogbacks (UCR217648), and 2 near Lake Matthews (UCR217521

and UCR217646). In 2011, we confirmed 1 occurrence in Temescal Wash and another unique occurrence in Wildomar. The Wildomar occurrence is not mentioned in the MSHCP and does not count as a required objective. Including CNLM data, we have confirmed 19 of 24 (79%) occurrences.

***Heuchera hirsutissima*, shaggy-haired alumroot**

Objective 2 for this species requires the inclusion of 2 known occurrences in the San Jacinto Mountains: 1 on the western slopes of the San Jacinto Mountains above the San Jacinto River and the other in a gully behind Tahquitz Rock. *H. hirsutissima* is a difficult species to identify because it is only distinguishable from similar species of *Heuchera* when in flower, and is part of a complex of species in need of monographic study (Elvander 1993). In 2007, with the aid of Andy Sanders, curator of the UCR Herbarium, we were unable to positively identify to species a collection we made of *Heuchera*, even though the specimen contained flowers. Therefore, we are reporting only on our observations of *Heuchera*. Prior to 2011, we confirmed an occurrence on the western slopes of the San Jacinto Mountains. Additionally, Monitoring Program staff have twice documented *Heuchera* sp. growing on or near Tahquitz Rock during off-work hours. However, all individuals located around Tahquitz Rock were growing outside of the Plan Area. If the individuals at the first location are indeed *H. hirsutissima*, we have confirmed 1 of 2 (50%) occurrences.

***Holocarpha virgata* ssp. *elongata*, graceful tarplant**

Objective 2 for this species requires the inclusion of at least 8 of the known occurrences, including 4 occurrences located on Santa Rosa Plateau and 4 occurrences in the San Mateo Canyon Wilderness Area in the Cleveland Nation Forest. Prior to 2011, we confirmed 4 occurrences at the Santa Rosa Plateau (UCR217500 and UCR189778), 2 in the Tenaja area of the San Mateo Canyon Wilderness and 1 in the Cleveland National Forest. In 2011, we surveyed 12 stations in the San Mateo Canyon Wilderness of the Cleveland National Forest, but did not detect this species. We have confirmed 7 of 8 (88%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities with at least 1000 individuals each. Prior to 2010, we confirmed 8 localities on the Santa Rosa Plateau and 2 in the area of the Tenaja Corridor. We have confirmed 10 of 10 (100%) localities.

***Hordeum intercedens*, vernal barley**

Objective 2 for this species requires the inclusion of at least 4 occurrences (including 3 core locations) in the San Jacinto Wildlife Area, the middle segment of the San Jacinto River from the Ramona Expressway south to Railroad Canyon, the upper Salt Creek drainage west of Hemet, and near Nichols Road at Alberhill. Prior to 2010, we confirmed an occurrence at the San Jacinto Wildlife Area (UCR189804, UCR189805, and UCR189806). In 2010, we confirmed an occurrence near the Salt Creek Drainage. We have possibly detected a third occurrence at Alberhill, but have been unable to get a positive species identification from Andy Sanders, curator of the UCR herbarium. We have confirmed 2 of 4 (50%) occurrences.

***Hulsea vestita* ssp. *callicarpha*, beautiful hulsea**

Objective 2 for this species requires the inclusion of at least 12 of the known occurrences at Lake Fulmor, Pine Cove, Idyllwild, Mountain Center, Pine Meadow and Lake Hemet. The MSHCP Historical Database contains 23 records for this species in the San Jacinto Mountains that are precise to within 2000 m or less. The Biological Monitoring Program and SBNF have detected *H. vestita* ssp. *callicarpha* within the vicinity of at least 18 of these records, including in the vicinity of all of the specific areas mentioned in the species account. Including data from SBNF, we have confirmed 12 of 12 (100%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 16 localities with no less than 50 individuals each. Of the 23 confirmed occurrences, 16 contain more than 50 individuals. Including data from SBNF, we have confirmed 16 of 16 (100%) localities.

***Juglans californica* var. *californica*, California black walnut**

Objective 2 for this species requires the inclusion of at least 7 known occurrences within the Santa Ana Mountains, at Lake Skinner, at the Santa Rosa Plateau, and east of Pedley. Prior to 2011, we confirmed 2 occurrences at Lake Skinner, 1 along the Santa Ana River/east of Pedley, and 1 in Chino Hills State Park. All of these locations contain only a few scattered individuals, not extensive California walnut woodlands. Occurrences of *Juglans californica* var. *californica* in the vicinity of Lake Skinner and Santa Rosa Plateau are not thought to be naturally occurring, but rather the result of introductions (USFWS 2004). Also, according to Zach Principe, former Project Ecologist at the Santa Rosa Plateau Ecological Reserve, naturally occurring *J. californica* var. *californica* has never been documented on the Santa Rosa Plateau (*2007 personal communication from Z. Principe to D. Menuz, former Botany Program Lead, Biological Monitoring Program, unpublished data*). As a result, we recommend that the objective for this species be reevaluated and rewritten. Native stands of this species are thought to be restricted to the area around the Santa Ana River and the northern Santa Ana Mountains (USFWS 2004). In 2011, we surveyed 6 stations in the Santa Ana River and Santa Ana Mountains, but did not detect any additional occurrences. As the objective is currently written, we have confirmed 4 of 7 (57%) occurrences.

***Lasthenia glabrata* ssp. *coulteri*, Coulter's goldfields**

Objective 2 for this species requires the inclusion of at least 20 of the known occurrences, including 3 Core Areas: the San Jacinto Wildlife Area and the southern shores of Mystic Lake, the middle segment of the San Jacinto River, and a portion of the Alberhill locality. Based on the species account, the MSHCP Historical Database, and the CNDDB, our interpretation of the known occurrences includes the 5 CNDDB records along the San Jacinto River south of Ramona Expressway, 7 in San Jacinto Wildlife Area, and 1 near Alberhill, as well as any 7 other historic occurrences that are distinct from the CNDDB records. Prior to 2011, we confirmed 11 occurrences at San Jacinto Wildlife Area: 5 CNDDB occurrences and 6 historic occurrences; and an occurrence on the southern shore of Mystic Lake. In 2011, we confirmed an additional occurrence in Warm Springs. We have confirmed 13 of 20 (65%) occurrences.

***Lepechinia cardiophylla*, heart-leaved pitcher sage**

Objective 2 for this species requires the conservation of seven known occurrences in the vicinity of Sierra Peak, Indian Truck Trail, Bald Peak, Trabuco Peak, Horsethief Trail, Pleasants Peak, and the ridge between Ladd Canyon and East Fork Canyon. All seven of the historic locations correspond to CNDDB occurrences. Prior to 2011, we confirmed occurrences of at Sierra Peak, near Pleasants Peak, Bald Peak, and Indian Truck Trail. The remaining three occurrences are all along the Riverside/Orange County boundary. We have thoroughly surveyed all suitable habitat located within the Riverside portion of their CNDDB polygons but did not detect *L. cardiophylla*. Although not specifically mentioned in the species account, we have detected this species in 5 additional locations throughout the Santa Ana Mountains: EO03 above Wardlow Canyon, along Skyline Drive, and 2 places along Indian Truck Trail. We have confirmed 4 of 7 (57%) required occurrences.

***Lilium humboldtii* ssp. *ocellatum*, ocellated Humboldt lily**

Objective 2 for this species requires the inclusion of at least 4 of the known occurrences at Arroyo Seco Canyon in the Agua Tibia Wilderness Area, Fisherman's Camp in Tenaja Canyon, Castro Canyon, Horsethief Canyon, Elsinore Mountains, and Corona between Tin Mine Canyon and Santiago Peak, Skyline Drive populations. Castro Canyon is located in San Diego County, and the reference to the Elsinore Mountains and Horsethief Canyon probably comes from the same 1955 herbarium collection by Gale Sphon that lists the locality as "Peninsular Ranges; Santa Ana Mountains region; Horsethief Canyon, Elsinore Mountains." Therefore, we interpret the objective to require the conservation of *Lilium humboldtii* ssp. *ocellatum* in Arroyo Seco Canyon, Tenaja Canyon, Horsethief Canyon, and in the vicinity of Tin Mine Canyon. Prior to 2011, we confirmed single occurrences at Arroyo Seco, Horse Thief Canyon (UCR217561), Tin Mine Canyon, Fisherman's camp, and De Luz Creek. We have confirmed 4 of 4 (100%) occurrences.

***Lilium parryi*, lemon lily**

Objective 2 for this species requires the inclusion of at least 7 occurrences within the San Jacinto Mountains. Prior to 2011, we confirmed 7 occurrences in the San Jacinto Mountains. We have confirmed 7 of 7 (100%) occurrences.

***Limnanthes gracilis* var. *parishii*, Parish's meadowfoam**

Objective 2 for this species requires the inclusion of at least 1 known occurrence on the Santa Rosa Plateau. In 2009, we confirmed the known occurrence on the Mesa de Colorado, at the Santa Rosa Plateau. We have confirmed 1 of 1 (100%) occurrence.

***Microseris douglasii* ssp. *platycarpha*, small-flowered microseris**

Objective 2 for this species requires the inclusion of at least 8 of the known occurrences at Lake Matthews, in the Cleveland National Forest, at Lake Skinner, and at Vail Lake. Prior to 2010, we confirmed 2 occurrences at Lake Skinner (UCR189562), 1 on Oak Mountain/Vail Lake (UCR189587), 1 at Lake Matthews (UCR217515) and 1 at Alberhill. In 2010, we confirmed occurrences near Lake Matthews (UCR217636) and in Paloma Valley at Hogbacks. In 2011, we confirmed the remaining occurrence at Oak Mountain. We have confirmed 8 of 8 (100%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities each with ≥1000 individuals. In 2010, we confirmed 9 localities, including: 1 south of Lake Matthews (UCR217636), 1 near Alberhill (UCR189588), 1 on the Mesa de Burro (UCR217650), 2 at the McElhinney/Stimmel property (UCR217519), 1 east of the Hogbacks (UCR217528), 1 on the southern slope of Bachelor Mountain (UCR189562), 1 east of Lake Skinner, and 1 on Oak Mountain (UCR189587). In 2011, we confirmed another locality at Oak Mountain. We have confirmed 10 of 10 (100%) localities.

***Mimulus clevelandii*, Cleveland's bush monkey flower**

Objective 2 for this species requires the inclusion of the 2 known occurrences of this species on Santiago Peak in the Santa Ana Mountains and on the northern slopes of the Agua Tibia Mountains. Prior to 2011, we confirmed the occurrence near Santiago Peak (UCR189579) and in the Agua Tibia Mountains (UCR217549. It was also detected incidentally in 2 new locations. We have confirmed 2 of 2 (100%) occurrences.

***Mimulus diffusus*, Palomar monkey flower**

Objective 2 for this species requires the inclusion of at least 18 of the known occurrences: on the Santa Rosa Plateau; in the vicinity of Sage; French Valley; east of Lake Skinner; and in the San Jacinto, Agua Tibia, and the Santa Ana Mountains. Based on our readings of the species account and the MSHCP Historical Database, we interpret this objective to require the inclusion of 5 occurrences in the Santa Ana Mountains, 3 in the Agua Tibia Mountains, 6 in the San Jacinto Mountains, 1 at the Santa Rosa Plateau, 1 near Sage, 1 at Lake Skinner, and 1 at the east end of French Valley. Prior to 2011, we confirmed 1 occurrence on Elsinore Peak, 1 in San Mateo Canyon (UCR205443), 1 near Lake Skinner (UCR217568), 2 in Agua Tibia (UCR205444 and UCR217534), 3 in the San Jacinto Mountains, and 3 in the Santa Ana Mountains (UCR217637 and UCR217640). We have confirmed 11 of 18 (61%) occurrences.

***Monardella macrantha* ssp. *hallii*, Hall's monardella**

Objective 2 for this species requires the inclusion of 5 known occurrences, including: Cahuilla Mountain, southwest of Pine Cove in the San Jacinto Mountains, 2 occurrences on the north slope of the Agua Tibia Mountains, and Santiago Peak in the Santa Ana Mountains. Based on the MSHCP Historical Database and CNDDB records, we believe the 2 cited occurrences in the Agua Tibia Mountains are actually at the same location. Therefore, we interpret the objective to require the inclusion of the 4 known occurrences at Cahuilla Mountain, southwest of Pine Cove, the north slope of the Agua Tibia Mountains, and Santiago Peak. Prior to 2011, we confirmed single occurrences in the Santa Ana Mountains, the Agua Tibia Mountains, Cahuilla Mountain, and the San Jacinto Mountains. Based on out interpretation of the objective, we have confirmed 4 of 4 (100%) occurrences.

***Muhlenbergia californica*, California muhly**

Objective 2 for this species requires the inclusion of known occurrences at Sage, Aguanga, Estelle Mountain, Prado Dam, Temescal Canyon, and Sitton Peak. Neither the MSHCP Historical Database nor the CNDDB contain any records of *M. californica* within the Plan Area. In addition, the locations mentioned in the USFWS Biological

Opinion (2004) and the species account are solely based on an unpublished report by the USFWS that we have been unable to acquire. Based on the current information we have about the distribution of this species, we recommend changing the species objective or not including this species in the MSHCP.

***Myosurus minimus* ssp. *apus*, little mouse tail**

Objective 2 for this species requires the inclusion of at least 5 of the known occurrences of this species, including Harford Springs County Park on the Gavilan Plateau and the 3 core locations: 1 along Salt Creek west of Hemet and 2 on the Santa Rosa Plateau. Prior to 2011, we confirmed occurrences at Mesa de Burro and Mesa de Colorado on the Santa Rosa Plateau, 2 near Salt Creek, and 1 at Harford Springs. We have confirmed 5 of 5 (100%) occurrences.

***Nama stenocarpum*, mud nama**

Objective 2 for this species requires the inclusion of 2 of 3 known occurrences along the San Jacinto River near Gilman Springs Road. Prior to 2011, we confirmed 2 occurrences along the edge of Mystic Lake (UCR217638). We have confirmed 2 of 2 (100%) required occurrences.

***Navarretia fossalis*, spreading navarretia**

Objective 2 for this species requires the inclusion of at least 13 of the known occurrences at Skunk Hollow, the Santa Rosa Plateau and core locations: the San Jacinto Wildlife Area, floodplains of the San Jacinto River from the Ramona Expressway south to Railroad Canyon, and upper Salt Creek west of Hemet. Based on our interpretation of the species account, these occurrences include 1 at Skunk Hollow, 1 at the Santa Rosa Plateau, 2 at Salt Creek, 4 along the San Jacinto River, and 5 at the San Jacinto Wildlife Area. Prior to 2010, we confirmed 1 occurrence at the San Jacinto Wildlife Area (UCR189559) and 1 on Mesa de Burro (UCR206021). In 2010, we confirmed 2 occurrences at the San Jacinto Wildlife Area, 1 near EO28 just north of the Ramona Expressway and 1 between EO37 and EO38. We also confirmed an occurrence in the vicinity of Salt Creek. In 2011, we surveyed 24 stations and confirmed one occurrences at the San Jacinto Wildlife Area East of Davis Road. We have confirmed 6 of 13 (46%) occurrences.

***Navarretia prostrata*, prostrate navarretia**

Objective 2 for this species requires the inclusion of at least 1 known occurrence at the Santa Rosa Plateau. Prior to 2011, we confirmed the occurrence on the Mesa de Burro (UCR206020). We have confirmed 1 of 1 (100%) occurrences.

***Orcuttia californica*, California Orcutt grass**

Objective 2 for this species requires the inclusion of at least 3 of the known occurrences at the Santa Rosa Plateau, Skunk Hollow, and in the upper Salt Creek drainage west of Hemet. Prior to 2011, we confirmed an occurrence at the Santa Rosa Plateau (UCR217551) and CNLM confirmed an occurrence at Skunk Hollow. In 2010, we surveyed 12 stations near the Salt Creek drainage, but did not detect any of this species. We did not survey for *O. californica* in 2011. Including CNLM data, we have confirmed 2 of 3 (66%) occurrences.

***Oxytheca caryophylloides*, chickweed oxytheca**

Objective 2 for this species requires the inclusion of at least 5 of the known occurrences within the San Jacinto Mountains. Prior to 2011, we confirmed 5 distinct occurrences north of Idyllwild, in the San Jacinto Mountains (UCR217535). We have confirmed 5 of 5 (100%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities with ≥1000 individuals each. Prior to 2011, we confirmed 10 localities with at least 1000 individuals in the vicinity of Hwy 243 between the Alandale and Vista Grande Ranger Stations (UCR217526 and UCR217651). We have confirmed 10 of 10 (100%) localities.

***Penstemon californicus*, California beardtongue**

Objective 2 for this species requires the inclusion of at least 15 occurrences in Aguanga, Blackburn Canyon, and the San Jacinto Mountains (including Garner Valley, Pyramid Peak, and Kenworthy Ranger Station). While the SBNF has confirmed the presence of *P. californicus* at Pyramid Peak, it is located outside of the Plan Area. Based on our analysis of the species account, the MSHCP Historical Database, and the CNDDB, we interpret this objective to require the inclusion of occurrences near Aguanga, the CNDDB occurrence EO6 on Rousse Ridge, the 7 CNDDB occurrences in Garner Valley, and 5 other historic locations distinct from those already mentioned. Prior to 2011, we confirmed 5 occurrences in Garner Valley. The habitat near Rousse Ridge does not appear to be suitable for *P. californicus,* so we surveyed an additional habitat in 13 stations near Rousse Hill, an area with habitat similar to Garner Valley, but still were unable to confirm any occurrences in that area. In 2011, we surveyed in the vicinity of CNDDB occurrences EO12 and EO01 in Garner Valley, but did not detect *P. californicus*. Not including Pyramid Peak, we have confirmed 5 of 14 (35%) occurrences.

***Phacelia stellaris*, Brand's phacelia**

Objective 2 for this species requires the inclusion of the 2 known occurrences along the Santa Ana River at Fairmont Park and in the Santa Ana Wilderness Area. The latter locality is actually a site along the Santa Ana River west of Fairmont Park where *P. stellaris* was collected in 2000. Prior to 2011, we confirmed the occurrence in the Santa Ana Wilderness. The occurrence at Fairmont Park is based on a voucher from 1925 that we have been unable to track down. We have confirmed 1 of 2 (50%) occurrences.

***Polygala cornuta* var. *fishiae*, Milk's fishwort**

Objective 2 for this species requires the inclusion of at least three of the known occurrences (Santa Rosa Plateau, Santa Margarita Ecological Reserve, and San Mateo Canyon). Prior to 2011, we confirmed occurrences of *Polygala cornuta* var. *fishiae* at the Santa Rosa Plateau (UCR189814), the Santa Margarita Ecological Reserve (UCR189555 and UCR217659), and in San Mateo Canyon (UCR189795). In 2011, we did not survey for this species. We have confirmed 3 of 3 (100%) occurrences.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 10 localities with ≥50 individuals or ramets each. Prior to 2010, we confirmed 6 localities greater than 50 individuals at the Santa Margarita Ecological

Reserve, 1 in San Mateo Canyon, 1 in the Tenaja Corridor (UCR217566), and 2 in the Santa Ana Mountains (UCR189801 and UCR189815). In 2010, we did not survey for this species. We have confirmed 10 of 10 (100%) localities.

***Potentilla rimicola*, cliff cinquefoil**

Objective 2 for this species requires the inclusion of 2 known occurrences in Dark Canyon and near Deer Spring. In 2008, we spent 9 days backpacking in the San Jacinto Mountains to look for this species. Before surveying, we identified areas with seemingly appropriate habitat using digital imagery in ArcGIS. We surveyed these areas as well as areas near the localities cited in the species objective. We found this species in only 1 of 32 surveyed grid cells. We found *Potentilla rimicola* almost directly between the two occurrences mentioned in objective 2 (UCR217560). We believe the occurrences cited in the objective, which are both drawn from collections made on 27 July 1924, may actually refer to a single collection site. If this is the case, then we have confirmed the only known occurrence for this species within the Conservation Area, and the species objective should be modified accordingly.

Objective 3 for this species, a demonstrate-conservation objective, requires the conservation of 5 localities at least 1 quarter section apart without regard to number of individuals. Prior to 2011, we confirmed one locality in the San Jacinto Mountains, described above. In 2011, we did not survey for this species. We have confirmed 1 of 5 (20%) localities.

***Quercus engelmannii*, Engelmann oak**

Objective 2 for this species requires the inclusion of at least 33 known occurrences of this species, including the core locations at the Santa Rosa Plateau and in the Santa Ana Mountains. Based on the MSHCP Historical Database, we interpret the objective to require the inclusion of 2 occurrences in the Tenaja corridor, 1 in the San Mateo Canyon Wilderness, 7 at the Santa Rosa Plateau, 3 south of the Santa Rosa Plateau, 2 in the vicinity of the Santa Margarita Ecological Reserve, 1 along Murrieta Creek, 2 at Lake Skinner, 1 at Vail Lake, 1 near Sage, 1 at Wilson Valley, 1 at the Potrero unit of the San Jacinto Wildlife Area, 1 at Estelle Mountain, 2 in the Santa Ana Mountains, 1 at Sycamore Canyon, 2 in the Agua Tibia Mountains, and 5 other occurrences distinct from those already mentioned. Prior to 2011, we confirmed 1 occurrence at the Potrero unit of the San Jacinto Wildlife Area, 7 at the Santa Rosa Plateau, 1 in San Mateo Canyon, 1 in the Agua Tibia Wilderness, 2 at the Santa Margarita Ecological Reserve, 2 near Lake Skinner, 2 in the Tenaja Corridor, 1 on Estelle Mountain, 1 within the precision buffer of the Vail Lake occurrence, and 7 other distinct occurrences. We have confirmed 25 of 33 (75%) occurrences.

Objective 3 for this species requires recruitment to be maintained at a minimum of 80 percent of the conserved occurrences as measured by the presence/absence of seedlings and/or saplings across any 5 consecutive years. This objective is addressed in a separate report, *Engelmann Oak (Quercus engelmanii) Recruitment Pilot Survey Report 2011*.

***Romney coulteri*, Coulter's matilija poppy**

Objective 2 for this species, a demonstrate-conservation objective, requires the inclusion of 30 localities (locality in this sense is not smaller than one quarter section). Based on our interpretation of the species account, the 30 localities, as long as they are at least 1 quarter section from each other, can be located anywhere within the Conservation Area. Prior to 2011, we confirmed 30 of 30 (100%) localities.

***Satureja chandleri*, San Miguel savory**

Objective 2 for this species requires the inclusion of at least seven of the known occurrences on the Santa Rosa Plateau; in the vicinity of Tenaja guard station, 3 miles south of Murrieta near De Luz Road in the Santa Ana Mountains; and 3 miles southwest of Murrieta near Warner's ranch. Based on our reading of the species account, CNDDB data, and the MSHCP Historical Database, we interpret the objective to require the inclusion of 5 occurrences at the Santa Rosa Plateau, 1 in San Mateo Canyon, and 1 in the Santa Ana Mountains. Prior to 2011, we confirmed 3 occurrences at the Santa Rosa Plateau: along Tenaja Truck Trail (UCR217505), in Miller Canyon (UCR189553), and in a drainage on the southeast corner of the Mesa de Burro (UCR189575). The remaining occurrences near the Plateau are currently outside of the Conservation Area and the 2 occurrences in the Santa Ana Mountains are based on extremely old and vague observations. We did not survey for this species in 2011. We have confirmed 3 of 7 (43%) occurrences.

***Sibaropsis hammittii*, Hammitt's clay-cress**

Species Objective 2 requires the inclusion of the 1 known occurrence near Elsinore Peak. Prior to 2011, we confirmed an occurrence on Elsinore Peak in the Santa Ana Mountains and have confirmed 1 of 1 (100%) occurrence.

***Trichocoronis wrightii* var. *wrightii*, Wright's trichocoronis**

Species Objective 2 requires the inclusion of 4 known occurrences along the San Jacinto River from the vicinity of the Ramona Expressway, San Jacinto Wildlife Area, and along the northern shore of Mystic Lake. In 2011, we surveyed 30 stations in the San Jacinto Wildlife Area and Mystic Lake and confirmed one occurrence of this species. We have surveyed intensively for this species. It may not be possible to meet the other three occurrence objectives. We have confirmed 1 of 4 (25%) occurrences.

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