

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

Rare Plant Survey Report 2007



19 March 2008

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NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological 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.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. 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 2007 Botany Program Lead, Diane Menuz. 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 Western Riverside County Regional Conservation Authority (RCA). For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

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INTRODUCTION

There are 63 plant species Covered by the Western Riverside County MSHCP. While the MSHCP lists species-specific criteria to be met for each species, generally the species objectives require the inclusion of a certain number of occurrences of that species within the Conservation Area. The MSHCP requires that the distribution of Covered plant species is surveyed for at least once every 8 years. Some species also have an objective specifying minimum population sizes that must be conserved at each occurrence.

Historic distribution information on the 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 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, the Monitoring Program plans to field verify historic records for each of the 63 Covered plant species during the first 5 years of the permit to determine their current status. At the end of this inventory stage, we will monitor verified occurrences of Covered plant species at least once every 8 years, as stipulated by the MSHCP, and continue to search for additional occurrences.

The University of California, Riverside (UCR) Center for Conservation Biology (CCB), under a contract from the California Department of Fish and Game, conducted surveys for 27 Covered plant species in 2003 and 2004 (UC Riverside 2005). Monitoring Program biologists conducted surveys for 16 Covered plant species in 2005 and 32 species in 2006. In 2007, we monitored the phenology of 15 species at sites where they were documented the previous year to guide the timing of our searches for Covered plant species at other locations. We focused our efforts on 28 plant species and documented the presence of 5 additional Covered Species that we encountered incidentally. In this report, we are including the results from surveys for *Quercus engelmannii* (Engelmann oak) conducted in the fall and winter of 2006 because that data was not included in the 2006 annual rare plant survey report (henceforth, references to 2007 include 2006 Engelmann oak surveys).

The goals for the 2007 rare plant survey were as follows:

Survey Goals:

- A) Document the presence of Covered Species at historical locations in the Conservation Area.
- B) Investigate the utility of using sentinel site information to make decisions about where and for which species to survey.
- C) Collect information on site characteristics such as vegetation structure, dominant habitat, and site impacts at all surveyed areas of historical occupancy by Covered plant species.
- D) Collect species-specific information such as population size and threats to the species as well as habitat covariate information including ground and vegetation cover at locations where Covered Species are found.
- E) Continue to test and refine protocol for surveying historical locations for rare plant species.

METHODS

Protocol Development

The protocol used for surveys in 2007 was modified from the *Western Riverside County MSHCP Biological Monitoring Program Protocol for Inventory-Phase Rare Plant Surveys and Plot-Based Data Collection 2006*, which was based largely on the *California Native Plant Society Vegetation Rapid Assessment Protocol* (CNPS Vegetation Committee 2004). We made several important modifications for 2007 surveys. First, while in 2006 habitat information such as phenology of vegetation, structure of vegetation layers and site disturbance was only collected when a Covered Species was found, in 2007 surveyors collected this information about the area they surveyed whether or not the targeted species was located. We hope this will allow comparison between sites where species were found and where they were not. This information may also give us more information about factors (e.g. late or early phenology, site disturbance, etc) that may explain why target species were not found at the time of survey. Second, surveyors were asked to provide information on how detectable the species would be at the site, if present. This information will help us understand how detectable different species are in the field and how this varies across sites, and may eventually be used to help determine if species are absent from a site. The last major change was that field staff collected more explicit information about the target species population when it was encountered in the field. We adapted much of this additional information from rare plant survey guidelines used by the U.S. Forest Service (USDA Forest Service 2005). We collected information including percent of target species in various phenological states, an estimate of area occupied by target species, and evidence of threats to species such as disease, competition, or herbivory. This species-specific information will give the Biological Monitoring Program a better understanding of the biology of the Covered plant species and also allow for quicker analysis of the threats that these species face at survey sites.

Personnel and Training

In January, February, and March of 2007, members of the plant field crew (“crew” or “surveyors”) participated in weekly training session with Mr. Andrew Sanders, UCR Herbarium Curator, to learn distinguishing traits and habitat information about selected Covered plant species. Crew members were shown herbarium specimen of target species as well as closely related or potentially confusing species. The week following a training session, crew members were quizzed on the information they learned, both with a written test and through a practical exam requiring correct identification of previously collected specimens. Crew members studied the 36 species originally targeted in the 2007 field effort, but because of lack of rain, surveys were only conducted for a subset of the originally chosen 36 species and additional species were targeted for surveys. Surveyors read the species accounts in volume 2 of the MSHCP (Dudek & Associates 2003), studied *The Jepson Manual* (Hickman 1993) and *A Flora of Southern California* (Munz 1974), looked at field photos of Covered plant species, and went in the field with crew already familiar with certain species to acquaint themselves with the additional target species.

Members of the plant field crew were required to become familiar with a large number of species in a variety of habitat types in order to collect information about associated species and gather plot-based data. Crew went on training walks with personnel already familiar with common vegetation in the Plan Area and used a variety of field guides to assist in plant identification. Plants that could not be identified to species during field surveys were collected

and identified with the assistance of Mr. Sanders. Some identified specimens were then added to the Monitoring Program in-house herbarium and used to aid future identification. Surveyors conducting rare plant surveys in 2007 included:

- Diane Menuz, Botany Program Lead (Regional Conservation Authority)
- Jason Hlebakos, Lead Botanist (Regional Conservation Authority)
- Amy Rowland (Regional Conservation Authority)
- Christina Greutink (Regional Conservation Authority)
- Joseph Veverka (Regional Conservation Authority)
- Kim Skahan (Regional Conservation Authority)
- Lee Ripma (Regional Conservation Authority)
- Lily Gordon (Regional Conservation Authority)
- Ryann Loomis (Regional Conservation Authority)
- Theresa Johnson (Regional Conservation Authority)
- Valerie Morgan (Regional Conservation Authority)
- Annie Bustamante (California Department of Fish and Game)
- Robert Jones (California Department of Fish and Game)
- Kelly Schmoker (California Department of Fish and Game)

Survey Site Selection

In 2007, we visited sites with known occurrences of 15 plants species to determine their presence and detectability (Table 1). Based on the results of these initial surveys, we chose to focus survey effort in 2007 on species that are found at high elevation, grow in areas that stay wet year round or are artificially inundated, or have a perennial life form. Furthermore, we selected species with unmet species objectives for more intensive survey efforts over species with met species objectives. In all, we performed targeted surveys for 27 plant species and found 5 species incidentally (Table 1).

We selected survey sites for targeted species by selecting coordinates from a database of historical points (hereafter “MSHCP Historical Database”) that fell within the Conservation Area, visiting areas mentioned in the species accounts, and georeferencing other distributional information. The MSHCP Historical Database was created by Dudek & Associates, Inc., an environmental consulting firm, to georeference and consolidate available distributional data for all Covered Species in the MSHCP (Dudek & Associates, 2001). We used additional sources of information besides the MSHCP Historical Database to add more recent data and to correct georeferencing errors. For these additional points, some of the sources of data we used include herbarium records and records from the California Natural Diversity Database (CNDDDB). Table 2 shows the number of times sites were surveyed in 2007 and the dates of the first and last survey at each site. Figure 1 provides an overview of the Conservation Area and the areas targeted for surveys in 2007.

Table 1. List of species with sentinel site surveys, targeted surveys, and/or found incidentally in 2007

Survey Type*	Species Scientific Name	Common Name	Flower time
S	<i>Allium munzii</i>	Munz's onion	Apr-May
T	<i>Arctostaphylos rainbowensis</i>	Rainbow manzanita	Jan-Feb
S	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milkvetch	Dec-June
I	<i>Atriplex coronata</i> var. <i>notatior</i>	San Jacinto Valley crownscale	Apr-May
S	<i>Brodiaea filifolia</i>	thread-leaved brodiaea	Mar-June
T	<i>Calochortus palmeri</i> var. <i>munzii</i>	Munz's mariposa lily	May-July
T	<i>Calochortus plummerae</i>	Plummer's mariposa lily	May-July
I	<i>Calochortus weedii</i> var. <i>intermedius</i>	intermediate mariposa lily	May-July
T	<i>Caulanthus simulans</i>	Payson's jewelflower	Apr-June
S, T	<i>Centromadia pungens</i> ssp. <i>laevis</i>	smooth tarplant	Apr-Nov
T	<i>Chorizanthe leptotheca</i>	peninsular spineflower	May-Aug
S	<i>Chorizanthe parryi</i> var. <i>parryi</i>	Parry's spineflower	Apr-June
S	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spineflower	Apr-June
S	<i>Convolvulus simulans</i>	small-flowered morning-glory	Mar-June
T	<i>Deinandra mohavensis</i>	Mojave tarplant	July-Sept
I	<i>Dodecahema leptoceras</i>	slender-horned spineflower	Apr-June
T	<i>Dudleya viscida</i>	sticky dudleya	May-June
T	<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	Santa Ana River woolly-star	June-Aug
T	<i>Erodium macrophyllum</i>	large-leaved filaree	Mar-May
S	<i>Harpagonella palmeri</i>	Palmer's grapplinghook	Mar-Apr
T	<i>Heuchera hirsutissima</i>	shaggy-haired alumroot	May-July
T	<i>Holocarpha virgata</i> ssp. <i>elongata</i>	graceful tarplant	July-Nov
I	<i>Hordeum intercedens</i>	vernal barley	Mar-June
S, T	<i>Hulsea vestita</i> ssp. <i>callicarpha</i>	beautiful hulsea	May-Oct
T	<i>Juglans californica</i> var. <i>californica</i>	Southern California black walnut	Mar-May
T	<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Coulter's goldfields	Feb-June
S, T	<i>Lepechinia cardiophylla</i>	heart-leaved pitcher-sage	Apr-July
T	<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	ocellated Humboldt lily	Apr-July
T	<i>Lilium parryi</i>	lemon lily	July-Aug
S	<i>Microseris douglasii</i> var. <i>platycarpha</i>	small-flowered microseris	Mar-Apr
I	<i>Mimulus clevelandii</i>	Cleveland bush monkey flower	May-July
T	<i>Monardella macrantha</i> ssp. <i>hallii</i>	Hall's monardella	June-Aug
S, T	<i>Navarretia fossalis</i>	spreading navarretia	May-June
S, T	<i>Oxytheca caryophylloides</i>	chickweed oxytheca	July-Sept
T	<i>Penstemon californicus</i>	California beardtongue	May-June
S, T	<i>Polygala cornuta</i> var. <i>fishiae</i>	Fish's milkwort	May-Aug
T	<i>Potentilla rimicola</i>	cliff cinquefoil	July-Sept

* Survey types are S- sentinel site visit, T- targeted search for species, I- found incidentally while searching for other species

Table 1. continued

Survey Type*	Species Scientific Name	Common Name	Flower time
T	<i>Quercus engelmannii</i>	Engelmann oak	Mar-May
T	<i>Romneya coulteri</i>	Coulter's matilija poppy	May-July
S, T	<i>Satureja chandleri</i>	San Miguel savory	Mar-May
T	<i>Sibaropsis hammittii</i>	Hammitt's clay-cress	Mar-Apr
T	<i>Trichocoronis wrightii</i> var. <i>wrightii</i>	Wright's trichocoronis	May-Sept

* Survey types are S- sentinel site visit, T- targeted search for species, I- found incidentally while searching for other species

Table 2. Sites surveyed in 2007, number of surveys completed, and date of first and last visit. See Figure 1 for map showing areas.

Site name	Number of surveys	Date of first visit	Date of last visit
Agua Tibia	2	12-Apr-07	14-Jun-07
Badlands/San Timoteo Canyon	4	28-Jun-07	24-Oct-07
Elsinore Peak	5	29-Mar-07	29-Mar-07
Estelle Mountain	8	04-Oct-06	09-Oct-07
Hemet Butte	2	15-Aug-07	15-Aug-07
Johnson Ranch	2	04-Oct-07	04-Oct-07
Lake Skinner	9	21-Sep-06	11-Sep-07
Potrero	8	06-Oct-06	24-Oct-07
San Bernardino Mountains	1	26-Jun-07	26-Jun-07
San Jacinto Mountains- north	63	15-May-07	20-Sep-07
San Jacinto Mountains- south	40	03-May-07	07-Sep-07
San Jacinto River	6	28-Mar-07	10-May-07
San Jacinto Wildlife Area	34	27-Mar-07	11-Jul-07
San Mateo Canyon	20	05-Oct-06	03-Oct-07
Santa Ana Mountains-N	39	25-Apr-07	28-Aug-07
Santa Ana River	9	10-Jul-07	27-Sep-07
Santa Margarita	12	29-Sep-06	06-Sep-07
Santa Rosa Plateau	5	19-Mar-07	10-May-07
Silverado Ranch	3	22-May-07	24-May-07
Sycamore Canyon	4	24-Oct-06	18-Jun-07
Tenaja Corridor	9	23-Oct-06	12-Oct-07
Wilson Valley	1	16-May-07	16-May-07
Total	286	04-Oct-06	24-Oct-07

Survey Methods

For targeted rare plants surveys, surveyors navigated to historic points or identified areas of suitable habitat to search for 1 or more target species. We did not place a time limit on the surveys; rather, surveyors searched all suitable habitat within the constraints of an 8 hour work day. When surveyors were unable to detect a target species, they recorded their search effort and collected habitat, general site phenology, and site disturbance information about the area they surveyed.

When a Covered Species was found, either as the result of a directed search for that species or incidental to a search for a different species, surveyors collected species-specific information, such as number of individuals, phenology, and signs of disturbance, in addition to the habitat information mentioned above. Surveyors set up a square 450 m² plot around the population center and recorded slope, elevation, and aspect within the plot. Within the plot, they estimated percent ground cover for bedrock, litter, water, basal stems, fines, and 4 size categories of rocks. Finally, surveyors created a list of all species found in the plot and recorded their height class and percent cover. Specimens of unknown species within the plot were collected for later identification. Survey methods are more completely described in *Western Riverside County MSHCP Biological Monitoring Program Protocol for Inventory-Phase Rare Plant Surveys and Plot-Based Data Collection* (Appendix A) and *Rare Plant Survey Forms* (Appendix B).

Some plots were positioned to be able to capture information from several species at a time. On occasions when surveyors did not have time to conduct a full plot survey, surveyors recorded only the site and species-specific information and/or an incidental observation point was recorded with a GPS and uploaded into a file of incidental observations. Whenever possible, surveyors were sent out to collect more thorough information at those sites, but due to time constraints, this was not always possible.

At sentinel sites, surveyors navigated to points where Covered plant species were documented by the Biological Monitoring Program in 2005 or 2006. Surveyors searched for the Covered Species in a small area around the given point, assuming that due to the recent nature of the data and the fact that all point coordinates were taken by GPS, search points had a high level of precision. Surveyors recorded information on the overall phenology of the area, the phenology of the dominant trees, shrubs, and herbs and other flowering and fruiting individuals at the site (Appendix C). When the target species was found, observers recorded the same species-specific information mentioned above for rare plant surveys

Data Analysis

The species-specific objectives listed in the MSHCP specify a certain number of locations, occurrences, and/or localities for each species, and often include a partial or complete 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. We use the term “detection” to mean an event where we found 1 or more individuals of a Covered plant species. The terms “location” and “occurrence” are not defined in the MSHCP, and in this report we define “occurrence” as the unit to describe a group of individuals meeting the criteria for 1 location or occurrence in the species objectives. It is important to note that we can “detect” a species many times without finding any “occurrences”, if the detections are not made in areas stipulated by the MSHCP. A “locality” is defined in the

MSHCP as “an area with multiple occurrences of a species based on the MSHCP species occurrence database or literature citations as noted in individual species accounts.” When referring to a group of Covered plant species, we use the term “occurrence” to include both occurrences and localities for members of that group.

In this report, we are presenting results of surveys conducted in 2007 as well as overall progress towards meeting species objectives. For some species, the objectives specifically define areas where Covered Species will be conserved in a one-to-one relationship between number of occurrences and areas where they are to be found. To meet this type of objective, we must have detected the species at least once in each area mentioned. We recorded multiple occurrences at an area when applicable so that future monitoring and management efforts will be informed of the distribution of a species within an area, but these multiple occurrences do not further the goal of meeting the species objective. Other species objectives require a specified number of known occurrences or localities to be included in the Conservation Area without listing all of the areas where the species will be conserved. In these cases, we used a combination of a close reading of the MSHCP species account and Fish and Wildlife Service Biological Opinion (U.S. Fish and Wildlife Service 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 objective refers. This is important for species such as *Lasthenia glabrata* ssp. *coulteri* (Coulter’s goldfields), which has a species objective asking for the inclusion of 20 known occurrences. If we detected this species 20 separate times at San Jacinto Wildlife Area and considered the species objective met, we would fail to adequately address the conservation of this species across the geographic range intended by the MSHCP.

Some species are designated as Demonstrate Conservation species by the MSHCP. In order for these species to be considered adequately conserved by the MSHCP, additional target goals beyond the conservation of historically known occurrences must be met. These goals entail finding a certain number of localities, which for these species are defined as each being “not smaller than one quarter section.” One quarter section is 160 acres, or approximately 804 m². We interpret this to mean that each unique locality meeting a Demonstrate Conservation objective must be a minimum of 804 m away from other localities. For most of the Demonstrate Conservation species, the MSHCP has designated a minimum population size to be confirmed at each locality, “unless a smaller population has been demonstrated to be self-sustaining.” A few species have Demonstrate Conservation objectives that only ask for certain numbers of localities without regard to the number of individuals at each locality.

RESULTS

We conducted 27 sentinel site visits for 15 species from 17 April to 11 July 2007 (Table 3). We did not detect *Allium munzii* (Munz’s onion), *Brodiaea filifolia* (thread-leaved brodiaea), *Chorizanthe parryi* var. *parryi* (Parry’s spine flower), *Harpagonella palmeri* (Palmer’s grapplinghook), or *Microseris douglasii* var. *platycarpa* (small-flowered microseris) during the sentinel site visits. We detected *Astragalus pachypus* var. *jaegeri* (Jaeger’s milk-vetch) at the higher elevation site in the San Jacinto Mountains, but not during 3 visits to a site in the Agua Tibia Wilderness Area. We did not detect *Chorizanthe polygonoides* var. *longispina* (long-spined spine flower) at the lower elevations sites we surveyed, but we found a few individuals, each less than 1 cm in diameter, in the higher elevation Garner Valley area. We found *Convolvulus*

simulans (small-flowered morning-glory) growing at our sentinel site at Santa Rosa Plateau, but not at Lake Skinner. Based on these findings, we decided not to conduct additional surveys for any of the above species, except for Jaeger's milk-vetch at high elevation sites.

During sentinel site visits, we detected the following species: *Centromadia pungens* ssp. *laevis* (smooth tarplant), *Hulsea vestita* ssp. *callicarpha* (beautiful hulsea), *Lepechinia cardiophylla* (heart-leaved pitcher sage), *Navarretia fossalis* (spreading navarretia), *Oxytheca caryophylloides* (chickweed oxytheca), *Polygala cornuta* var. *fishiae* (Fish's milkwort) and *Satureja chandleri* (San Miguel savory). We conducted additional surveys for these 7 species, as well as for other species occurring in similar habitats. We also collected information for Covered Species which we found incidentally while conducting other work.

We conducted a total of 301 targeted plant surveys, the majority between 19 March 2007 and 24 October 2007. We made a total of 329 detections of Covered plant species and set up 84 plots that captured data for 96 of those detections. We detected all of our target species except for *Erodium macrophyllum* (large-leaved filaree), *Potentilla rimicola* (cliff cinquefoil), *Sibaropsis hammittii* (Hammitt's clay-cress), and *Trichocoronis wrightii* var. *wrightii* (Wright's trichocoronis) and found 5 other Covered plant species incidentally. We found at least 1 target species at 17 of 23 areas surveyed. We classified the detections we made as 54 new occurrences (Table 4). We also found a total of 22 localities for 4 species with Demonstrate Conservation targets (Table 5).

***Arctostaphylos rainbowensis*, Rainbow manzanita**

The objectives for this species require the inclusion of "15 known localities of Rainbow manzanita: San Mateo Canyon Wilderness, Gavilan Mountain, Santa Margarita Ecological MSHCP Conservation Area, Santa Rosa Plateau and the Temecula, Wildomar, Margarita Peak and Pechanga areas" and for the conservation of 10 localities with at least 50 individuals each. Margarita Peak is not located within the Plan Area. We found 8 of 15 (53%) of the localities of this species in 2007, including 3 in San Mateo Canyon, 1 in Santa Margarita Ecological Reserve, 3 in Santa Rosa Plateau, and 1 in the Tenaja Corridor. We found 5 localities with 20 or more individuals, with only 1, in the Tenaja Corridor, with an estimated population size over 50. However, the locality in the Tenaja Corridor was not entirely contained within the Conservation Area, and thus there may not be 50 individuals in conservation at this locality. At the other 3 localities, we detected 6 or fewer individuals.

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

The objective for this species require the inclusion of "seven known localities (18 occurrences) of this species at Aguanga Valley, San Jacinto Mountains, Potrero Creek, Sage, Temecula Canyon and the core location at Vail Lake and the base of the Agua Tibia Mountains." Based on the Biological Opinion and species account, we interpret most of the occurrences to be in the vicinity of Vail Lake, Agua Tibia, and Aguanga. In 2006, we confirmed 1 occurrence each in Agua Tibia and the San Jacinto Mountains. In 2007, we found that Jaeger's milk-vetch was more widely distributed around Rouse Ridge than we had found previously. We did not locate

Table 3. Sentinel Site Survey Results for Covered Plants in 2007

Site ID	Species Scientific Name	Common Name	General Survey Area	Date	Detected
152ALMU	<i>Allium munzii</i>	Munz's onion	Elsinore Peak	4/17/07	N
936ALMU	<i>Allium munzii</i>	Munz's onion	Harford Springs	5/4/07	N
12APJA	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milk-vetch	Agua Tibia	4/13/07	N
12APJA	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milk-vetch	Agua Tibia	5/16/07	N
13APJA	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milk-vetch	SJ Mtns south	6/1/07	Y
12APJA	<i>Astragalus pachypus</i> var. <i>jaegeri</i>	Jaeger's milk-vetch	Agua Tibia	6/14/07	N
14BRFI	<i>Brodiaea filifolia</i>	thread-leaved brodiaea	San Jacinto Wildlife Area	5/1/07	N
17BRFI	<i>Brodiaea filifolia</i>	thread-leaved brodiaea	Santa Rosa Plateau	5/2/07	N
14BRFI	<i>Brodiaea filifolia</i>	thread-leaved brodiaea	San Jacinto Wildlife Area	5/17/07	N
59HEPU	<i>Centromadia pungens</i> ssp. <i>laevis</i>	smooth tarplant	San Jacinto Wildlife Area	5/1/07	N
58HEPU	<i>Centromadia pungens</i> ssp. <i>laevis</i>	smooth tarplant	San Jacinto Wildlife Area	7/2/07	Y
136CPPA	<i>Chorizanthe parryi</i> var. <i>parryi</i>	Parry's spine flower	Lake Skinner	5/2/07	N
27CPLO	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spine flower	Lake Skinner	4/16/07	N
26CPLO	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spine flower	Elsinore Peak	4/17/07	N
24CPLO	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spine flower	Lake Skinner	5/4/07	N
36CPLO	<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spine flower	Garner Valley	5/15/07	Y
1COSI	<i>Convolvulus simulans</i>	small-flowered morning-glory	Santa Rosa Plateau	5/2/07	Y
2COSI	<i>Convolvulus simulans</i>	small-flowered morning-glory	Lake Skinner	5/4/07	N
44HAPA	<i>Harpagonella palmeri</i>	Palmer's graplinghook	Lake Skinner	5/4/07	N
135HVCA	<i>Hulsea vestita</i> ssp. <i>callicarpa</i>	beautiful hulsea	SJ Mtns north	5/15/07	Y
74LECA	<i>Lepechinia cardiophylla</i>	heart-leaved pitcher sage	Santa Ana Mountains-N	6/20/07	Y
106MDPL	<i>Microseris douglasii</i> var. <i>platycarpa</i>	small-flowered microseris	Lake Skinner	5/4/07	N
137NAFO	<i>Navarretia fossalis</i>	spreading navarretia	San Jacinto Wildlife Area	7/2/07	N
137NAFO	<i>Navarretia fossalis</i>	spreading navarretia	San Jacinto Wildlife Area	7/11/07	Y
73OXCA	<i>Oxytheca caryophylloides</i>	chickweed oxytheca	SJ Mtns north	5/15/07	Y
114PCFI	<i>Polygala cornuta</i> var. <i>fishiae</i>	Fish's milkwort	Santa Ana Mountains-N	6/20/07	Y
126SACH	<i>Satureja chandleri</i>	San Miguel savory	Santa Rosa Plateau	4/20/07	Y

this species during surveys at the Potrero unit of the San Jacinto Wildlife Area (henceforth: “Potrero”). We have found 2 of 7 (29%) localities and 2 of 18 (11%) of the known occurrences.

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

The objective for this species requires inclusion of the “Alberhill Creek locality as well as the 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 include 4 localities: Alberhill Creek, San Jacinto Wildlife Area, San Jacinto River south of San Jacinto Wildlife Area and upper Salt Creek. We detect this species 3 times in 2007 at the San Jacinto Wildlife Area, an area where we have previously detected this species. We have found 1 of 4 (25%) of the localities for this species.

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

The objective for this species requires the inclusion of “10 of the known locations within the San Jacinto Mountains, including Garner Valley.” We detected Munz’s mariposa lily in 2007 in 22 places, including 4 occurrences in Garner Valley and 1 in Alvin Meadows. Data collected by the San Bernardino National Forest (SBNF) as well as additional detections made by the Biological Monitoring Program in 2006 show that this species is present in the San Jacinto Mountains from Alvin Meadows west of Idyllwild to Bull Canyon Trailhead, south of Garner Valley. The historic occurrence in the vicinity of Mt. Edna, considerably north of where we have documented this species, remains to be confirmed. Combining Forest Service data with our own, this species has been confirmed at 9 of 10 (90%) of the known occurrences.

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

The objective for this species requires 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 to mean 1 occurrence each in the Jurupa Hills, in the vicinity of Reche Canyon/Boxsprings, along Highway 74, in the San Bernardino Mountains, at Lake Skinner, and in Garner Valley, and 2 occurrences in the vicinity of the Badlands and San Timoteo Canyon. This species objective also asks for the conservation of 6 localities with 500 individuals each. We found 1 occurrence along Highway 74 in 2007, and also detected it near Alvin Meadows in the San Jacinto Mountains. We counted this as 1 of 8 known occurrences (13%). Neither area had occurrences with ≥ 500 individuals. We did not detect Plummer’s mariposa lily in the San Bernardino Mountains.

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

The objective for this species requires the inclusion of “at least two of the known localities (hills west of Crown Valley and Vail Lake) and possibly a third locality (Sierra Peak area of the Santa Ana Mountains).” In 2007, we incidentally found 1 occurrence of this species in the Santa Ana Mountains, though only 1 individual was observed. We did not conduct any additional surveys for this species. We have therefore detected 1 of 3 localities (33%), though the locality in the Santa Ana Mountains should be resurveyed in an effort to find more individuals.

Table 4. Survey effort and results for 2007, and cumulative progress towards meeting species objectives. Species highlighted in gray have met at least the minimum level of occupancy (75%) specified by the MSHCP.

Species Scientific Name	Surveys Conducted in 2007	Species Detections in 2007	Plots with Species in 2007	Occurrences Found in 2007	Total Occurrences Found ¹	Occurrences Listed in MSHCP	Percent of Objectives Met
<i>Arctostaphylos rainbowensis</i>	11	22	7	8	8	15	53%
<i>Astragalus pachypus</i> var. <i>jaegeri</i>	5	7	1	0	2	7	29%
<i>Atriplex coronata</i> var. <i>notatior</i>	1	3	1	0	1	4	25%
<i>Calochortus palmeri</i> var. <i>munzii</i>	11	22	4	5	9 ²	10	90%
<i>Calochortus plummerae</i>	10	5	2	0	1	8	13%
<i>Calochortus weedii</i> var. <i>intermedius</i>	2	1	0	1	1	3	33%
<i>Caulanthus simulans</i> ³	7	2	1	no primary objective			
<i>Centromadia pungens</i> ssp. <i>laevis</i>	7	7	5	1	7 ²	27	26%
<i>Chorizanthe leptotheca</i> ³	10	5	3	no primary objective			
<i>Deinandra mohavensis</i> ⁴	15	6	3	4	4	5	80%
<i>Dodecahema leptoceras</i>	1	1	1	1	3	11	27%
<i>Dudleya viscida</i>	3	3	3	3	3	3	100%
<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	9	6	3	2	3	3	100%
<i>Erodium macrophyllum</i>	1	0	0	0	2 ²	8	25%
<i>Heuchera hirsutissima</i> ³	9	1	1	1	1	2	50%
<i>Holocarpha virgata</i> ssp. <i>elongata</i>	4	4	1	0	5	8	63%
<i>Hordeum intercedens</i>	5	7	5	0	1	4	25%
<i>Hulsea vestita</i> ssp. <i>callicarpa</i>	5	8	3	0	11 ²	12	92%
<i>Juglans californica</i> var. <i>californica</i>	14	18	5	2	3	7	43%
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	26	40	6	5	10 ²	20	50%
<i>Lepechinia cardiophylla</i>	6	4	2	1	4 ²	6	67%
<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	7	7	3	2	2	4	50%
<i>Lilium parryi</i>	4	3	2	3	7	7	100%
<i>Mimulus clevelandii</i>	1	2	1	0	1	2	50%
<i>Monardella macrantha</i> ssp. <i>hallii</i>	5	3	2	2	4	5	80%
<i>Navarretia fossalis</i>	5	0	0	0	1	13	8%
<i>Oxytheca caryophylloides</i> ⁴	9	5	3	2	4	5	80%
<i>Penstemon californicus</i>	17	9	3	3	4	15	27%
<i>Polygala cornuta</i> var. <i>fishiae</i>	14	43	6	0	3	3	100%

Table 4 continued.

Species Scientific Name	Surveys Conducted in 2007	Species Detections in 2007	Plots with Species in 2007	Occurrences Found in 2007	Total Occurrences Found ¹	Occurrences Listed in MSHCP	Percent of Objectives Met
<i>Potentilla rimicola</i>	8	0	0	0	0	2	0%
<i>Quercus engelmannii</i>	17	27	9	7	17	33	52%
<i>Romneya coulteri</i>	22	57	9	no primary objective			
<i>Satureja chandleri</i>	6	1	1	1	2	7	29%
<i>Sibaropsis hammittii</i>	1	0	0	0	0	1	0%
<i>Trichocoronis wrightii</i> var. <i>wrightii</i>	3	0	0	0	0	4	0%
Totals	281	329	96	54	124	264	47%

¹Total occurrences found include occurrences found by the MSHCP 2005-2007, SBNF 2002-2007 and UCR CCB 2003-2004.

²Some or all of the met occurrences come from SBNF and/or UCR CCB data. See species-specific information in the results section for more information.

³Species with some uncertainty regarding identification to the species level. See species-specific information in the results for more information.

⁴The Occupancy portion of the Species Objectives has been met. The Demonstrate Conservation Species Objective has not been met.

Table 5. 2007 survey results and overall progress towards meeting Demonstrate Conservation objective for species surveyed for in 2007.

Species Scientific Name	Life form	Target number of individuals per locality	Target number of localities	Number of localities found in 2007	Total number of localities with at least target number of individuals
<i>Arctostaphylos rainbowensis</i>	shrub	50	10	1*	1*
<i>Calochortus plummerae</i>	geophyte	500	6	0	0
<i>Chorizanthe leptotheca</i>	annual	1000	10	0	0
<i>Deinandra mohavensis</i>	annual	&	4	0	0
<i>Hulsea vestita</i> ssp. <i>callicarpa</i>	perennial herb	50	16	1	16#
<i>Holocarpha virgata</i> ssp. <i>elongata</i>	annual	1000	10	0	8#
<i>Oxytheca caryophylloides</i>	annual	1000	10	0	1
<i>Polygala cornuta</i> var. <i>fishiae</i>	perennial shrub	50	10	7	10\$
<i>Potentilla rimicola</i>	perennial from	^	5	0	0
<i>Romneya coulteri</i>	subshrub to shrub	^	30	13	16
Total			111	22	52

¹Includes locality with individuals on both private and public land, unsure how many individuals are actually in conservation.

²Includes data found by UCR CCB and/or SBNF.

³Includes 2 localities that have approximately 50 individuals, though population size estimates are inexact.

⁴Demonstrate Conservation objective asks for occupancy of 100 acres per locality.

⁵Demonstrate Conservation objective does not specify number of individuals per locality.

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

The objective for this species does not require the inclusion of particular occurrences of this species. In 2007, we may have detected this species in the southeast portion of the Plan Area, near Silverado Ranch. Because of late phenology and small population size, we were not able to collect a voucher specimen and confirm the identity of the *Caulanthus* species found in this area. The Biological Monitoring Program will revisit this area in 2008.

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

The objective for this species requires inclusion of “at least 27 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 Mathews, 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.” In 2007, we detected smooth tarplant at Potrero, San Timoteo Canyon, and San Jacinto Wildlife Area. Only the detection at Potrero qualifies as a new occurrence. In previous years, the Biological Monitoring Program has found 4 occurrences at San Jacinto Wildlife Area and 1 at Harford Springs in the Gavilan Hills. UCR CCB found 1 additional occurrence at San Jacinto Wildlife Area. Together, the Biological Monitoring Program and UCR CCB have detected 7 out of 27 required occurrences (26%).

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

This species has a Demonstrate Conservation objective, requiring the conservation of 10 localities with 1000 individuals each. In 2007, we detected an unidentified *Chorizanthe* 5 times at 4 unique sites that may be Peninsular spine flower. We will confirm identification in the future when individuals at those locations are more robust. There were not more than 200 individuals at any of 5 places we detected these *Chorizanthe* species.

***Deinandra mohavensis*, Mojave tarplant**

The objective for this species requires inclusion of “at least five of the known localities (represented by seven records) within the San Jacinto Mountains and Foothills and northeast of Vail Lake.” We interpret this to mean 4 localities in the San Jacinto Mountains and 1 in the vicinity of Vail Lake. It also asks for the inclusion of 4 localities occupying at least 100 ac each. In 2007, we detected this species 6 times, including at 4 of the known locations in the San Jacinto Mountains. We do not have access to the area around the fifth known locality, so we have found 4 of 5 known locations (80%). Mojave tarplant did not occupy 100 ac at any of the places we detected it.

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

The objective for this species requires inclusion of “at least 11 of the known locations of this species, 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.” In 2007, we found this species incidentally along the upper San Jacinto River near Cranston Guard Station. In 2006, we found this species in Agua Tibia and Bautista Canyon, for a total of 3 out of 11 locations (27%).

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

The objective for this species requires inclusion of “three populations within the San Mateo Wilderness Area of the Santa Ana Mountains.” We found 3 of 3 (100%) of the occurrences. The occurrences we detected were separated from one another by at least 1 km, in San Mateo Canyon. We believe it is likely that additional surveys in the area would reveal that sticky-leaved dudleya is widely distributed along the canyon, not just clustered around the 3 areas where we collected data.

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

The objective for this species requires inclusion of at least “three localities of this species along the Santa Ana River near the San Bernardino County border.” We found 1 individual in 2005 and 6 individuals in 2007 spread across slightly less than 1.5 km of the Santa Ana River. While this may constitute the localities referred to in the species account, we believe that this species should be monitored and/or managed to ensure that it remains extant.

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

The objective for this species requires inclusion of “eight out of the 10 known localities of round-leaved filaree: four occurrences in the Gavilan Hills region, one at Lake Mathews, one along Temescal Wash near Lee Lake, one at Diamond Valley Lake and one in the foothills of the Agua Tibia Mountains.” We did not detect this species during surveys at Lake Skinner in 2007. UCR CCB found this species at Lake Skinner and Oak Mountain, for 2 of 8 localities (25%).

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

The objective for this species requires inclusion of “two known localities of this plant in the San Jacinto Mountains: one locality lies on the western slopes of the San Jacinto Mountains above the San Jacinto River and the other locality is in a gully behind Tahquitz Rock.” We found *Heuchera* growing on the western slopes of the San Jacinto Mountains in the vicinity of Little Round Valley. However, neither we nor Mr. Sanders felt comfortable conclusively identifying our voucher specimen to species, so we cannot be sure whether we found shaggy-haired alumroot or a closely related species. We did not locate other occurrences of *Heuchera* during additional surveys in the Conservation Area. If the *Heuchera* we found near Little Round Valley is indeed shaggy-haired alumroot, then we have found 1 of 2 localities of this plant (50%). Additionally, a member of the Monitoring Program staff found *Heuchera* species growing on Tahquitz Rock during off work hours. No individuals were in flower, and they could not be identified to species. No voucher specimen was collected due to the small number of individuals present. All individuals located around Tahquitz Rock were growing outside of the Plan Area.

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

The objective for this species requires inclusion of “at least eight of the known locations, including four occurrences located on Santa Rosa Plateau and four occurrences in the San Mateo Canyon Wilderness Area” and for the conservation of 10 localities with at least 1000 individuals each. The Monitoring Program, in previous years’ surveys, has found that graceful tarplant is well-distributed across the Santa Rosa Plateau and has also found 1 occurrence each along Wildomar Road in the Cleveland National Forest and in the Tenaja Corridor. In 2007, we detected graceful tarplant at another site in the Tenaja Corridor and at 2 additional sites at the Santa Rosa Plateau. We have not been able to locate herbarium records or other sources indicating that graceful tarplant actually does occur in the Riverside County portion of San

Mateo Canyon Wilderness Area. In a botanical assessment of the wilderness area, Boyd et al. (1992) only make note of graceful tarplant occurring occasionally on Miller Mountain, a landform that is predominantly in San Diego County. If we consider the Wildomar Road detection to be part of the San Mateo Canyon Wilderness, we have found 1 of 4 locations in the San Mateo Canyon Wilderness Area and 4 of 4 of the locations of this species at the Santa Rosa Plateau, for a total of 5 of 8 locations (63%). We recommend further work to determine whether this species occurs more extensively within the San Mateo Canyon Wilderness Area. We did not find any occurrences with ≥ 1000 individuals in 2007. In 2006, we found 8 occurrences with 1000 or more individuals.

***Hordeum intercedens*, vernal barley**

The objective for this species requires inclusion of “at least four locations (including three core locations) of vernal barley: the San Jacinto Wildlife Area, the middle segment of the San Jacinto River from Ramona Expressway south to Railroad Canyon, the upper Salt Creek drainage west of Hemet, and the occurrence near Nichols Road at Alberhill.” We found 5 locations of vernal barley during surveys at San Jacinto Wildlife Area. We did not detect vernal barley during surveys along the middle segment of the San Jacinto River. Thus, we have found 1 of 4 locations (25%).

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

The objectives for this species require inclusions of “at least 12 of the known occurrences at Lake Fulmor, Pine Cove, Idyllwild, Mountain Center, Pine Meadow and Lake Hemet” and for the conservation of 16 localities with no fewer than 50 individuals each. We detected this species 8 times in 2007, though none of the detections were at unique occurrences. The Biological Monitoring Program, UCR CCB, and the SBNF have found beautiful hulsea throughout much of the San Jacinto Mountains. The only recorded occurrence that has not been detected is at Pine Meadow, possibly because the majority of Pine Meadow is not within the Conservation Area. The Biological Monitoring Program has confirmed 8 occurrences, UCR CCB 1 occurrence, and SBNF 2 occurrences, for a total of 11 of the 12 known occurrences for this species (92%). In 2007, we found at least 50 individuals at 3 localities. The Demonstrate Conservation objective for this species has been met through a combination of previous Biological Monitoring Program data, SBNF Data, and UCR CCB data. There are at least 16 localities with 50 or more individuals of beautiful hulsea in the San Jacinto Mountains.

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

The objective for this species requires inclusion of “at least seven known occurrences of this species within the Santa Ana Mountains, at Lake Skinner, at the Santa Rosa Plateau and one east of Pedley.” Based on analysis of the species account, the MSHCP Historical Database, and the Biological Opinion, we interpret the known occurrences to include 1 in the Santa Ana Mountains, 1 at the Santa Rosa Plateau, 1 east of Pedley, 1 at Lake Skinner (defined broadly to include the Southwestern Riverside County Multi-Species Reserve and Johnson Ranch), 1 near the Jurupa Hills, and 2 additional occurrences not specified. In 2007, we detected this species at Johnson Ranch and Lake Skinner for the broadly defined Lake Skinner occurrence. We also found this species at Estelle Mountain and the Badlands, which we will count as the 2 unspecified occurrences, for a total of 3 of 7 known occurrences (43%). Occurrences of California black walnut in the vicinity of Lake Skinner and Santa Rosa Plateau are not thought to be naturally occurring, but rather the result of introductions (U.S. Fish and Wildlife Service

2004). According to Zach Principe, former Project Ecologist at the Santa Rosa Plateau Ecological Reserve, naturally occurring California black walnut has never been documented on the Santa Rosa Plateau (2007 email from Z. Principe to Diane Menuz, Biological Monitoring Program Botany Program Lead, unreferenced). The only known report of this species at that reserve is from the vicinity of the old adobe buildings, where he has only seen English walnut (*Juglans regia*). Native stands of this species are thought to be restricted to the area around the Santa Ana River and the northern Santa Ana Mountains (U.S. Fish and Wildlife Service 2004). The Biological Monitoring Program will make the documentation of these occurrences a priority.

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

The species objective requires inclusion of “at least 20 of the known occurrences of this species, including the three 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 analysis of the species account, the MSHCP Historical Database and CNDDDB, our interpretation of the known occurrences consist of 6 occurrences along the San Jacinto River south of Ramona Expressway, 10 occurrences in San Jacinto Wildlife Area, 1 near Alberhill, and 3 other locations. Our surveys in 2007 and previous years and surveys conducted by UCR CCB show that Coulter's goldfields is well distributed across San Jacinto Wildlife Area and therefore we confirm the presence of this species at the 10 known occurrences at this Core Area. We did not detect Coulter's goldfields in the Conservation Area during surveys along the San Jacinto River south of the Ramona Expressway.

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

The species objective requires conservation of “6 known populations, 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.” In 2007, we detected this species 4 times, including at 1 new occurrence at Sierra Peak. We found occurrences near Bald Peak and Indian Truck Trail in 2006, and UCR CCB found 1 occurrence near Pleasants Peak for a total of 4 of 6 occurrences (67%). We also previously detected this species near Trabuco Peak, but determined that this location was in Orange County.

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

The species objective requires conservation of “the known locations at Arroyo Seco Canyon in the Agua Tibia Wilderness Area and Fisherman's Camp in Tenaja Canyon and the historic occurrences known from 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 Canyon, 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 this objective to mean that ocellated Humboldt lily will be conserved in Arroyo Seco Canyon, Tenaja Canyon, Horsethief Canyon, and in the vicinity of Tin Mine Canyon. In 2007, we found occurrences of ocellated Humboldt lily at Arroyo Seco and in Tenaja Canyon, south of Fisherman's Camp. We did not survey Horsethief Canyon due to issues with accessibility, and we did not locate this species in surveys in and around Tin Mine Canyon. We made an additional detection of this species along De Luz Creek in the Tenaja Corridor. In 2006, we also detected this species near the junction of Indian Truck

Trail and Main Divide Road in the Santa Ana Mountains. We have found 2 of 4 known occurrences (50%).

***Lilium parryi*, lemon lily**

The objective for this species requires “at least six localities (seven occurrences) within the San Jacinto Mountains.” We detected this species in 3 places in the San Jacinto Mountains in 2007. Cumulatively, we have found a total of 6 of 6 (100%) of the localities and 7 of 7 (100%) of the occurrences of this species. It should be noted, however, that we only found 11 or fewer individuals at 4 of the occurrences.

***Mimulus clevelandii*, Cleveland’s bush monkeyflower**

The species objective for this species requires inclusion of “the two known localities of this species on Santiago Peak in the Santa Ana Mountains and on the northern slopes of the Agua Tibia Mountains.” We found this species incidentally during surveys for other species in the Santa Ana Mountains near where Cleveland’s bush monkeyflower was found during surveys in 2006. We did not survey for this species in the Agua Tibia Mountains in 2007, and our surveys there in 2006 were unsuccessful at locating this species, meaning that 1 of 2 localities (50%) of this species have been confirmed.

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

The objective for this species requires inclusion of “at least the five known locations of this species: Cahuilla Mountain and an occurrence southwest of Pine Cove in the San Jacinto Mountains, two occurrences on the north slope of the Agua Tibia Mountains and Santiago Peak in the Santa Ana Mountains.” In 2007, we confirmed the presence of Hall’s monardella at Cahuilla Mountain. Additionally, we found an unidentified *Monardella* species growing near Santiago Peak in the Santa Ana Mountains in areas previously mapped by the Cleveland National Forest as containing this species. Our ability to identify the species was hampered because during 2 visits there we were unable to find any individuals in flower. This area will be revisited in 2008 to confirm the identity of the *Monardella*. In 2005, we confirmed the presence of this species southwest of Pine Cove and at 1 of the Agua Tibia Mountains sites. If the individuals near Santiago Peak are indeed Hall’s monardella, we have found 4 of 5 occurrences (80%).

***Navarretia fossalis*, spreading navarretia**

The objective for this species requires inclusion of “13 of the known locations of spreading navarretia at Skunk Hollow, 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 analysis of the species account, the MSHCP Historical Database, and CNDDDB, we interpret the known occurrences to include 1 at Skunk Hollow, 1 at Santa Rosa Plateau, 4 at San Jacinto Wildlife Area, 4 along the San Jacinto River south of San Jacinto Wildlife Area, and 3 at upper Salt Creek. We did not detect spreading navarretia in the Conservation Area during surveys along the San Jacinto River in 2007. We have previously found 1 occurrence of this species at San Jacinto Wildlife Area, for 1 of 13 (8%) occurrences.

***Oxytheca caryophylloides*, chickweed oxytheca**

The objective for this species require inclusion of “at least five of the known locations within the San Jacinto Mountains” and for the conservation of 10 localities with 1000 individuals each. In 2006, we detected chickweed oxytheca 5 times in the San Jacinto Mountains. Combined with surveys conducted in 2006, we have detected chickweed oxytheca at 4 out of 5 (80%) of the known occurrences. However, only Hall Canyon had ≥ 1000 individuals. We found 700 individuals at 1 of the other locations and the other 2 locations had less than 100 individuals each.

***Penstemon californicus*, California beardtongue**

The objective for this species requires inclusion of “at least 15 occurrences in Aguanga, Blackburn Canyon and the San Jacinto Mountains (including Garner Valley, Pyramid Peak, and Kenworthy Ranger Station).” Pyramid Peak is located just east of the Plan Area. Based on analysis of the species account and the MSHCP Historical Database, we interpret this objective to mean that the majority of occurrences will occur throughout Garner Valley. We detected California beardtongue 9 times in 2007, for a total of 3 occurrences. We found an additional occurrence of this species in 2006, for a total of 4 out of 15 occurrences (27%).

***Potentilla rimicola*, cliff cinquefoil**

The objectives for this species require inclusion of “two known localities of this species in Dark Canyon and near Deer Spring” and for the conservation of 5 localities at least 1 quarter section apart without regard to number of individuals at each locality. During surveys in the San Jacinto Mountains, including at the 2 localities mentioned above, we did not detect this species.

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

The objectives for this species require inclusion of “at least three of the known localities (Santa Rosa Plateau, Santa Margarita Ecological Preserve, and San Mateo Canyon)” and for the conservation of 10 localities with at least 50 individuals or ramets each. Our survey efforts in 2006 detected Milk’s fishwort in 3 of 3 (100%) of the mentioned areas. In 2007, we found 1 occurrence in the Santa Ana Mountains and 1 occurrence in San Mateo Canyon that each had more than 50 individuals or ramets. Additionally, we found Milk’s fishwort growing in large patches intermittently along all surveyed areas of the Santa Margarita River. Based on the idea that each patch of 50 individuals must be separated from others by 804 m, we count the occurrences along the Santa Margarita River as 6 localities, each with over 50 individuals. We estimated that 1 occurrence in Tin Mine Canyon (northern Santa Ana Mountains) and 1 occurrence found in 2006 in San Mateo Canyon contain around 50 individuals, but we must return to obtain a more precise count before we can be certain that these localities will help satisfy the species-specific objective. Assuming both of those occurrences have at least 50 individuals, both species objectives for Milk’s fishwort will have been met. It should be noted, though, that we have not found an occurrence with more than 14 individuals at the Santa Rosa Plateau.

***Quercus engelmannii*, Engelmann oak**

The species objective for this species requires 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.” This species also has a reproductive objective that is addressed in a separate report (*Engelmann Oak Recruitment Survey Report 2007*). Based on our analysis of

information from the species account and the MSHCP Historical Database, our interpretation of the known occurrences includes 10 at the Santa Rosa Plateau, 4 in the Santa Ana Mountains, 1 in the land currently in Conservation Area in the Tenaja Corridor, 6 near the Tenaja Corridor but not yet in lands currently part of the Conservation Area, 5 scattered throughout the area around Agua Tibia, Vail Lake, and Aguanga, and 7 other occurrences throughout the county. We have detected extensive occurrences throughout the Santa Rosa Plateau and along the Tenaja Corridor, with smaller occurrences in the Santa Ana Mountains, Santa Margarita Ecological Reserve, and Lake Skinner. Additionally, we detected 2 apparently pure Engelmann oak adult trees at 2 separate locations at Potrero, each surrounded by a number of hybrid individuals. Across the Conservation Area, we have found a total of 17 of 33 (52%) occurrences. We were unsuccessful at detecting Engelmann oak during surveys for this species at Sycamore Canyon and Estelle Mountain.

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

This species has a Demonstrate Conservation objective, requiring confirmation of 30 localities, not smaller than 1 quarter section each. Using this definition as a minimum distance between localities, we found 2 localities in the Estelle Mountain area and 11 in the Santa Ana Mountains in 2007. We found 2 additional localities in 2006 and UCR CCB found 1 additional locality, for a total of 16 of 30 (53%) localities of Coulter's matilija poppy.

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

The species objective requires inclusion of "at least seven of the known locations of San Miguel savory on the Santa Rosa Plateau; in the vicinity of Tenaja guard station and three miles south of Murrieta near De Luz Road in the Santa Ana Mountains; and three miles southwest of Murrieta near Warner's Ranch." Based on our analysis of the species account, CNDDDB data, and data from the MSHCP Historical Database, we interpret the 7 occurrences to include 6 occurrences on the Santa Rosa Plateau, including 2 duplicate records cited in the Biological Opinion, and 1 in the Santa Ana Mountains. We found 1 occurrence of San Miguel savory in 2007 and 1 in 2006, both on the Santa Rosa Plateau, for 2 of 7 occurrences (29%). We were not successful at detecting additional occurrences during other surveys in the Santa Ana Mountains or at the Santa Rosa Plateau.

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

The objective for this species requires inclusion of "the one known locality near Elsinore Peak." We did not detect this species in 2007 surveys, nor has the Biological Monitoring Program detected this species in previous surveys.

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

The objective for this species requires inclusion of "four of the known locations along the San Jacinto River from the vicinity of the Ramona Expressway and San Jacinto Wildlife Area and along the northern shore of Mystic Lake." We did not detect this species in 2007 at the San Jacinto Wildlife Area, nor did we detect this species during 2006 surveys.

DISCUSSION

By using sentinel sites, we were able to make decisions about where to survey in 2007 based on field evidence rather than relying solely on our assumptions about the impact of the lack of rainfall. We concluded that species found at high elevation sites, species at sites

artificially inundated with water, and perennial species throughout the Plan Area were appropriate to survey for in 2007. In years with more rainfall, we may be able to use sentinel sites to determine *when* to survey for rare plant species, rather than just *where* to survey for them, based on when annual species or otherwise seasonally cryptic species begin to appear at known locations. New crew members also benefited from sentinel sites by having the opportunity to see species in the field at known sites before conducting targeted surveys.

We conducted 281 surveys for rare plants in 2007. These surveys, as well as some incidental sightings made while crew were surveying for non-plant species, resulted in 329 detections of Covered plant species in 2007. Of these detections, 54 constitute unique occurrences or localities that count towards meeting as yet unmet MSHCP species objectives. There are several reasons why only about 16% of detections constitute unique occurrences. First, sometimes surveyors recorded information to show the spread of a species throughout an occurrence. For example, we marked individuals and small clusters of *Arctostaphylos rainbowensis* (Rainbow manzanita) found along a 1000 m section of the San Mateo Trail in the San Mateo Canyon Wilderness as separate detections so that we would have a better sense of the full distribution of this species in that area, though all of the detections constitute 1 occurrence. Second, sometimes different crew members recorded the same site at different times, such as when they all used a common trail that passed by a Covered Species. Also, sometimes a second recorder would return to record more information at a site when the initial recorder did not have time to complete all of the data collection. Third, we detected Covered Species at sites that are not mentioned as known occurrences in the MSHCP species account and/or USFWS Biological Opinion and thus do not help satisfy current species objectives.

For the 35 Covered plant species targeted or detected incidentally in 2007, the Biological Monitoring Program verified the continued presence of these species at 47% of the historically documented occurrences or localities, taking into account Monitoring Program work from 2005 through 2007, UCR CCB work in 2003 and 2004, and recent SBNF data. We have verified at least 75% of the occurrences for 9 of these species, including *Calochortus palmeri* var. *munzii* (Munz's mariposa lily), *Deinandra mohavensis* (Mojave tarplant), *Dudleya viscida* (sticky-leaved dudleya), *Eriastrum densifolium* ssp. *sanctorum* (Santa Ana woolly star), *Hulsea vestita* ssp. *callicarpa* (beautiful hulsea), *Lilium parryi* (lemon lily), *Monardella macrantha* ssp. *hallii* (Hall's monardella), *Oxytheca caryophylloides* (chickweed oxytheca), and *Polygala cornuta* var. *fishiae* (Fish's milkwort). For a few of these species, particularly Santa Ana woolly star, we are concerned about the persistence of the species at the known occurrences, because of the small population sizes we observed.

Species occurrences or localities may not have been verified yet for several reasons. First, many of the known occurrences or localities mentioned in the MSHCP species accounts are not yet part of the Conservation Area. Second, some occurrences or localities mentioned in the species objectives may be the result of inaccurate or faulty data, resulting in a named locality that is not actually in Riverside County or misinterpreting a site in the foothills of the Santa Ana Mountains as being on the ridge of the mountains. Third, for some occurrences, we may not have surveyed the right area within a site to find the target species. This is especially problematic when historical records do not contain precise coordinates or other specific location information. For example, we have surveyed for *Potentilla rimicola* (cliff cinquefoil) several times in the vicinity of Dark Canyon in the San Jacinto Mountains, but we may not have surveyed for it at the exact spot where it was collected in 1924. Fourth, for annual species and many perennial species,

we may not have surveyed at a time when the species was detectable. We will minimize this problem with the use of sentinel sites. Last, for some species, we have not fully surveyed all historic occurrences due personnel and time constraints.

Of the 10 Demonstrate Conservation species we targeted or detected incidentally in 2007, we have verified 52 of the 111 target localities, through a combination of our own, SBNF, and UCR CCB data. We have found all of the target localities with the specified number of individuals for *Hulsea vestita* ssp. *callicarpa* (beautiful hulsea) and *Polygala cornuta* var. *fishiae* (Fish's milkwort). We have not found any of the localities for 4 of the species and only 1 locality for 2 additional species. We encountered several issues that may have made finding the specified number of individuals at each locality difficult. For *Arctostaphylos rainbowensis* (Rainbow manzanita), we have a difficult time finding and counting all individuals at a locality because individuals seem to have a patchy distribution in difficult to penetrate chaparral and can only be identified at close proximity. Thus, we have collected data primarily on individuals near roads and trails. For geophytic species, we may be underestimating the number of individuals because some bulbs may not produce aboveground biomass during excessively dry years. Similarly, for annual species, the number of individuals found in a dry year most likely does not reflect the number of individuals that may be detectable during wetter years. For annual species, the number of individuals found during extremely dry or extremely wet years may not be good measures to use for meeting species objectives.

Recommendations for Future Surveys

Work in 2007 showed that even during a particularly dry year, we were able to set survey priorities that allowed us to be successful. The use of sentinel sites helped facilitate this. In future years, we should make sure that we have sentinel sites with a good distribution across the county and at various elevations. While we try to survey for species during their flowering time, this time is annually variable for many species, depending on factors such as timing of rainfall. Eventually, through the use of sentinel sites, we hope to better understand the relationship between the time of rainfall and when surveys for particular species should begin. In order to improve our ability to meet Demonstrate Conservation objectives, we should resurvey some of the locations that fell short of the requisite number of individuals during a year with normal rainfall. Additionally, during years with adequate rainfall, we should prioritize those species we have difficulty finding during dry years to enable us to meet species objectives within the 8-year monitoring period required by the species objectives.

We were unable to conclusively determine the identity of individuals at occurrences of 4 of the Covered Species we found in 2007. For *Monardella macrantha* spp. *hallii* (Hall's monardella), we did not find any flowering or fruiting individuals during 2 visits to a site, precluding our ability to conclusively identify the *Monardella* to species. This can be remedied through surveys at the site in future years. We are fairly confident that what we found is Hall's monardella because the species has been documented previously in the same area by biologist working for the Cleveland National Forest. For *Caulanthus simulans* (Payson's jewelflower), *Heuchera hirsutissima* (shaggy-haired alumroot), and *Chorizanthe leptotheca* (Peninsular spine flower), our inability to identify individuals to species is related to the lack of clear differentiation between the Covered Species and close relatives. Mr. Sanders, UCR Herbarium Curator, did not feel comfortable making species identifications on voucher specimens of these species. We will continue to voucher material from these species when found and make sure to

send vouchered material to experts for verification. If we determine that any species objectives were based on data from misidentified species, it will be up to the Regional Conservation Authority and the MSHCP permittees to decide what taxon, if any, is Covered under the MSHCP.

Figure 1. Sites surveyed in 2007 for rare plant species.

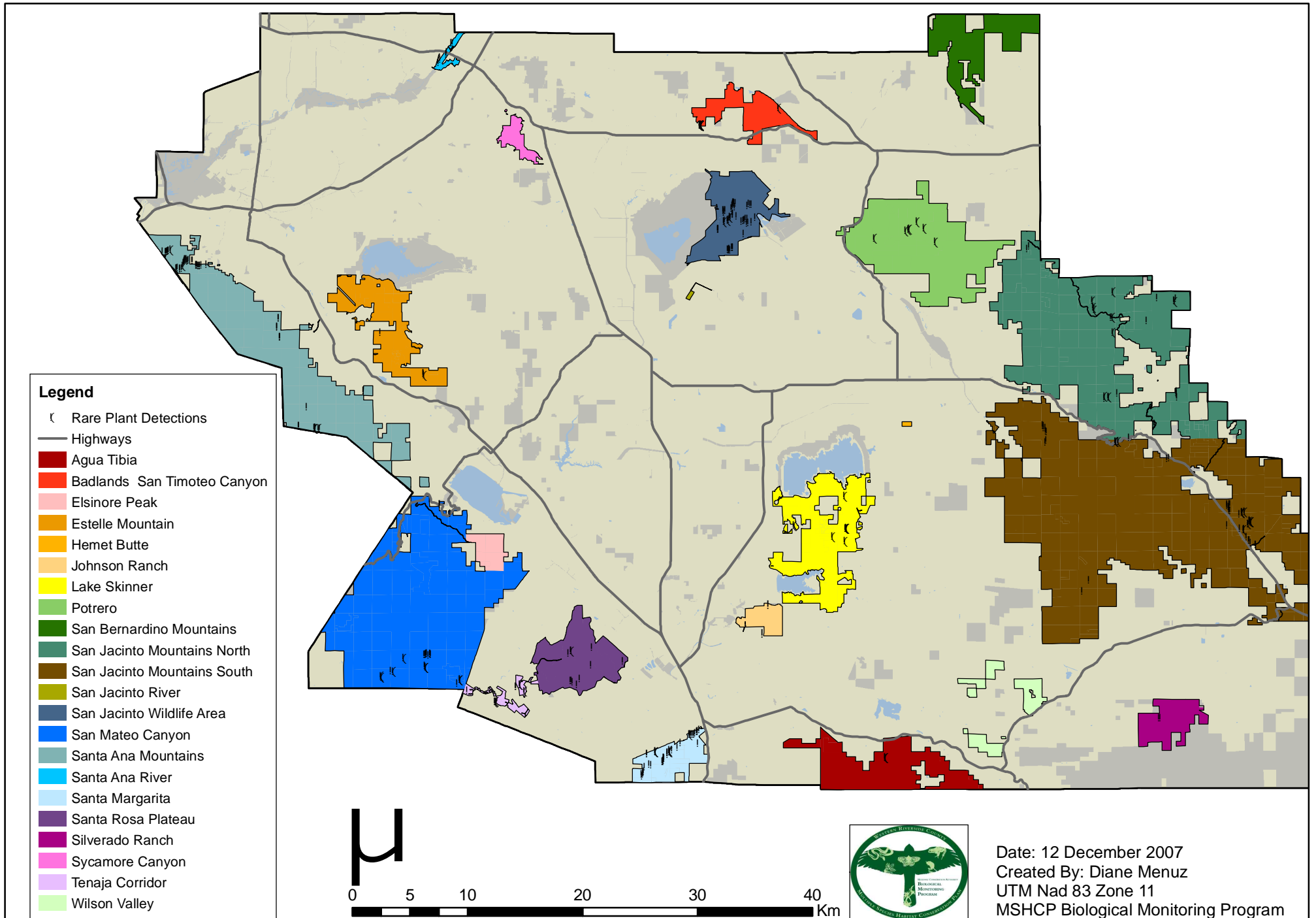


Figure 2a. Covered Plant Species Detected During Rare Plant Surveys in 2007.

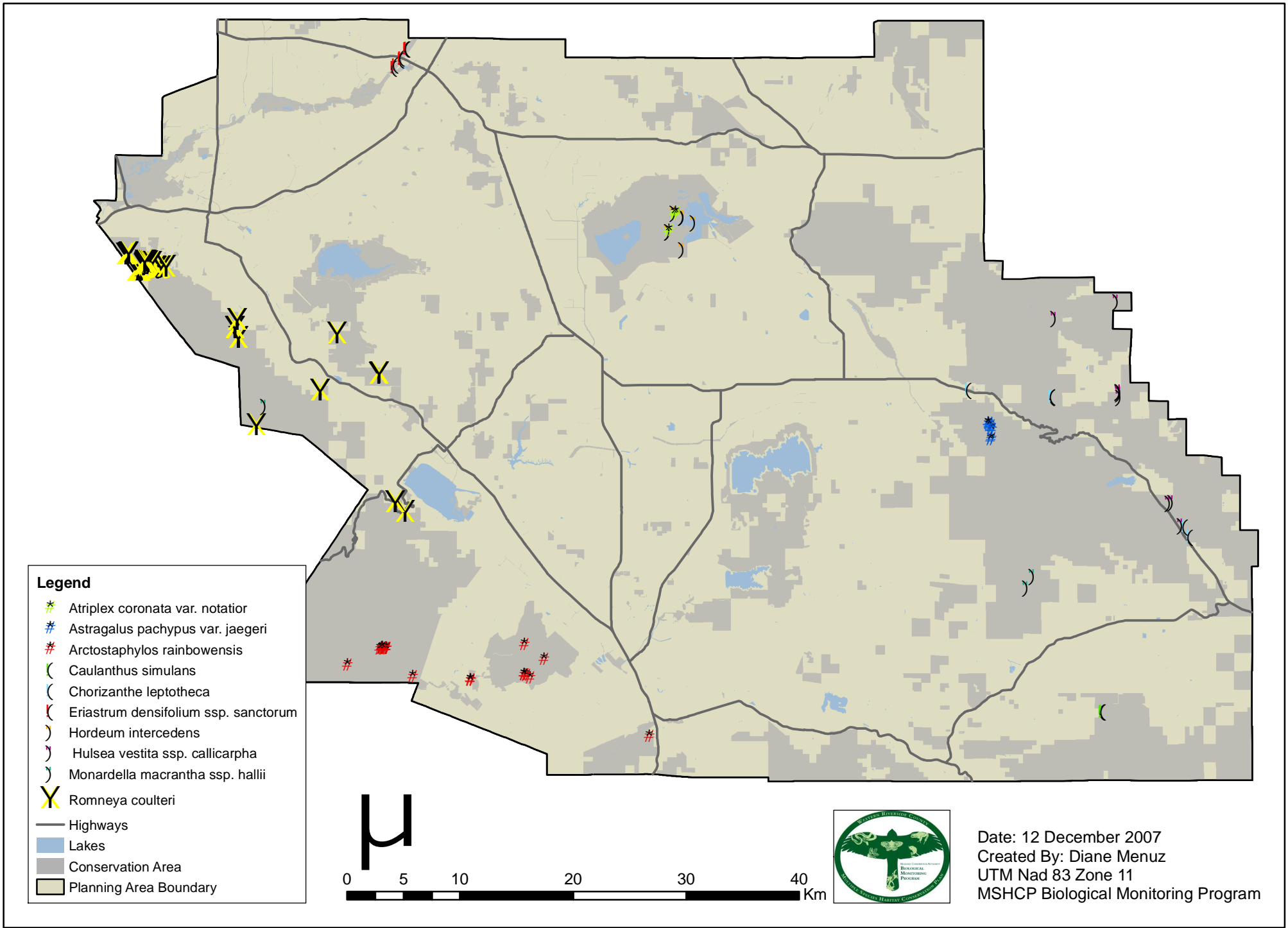


Figure 2b. Covered Plant Species Detected During Rare Plant Surveys in 2007.

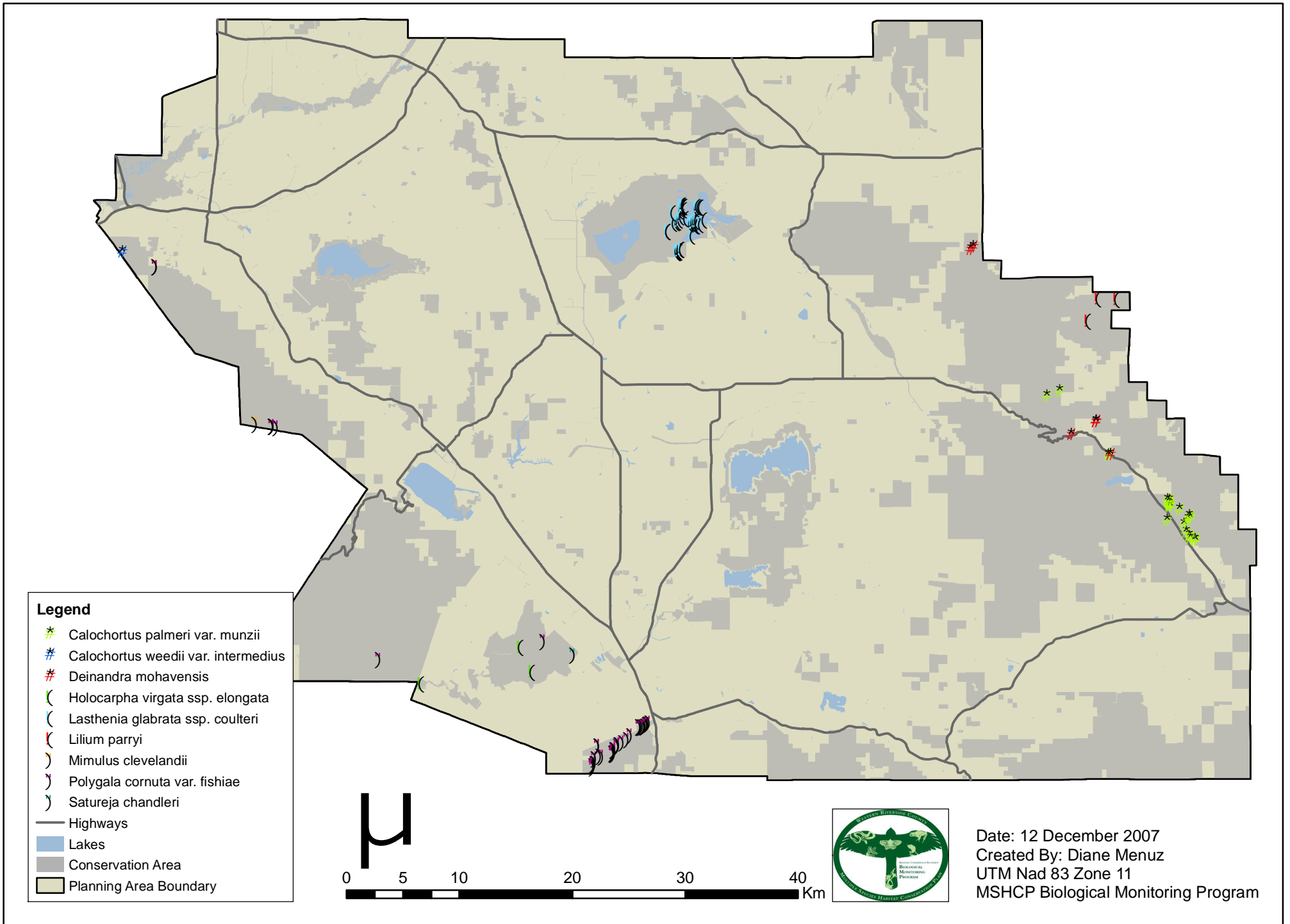
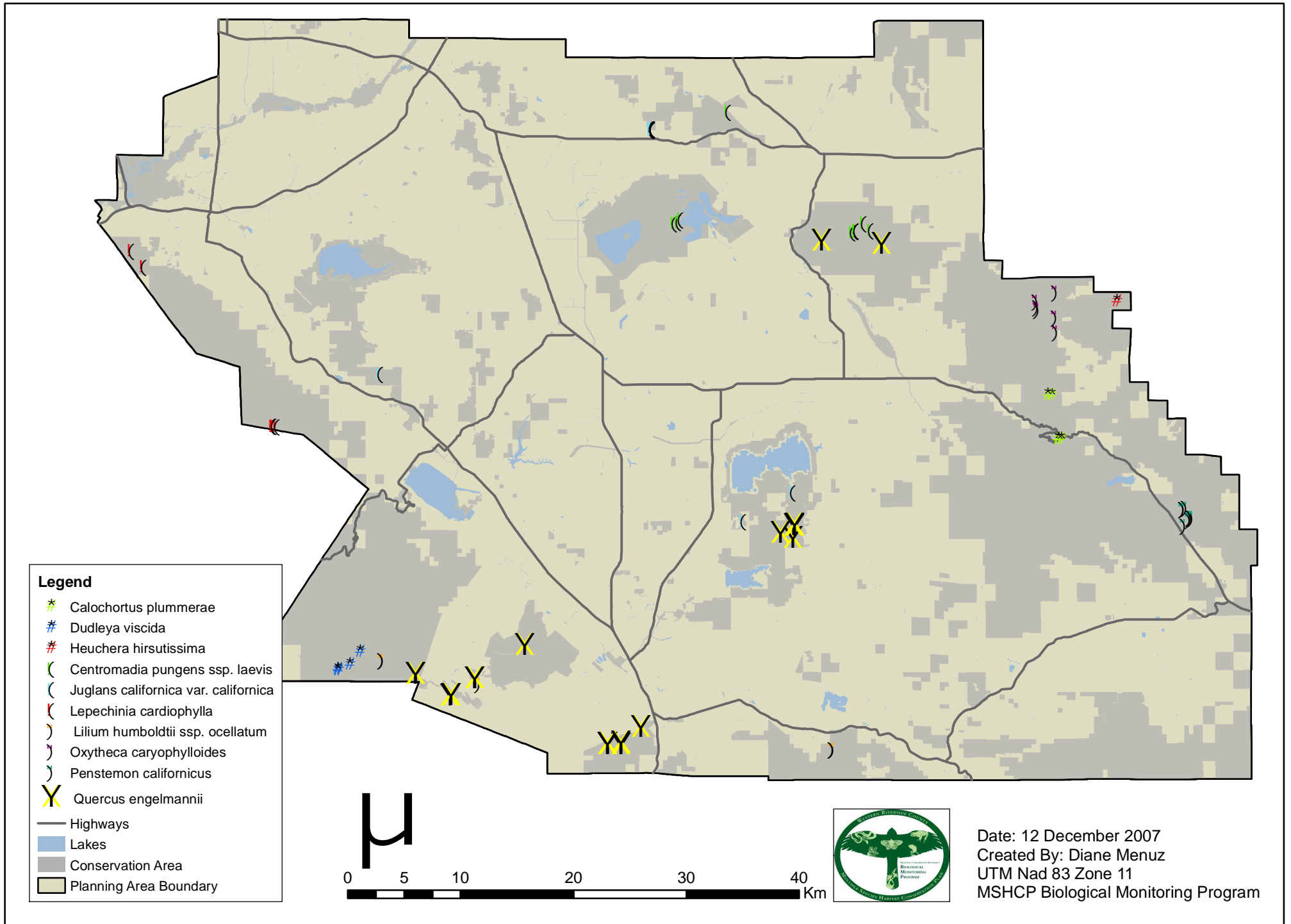


Figure 2c. Covered Plant Species Detected During Rare Plant Surveys in 2007.



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Appendix A: Western Riverside County MSHCP Biological Monitoring Program Protocol for Inventory-Phase Rare Plant Surveys March 6, 2007

Goals: Verify the occurrence of Covered Plant Species throughout Western Riverside County in order to meet MSHCP Species Objectives and to update historical distribution information. Collect habitat information to look for covariates associated with species presence.

Objectives: To achieve the above goals, surveys will be conducted annually throughout the Conservation Area in habitat deemed suitable for each species. Searches will be directed primarily by historical distribution information. When Covered Plant Species are located, plot-based data will be collected to obtain habitat covariates. Data collected in surveys and plots generally follow and are modified from California Native Plant Society and USDA Forest Service rare plant survey and vegetation assessment guidelines (USDA Forest Service 2005, CNPS 2004).

Timing: Surveys for Covered Plant Species will be conducted throughout most of the spring, summer and fall depending on rainfall, other seasonal variants, and current status towards meeting Species Objectives. Surveys will occur 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). Because under certain climatic conditions, some annual species will not germinate, known occurrences will occasionally be surveyed to document a species' presence or absence during a particular time of year at that particular place. If no individuals are found at these dependable locations, the lack of observing the species at other locations will not be taken as evidence toward documenting absence. However, presence of individuals at the dependable locations will not be enough to absolutely qualify an absence elsewhere to mean that a species is absent at that place due to observer error, regional differences in seasonality and the impossibility of covering all ground in a survey.

Survey Locations: Rare Plant Surveys will be conducted on accessible lands in the Conservation Area in areas known from the MSHCP Historical Database to support Covered Species. Points in the Database were derived from herbarium records, CNDDDB information and other records. Additional distributional information will be added from sources such as regional HCPs and land manager's records as needed to further direct searches and meet Species Objectives. Maps will be prepared before each survey with one or more UTM points and/or area descriptions for surveyors to visit.

Equipment

Clinometer	Hand held pruning shears
Handheld GPS unit	Weed digger
Topographic maps	Declinated compass
Digital camera	30 m transect tape
Flags or flagging	Field forms
Field plant press with newspaper	Collection notebook

Clipboard
Two way radio

Plant identification aids

Methods:

I: Rare Plant Surveys- Search

- 1 Examine maps and crew leader's instructions to determine areas to visit. In general, one historic point will correspond to one survey form. In some instances, such as when several sources of information are used in a fairly homogenous area (such as herbarium records and MSHCP Historic Database points in a large field in the San Jacinto Wildlife Area) up to five data points can be grouped on one data sheet. However, points from different species can never be put on the same Rare Plant Survey Form. The crew leader will determine in advance which points can be grouped. However, on-site observations about habitat heterogeneity may lead the crew to fill out different datasheets for points that the crew leader grouped together.
- 2 Record start time of survey on survey form. Keep GPS on throughout survey period to record tracks information. At the end of the survey, record end search time.
- 3 While surveying, use the historical points given to help direct your search while keeping in mind that all points have some margin of error associated with them and most occurrences will not be found directly at the point due to this error and to population migration over time.
- 4 Perform a meandering survey looking closely at all suitable habitat patches and walking around historical points as best as possible. If historical points are inaccessible due to difficulty of terrain or land access issues, or the habitat is completely inappropriate for the species, you can decide not to visit the actual point, but always note this on the survey form.

II: Rare Plant Surveys- Survey Form

- 1 Leave survey ID and Plot ID blank. These will be filled in at the office.
- 2 In area name, fill in general name of area such as San Jacinto Wildlife Area or Black Mountain.
- 3 Fill in recorder initials and the initials of all additional observers. Make sure to use your unique three letter initials.
- 4 Record the date and the four letter species code for the species you are working with. If you are working with multiple species, a new Survey Form will have to be filled out for each species.
- 5 Write coordinates from one point in search. If there are no coordinates (such as when searching area around a descriptive herbarium record), record coordinates from area that matches description or area where searched. All GPS units should be in NAD83.
- 6 For all points for that species that are in fairly homogenous habitat and can be grouped together, record the point ID (the name in the GPS unit) and whether or not you actually visited within about ten meters of that point. Also record if you would recommend revisiting the area around each particular point. Write any notes that may help explain your answers in the notes section for each point, such as "up inaccessible cliff" or "in Lake Mathews."
- 7 Write initials of all observers that recorded tracks information on their GPS.
- 8 Write start and end time of search. Search begins as soon as observers leave the vehicle.

- 9 For all habitat information, record information about the general area searched, not any one specific point, if the target species is not found. If the target species is found, record information for 10 through 16 about the area where the target species occurs.
- 10 Circle the dominant habitat type or write in other.
- 11 Check whether herb, shrub or tree layer is dominant.
- 12 For ground, shrub and tree layers, put C, I, or O for Continuous, Intermittent or Open vegetation. Continuous vegetation should be more than 2/3 cover, Intermittent is between 1/3 and 2/3 cover and Open is less than 1/3 cover.
- 13 For ground, shrub and tree layers, write in E, P, or L for Early, Peak or Late phenology. Do not choose more than one (e.g., P/L). If a layer is between two phenologies, choose the one you think is dominant and make a note in the “additional description” area.
- 14 Estimate the size of the dominant stand of vegetation that you surveyed.
- 15 Record site impacts by using numbered codes and follow each code with L, M, or H to denote Light, Moderate or High intensity impact.
- 16 In “Additional description of area” record any additional information about the survey. This is the place to list a few dominant plant species or the fact that you found a species known to co-occur with the species targeted by your survey. This is also the place to explain the specifics of the site impact codes you recorded. Also describe generally the lay of the land (e.g., conifer forest/grassland bordered by chaparral to the west and Highway 74 to the east).
- 17 Record the directions to the site from a major landmark, such as a town, freeway or intersection. Be sure to mention any gates, road quality issues, or confusing intersections so that future crews will be able to smoothly find the area. If necessary, record a GPS coordinate at especially difficult intersections. If you set up a plot, make sure to record particularly detailed directions.
- 18 Whether or not you find the target species, you should record information from steps 19 through 21. If species was found, you can still indicate how much of the habitat you surveyed and how detectable the species was. This will help indicate the appropriate level of confidence in population size estimates.
- 19 Circle Y, N or U for appropriate habitat found. List appropriate habitat elements if you circle Y or Q such as red clay soil, stream bed, etc.
- 20 Circle 1, 2 or 3 to indicate how much of the suitable habitat you surveyed.
- 21 Circle 1, 2 or 3 to show how detectable you think the species would be if it was in peak phenology. Circle 1, 2 or 3 to show how detectable you think the species would be if it was in early/late phenology. Take into account the overall detectability of the species, the openness of the habitat being surveyed and any other factors that may influence detectability.
- 22 Circle Y or N for species located. If species is not located, you are done filling out survey form.
- 23 Leave ID correct section blank. The ID of the species will be confirmed via specimen or photo by someone at the office.
- 24 Record the UTM's of the occurrence at the center of the occurrence. Also record the error in the GPS and the elevation, both in meters.
- 25 Record the last name and collection number of any specimen taken of the target species. See guidelines on collecting before taking a specimen.
- 26 Record the last name of the camera operator and the .jpg numbers of all photos of the species. All target species found should have at least one photo taken.

- 27 Write the number of individuals in the occurrence. Circle whether this is an exact number or an estimate. Count the exact number up to 100 individuals. Beyond 100 individuals, you can estimate.
- 28 Circle Y or N for whether or not you sub-sampled the population to determine population size.
- 29 Estimate the percent of the population in each stage of development, flowering/bud, fruit/dispersed, vegetative, and seedling/juvenile.
- 30 Estimate the size of the area of occurrence in square meters.
- 31 Circle Disease, Competition, Collection, Trampling, Herbivory if there is evidence that any of these are affecting the population.
- 32 Record any other species-specific information in the notes section, including specifics about the impacts listed above. Look for and record any patterns you notice in species microhabitat distribution, such as sunny versus shady, soil types or disturbance.
- 33 Circle Y or N for whether Plot was established.
- 34 If Y, record number of individuals in Plot and whether that number is exact or estimated.
- 35 Continue on to Plot Form.

III: Rare Plant Surveys- Plot Form

- 1 A plot can be conducted for more than one target species as long as each species has a separate first page filled out. Begin on page two by recording Area Name, recorder and observer initials, and date. Leave Plot ID and Survey ID(s) for Plot blank. These will be filled in at the office.
- 2 Record all target species in plot.
- 3 Circle Y or N for study plot revisit (Y would mean a revisit to a place where the Monitoring Program has previously set up a plot).
- 4 Determine center point of plot by determining center of target species' occurrence. This will be the same as the coordinates on the first page unless you have to move coordinates in order to include several species in a plot or to allow for a study plot to be set up.
- 5 Record coordinates at the center of the plot, GPS error and elevation.
- 6 Put pin flags in the ground in the four cardinal directions, each 15 m from the center point. This creates a square that is approximately 450 sq. meters.
- 7 Record slope in degrees using a compass or clinometer to estimate or average the slope over the plot. Record aspect in direction of slope.
- 8 Take photo due north and record camera operator last name and .jpg number of photo.
- 9 If you decide to take other plot photos to record information not found in north-facing photos, record last name, .jpg number and direction of additional photos.
- 10 For plot location, record landmarks and information that will help others find the plot in the future and specific details about where the plot is located.
- 11 Record any additional information not already captured in the Survey Form description and the plot location field in the additional comments field.
- 12 For surface coarse fragments, estimate the cover class of each size at or near the ground surface averaged over the plot. Always remember to estimate what you actually see on the surface as opposed to what is under organic litter, big rocks, etc. However, rocks, organic litter, or fine material visible under the canopy of shrubs or trees should be included in the cover estimate. Coarse fragments should add up to a total of 100% cover. Living stem is only the cover

that would remain if all above ground vegetation was cut down and will generally not be more than five percent. Bedrock is defined as continuous, exposed, non-transported rock. Litter is undecomposed organic matter including fallen logs, branches, twigs, needles and leaves.

13 Make a species list of all plants found within the plot. Record which layer (low, medium, high) of the plot the species was found. Record the dominant phenology represented by that plant (green/not flowering, flowering, seed, or desiccated). Each represented taxon will be entered separately in each layer in which it occurs. Each individual plant is recorded in only one layer, the layer in which the tallest portion of the individual is found. Each species within each layer should be assigned an estimate of percent cover.

14 Record the total percent cover for each layer of the vegetation, the total cover, and the cover of non-native species. These estimates should look at the overall cover provided by a layer, not simply the addition of all species in that layer. For example, if a plot has two shrub species with 10% and 20% cover, but overlap for 5% of that cover, 25% cover would be recorded for the shrub layer instead of 30%. These estimates give an absolute aerial cover and each category can not exceed 100%.

Data Analysis:

Presence data will provide the baseline for expectations when the Biological Monitoring Program moves from the inventory to the monitoring phase. All of the Covered Species of plants under the MSHCP require monitoring at least once every eight years, and populations found during the inventory phase will be revisited periodically for the monitoring effort. All subsequent revisits will be directed at collecting the same types of data we have collected during our baseline study. Thus, there will be continuity in this study which will provide us with the ability to track changes in terms of the health or success of the population by monitoring such elements as population size, associated vegetation, and disturbance

Species that are not able to meet MSHCP Species Objectives during the inventory phase will become the focus of more targeted work in two ways. First, survey effort will be increased and the area searched will be enlarged to enhance the likelihood of successfully verifying extant populations. This effort will draw upon ecological data gathered at the sites of populations of the same species that were verified during the inventory phase. Thus, modeling can be incorporated to help select suitable habitat. Second, certain species will become the focus of more frequent and intensive monitoring efforts to closely watch population trends and provide suggestions for management. The inventory phase of the rare plant work is necessary so that species of most concern can be identified.

Analysis of preliminary data will be minimal, and will be limited to such analyses as correlations that may further our understanding of the ecology and growing requirements of the species. These preliminary data do not provide for rigorous statistical analysis, but are nevertheless fundamental to the long-term monitoring objective.

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Rare Plant Survey Report 2007

United States Department of Agriculture Forest Service. March 2005. Threatened, Endangered And Sensitive Plants Element Occurrence, Rangeland Management Staff. Washington, DC.

Appendix B: Rare Plant Survey Form

Recorder initials:	Additional observers:	Date:
Sp. Code:	Coordinates of search: E 0 _____ N _____	
Point ID	Visited? Y N	Revisit recommended? Y N Notes:
Point ID	Visited? Y N	Revisit recommended? Y N Notes:
Point ID	Visited? Y N	Revisit recommended? Y N Notes:
Point ID	Visited? Y N	Revisit recommended? Y N Notes:
Point ID	Visited? Y N	Revisit recommended? Y N Notes:
GPS users for Tracks:		
Begin search time:	End search time:	

Dominant Habitat: Chaparral CSS Grassland Vernal pool/Alkali Riparian Conifer Forest			
Developed/Disturbed Meadow/Marshes Desert Scrub Woodland Other: _____			
Dominant Layer (check one) ___ Herb (0-0.5 m) ___ Shrub (0.5-4 m) ___ Tree (4 m)			
Structure: Ground ___ Shrub ___ Tree ___ (Continuous, Intermittant, Open, or N/A)			
Phenology: Ground ___ Shrub ___ Tree ___ (Early, Peak, Late, N/A)			
Stand Size: ___ <1 acre ___ 1-5 acres ___ >5 acres (check one) (1 acre= 4047 m ² or 64 m x 64 m)			
Site Impact Codes (see list)/Intensity (L, M, H): ___/___, ___/___, ___/___, ___/___, ___/___			
Additional description of area:			
Access Notes:			

Appropriate habitat found? Y N U			
List appropriate habitat elements:			
Proportion of suitable habitat surveyed 1 2 3 (1 equals almost all, 3 equals very little)			
Detectability of species in peak phenology 1 2 3 (1 equals very, 3 equals barely detectable)			
Detectability of species in early/late phenology 1 2 3 (1 equals very, 3 equals barely detectable)			

Species located? Y N (For office only) ID Correct: Y N U Method ID confirm:			
UTMs of Occurrence E 0 _____ N _____		GPS error: _____ m	
Specimen taken (collector name and #)		Elevation:	
Photo(s) of species (camera operator and jpg #)			
Number of individuals in occurrence		Exact / Estimate Subsample? Y N	
% flower/bud _____		% fruit/dispersed _____ % vegetative _____ % seedling/juvenile _____	
Area of occurrence: _____ m ²			
Evidence of: Disease Competition Collection Trampling Herbivory (circle all that apply)			
Sp. notes, including re: above:			
Plot set up? Y N		# individuals in plot Exact/Estimate	

Rare Plant Survey Form Page 2 of 3

Recorder initials:	Additional observers:	Date:
Survey ID(s) included in Plot		
Target species:		
Plot size: 450 m ² or Other _____	Study Plot Revisit? Yes No	
Coordinates of plot E 0 _____	N _____ Error +/- _____ m	
Elevation: _____ m Slope: _____ °	Aspect _____ °	
N-facing photo (camera operator and jpg #)		
Other plot photos:		

Plot location:

Surface Coarse Fragments and Soils Information	
Type:	Percent Cover
Fines: Including sand, mud	
Gravel: 2mm-7.5cm	
Cobble: 7.5-25 cm	
Stone: 25-60 cm	
Boulders: >60 cm	
Bedrock: Including outcrops	
Litter: Organic matter covering ground	
Water: Standing or running	
Living stems: at ground surface	
Other: (specify)	

*note all surface fragments, non-vegetation, living stems, etc., should add up to 100%

1 Development	19 Vandalism/Dumping/Litter
2 Off-highway vehicles and motorized recreation	20 Foot Traffic/Trampling
3 Agriculture	23 Erosion/Runoff
4 Grazing	26 Degrading Water Quality
5 Competition from Exotics	27 Wood Cutting
6 Logging	29 Recreational Use (hiking, mtn bike, etc)
11 Groundwater Pumping	33 Channelization (anthropogenic)
12 Dam	39 Fire suppression (hand lines, back burning)
13 Other (Specify)	42 Fire (last 5 years)
15 Road/Trail Construction/ Maintenance	45 Fire (more than 5 years ago)

Appendix C: Rare Plant Sentinel Site Survey Form

Recorder initials:	Additional observers:	Date:
Sp. Code:	Coordinates of search: E 0 _____ N _____	
Sentinel Site Area Name:		
Species occurrence ID: BM _____		
GPS users for Tracks:		
Begin search time:	End search time:	

Sentinel Site found? Y N U

Phenology: Ground _____ Shrub _____ Tree _____ (Early, Peak, Late, N/A)
List dominant (by percent cover) three species for each category and circle phenology
Tree/shrub
1) _____ Green Flower Fruit Desiccate
2) _____ Green Flower Fruit Desiccate
3) _____ Green Flower Fruit Desiccate
Herb
1) _____ Green Flower Fruit Desiccate
2) _____ Green Flower Fruit Desiccate
3) _____ Green Flower Fruit Desiccate
List other flowering or fruiting species
1) _____ Green Flower Fruit Desiccate
2) _____ Green Flower Fruit Desiccate
3) _____ Green Flower Fruit Desiccate
Additional description of area:

Species located? Y N (For office only) ID Correct: Y N U Method ID confirm:
UTMs of Occurrence E 0 _____ N _____ GPS error: _____ m
Specimen taken (collector name and #) _____ Elevation: _____
Photo(s) of species (camera operator and jpg #)
Number of individuals in occurrence _____ Exact / Estimate _____ Subsample? Y N
% flower/bud _____ % fruit/dispersed _____ % vegetative _____ % seedling/juvenile _____
Area of occurrence: _____ m ²
Evidence of: Disease Competition Collection Trampling Herbivory (circle all that apply)
Sp. notes, including re: above: