Western Riverside County
Multiple Species Habitat Conservation Plan
Biological Monitoring Program

2024 Rare Plant Survey Report

Coulter's Matilija Poppy (*Romneya coulteri*)
Photo by Gabriel Elliott

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NOTE TO READER:

This report is an account of survey activities conducted by the Biological Monitoring Program (BMP) for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. Reserve assembly is ongoing and is expected to take 20 or more years to complete. The Conservation Area includes lands acquired under the terms of the MSHCP and other lands that have conservation value (called Public/Quasi Public Lands in the MSHCP) within the boundary of the MSHCP (Plan Area). In this report, the term "Conservation Area" refers to these lands as they were understood by the BMP at the time the surveys were conducted.

The BMP monitors the status and distribution of the 146 species covered by the MSHCP 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 Wildlife (CDFW, formerly California Department of Fish and Game) and the U.S. Fish and Wildlife Service]. BMP activities are guided by defined conservation objectives for each Covered Species, other information needs identified in MSHCP Section 5.3 or elsewhere in the document (Dudek & Associates 2003), and the information needs of the Permittees. A list of the lands where data collection activities were conducted in 2024 is included in Section 8.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies.

The primary author of this report was the 2024 Botany Taxa Lead, Gabriel Elliott. This report should be cited as: Biological Monitoring Program. 2025. Western Riverside County MSHCP Biological Monitoring Program 2024 Rare Plant Survey Report. Prepared for the Western Riverside County Multiple Species Habitat Conservation Plan. Riverside, CA. Available online: https://www.wrc-rca.org/species-surveys/.

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

Please contact the BMP Administrator with questions about the information provided in this report. Questions about the MSHCP should be directed to the Executive Director of the RCA. Further information on the MSHCP and the RCA can be found at www.wrc-rca.org.

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INTRODUCTION

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) includes 63 rare plants as Covered Species (Dudek & Associates 2003). For most Covered Species, the MSHCP requires the confirmation of a number of occurrences, often at specified sites, within the Conservation Area. The species-specific objectives are set forth in Vol. 1, Sec. 9, Table 9-2. Species Conservation Summary (Dudek & Associates 2003). Each objective is intended to provide measurable criteria for evaluating conservation success. Unless a given objective has more rigorous requirements, we survey each Covered Species at least once every eight years, with the goal of verifying occupancy at ≥75% of the sites listed in the species-specific objective (Dudek & Associates 2003, Table 5.8). There are 19 plant species that have additional requirements as seen in Volume 1, Section 9, Table 9-3, of the MSHCP (Dudek & Associates 2003). Thirteen species have additional objectives to demonstrate a particular level of conservation, such as a minimum number of individuals at a specified number of locations. The remaining six species require a Memorandum of Understanding (MOU) to be executed with the United States Forest Service (USFS) in order to be considered Covered Species Adequately Conserved.

From 2005 to 2012 the Biological Monitoring Program conducted an initial inventory and assessment phase to determine the status and future monitoring needs of all Covered Species. We gathered known distribution information from a variety of sources, including herbarium records, field notes, gray literature and species databases (CCH 2007; Dudek & Associates 2001; CNDDB 2006). We conducted baseline inventory field surveys to determine whether MSHCP objectives were being met and used those results to develop long-term monitoring strategies.

Currently, the Biological Monitoring Program is focused on implementing the long-term monitoring phase. We primarily conduct monitoring surveys to confirm existing species occurrence records. In addition, we conduct inventory surveys for new rare plant occurrences as newly acquired Additional Reserve Lands (ARL) are added to the MSHCP Conservation Area or as new information about habitat suitability is obtained. Please refer to Appendix A for the current status of rare plant species objectives and contact the BMP Botany Lead for any details of our interpretation of the species occurrence objectives for rare plant species.

This report covers the eight-year monitoring period from 2017-2024. In 2024, we conducted rare plant surveys for 43 Covered Species with the following goals:

Survey Goals

1. Meet MSHCP Species Objectives and improve knowledge of covered plant species distribution within the Conservation Area.

   a. Verify historical locations and document new locations of covered plant species in the Conservation Area
   b. Monitor the continued presence of covered plant species at confirmed locations at least once every eight years.
2. Improve knowledge of covered plant species' ecology and habitat requirements.
   a. Collect species-specific information such as population size, plant density, abundance, and phenology.
   b. Collect information on habitat characteristics associated with species presence to guide future inventory surveys.
3. Continue to test and refine the protocol for covered plant species surveys.

METHODS

Study Area

We conducted this study within western Riverside County, California in 2024. The region has a Mediterranean climate characterized by mild, wet winters and long, dry summers (Munz 1974). The long-term average annual precipitation in the Riverside Area is 23.77 centimeters (cm). The region's topography consists of lowland plains and valleys intersected with rolling hills and surrounded by mountain ranges (Dudek and Associates 2003). There are approximately 1500 plant species including many rare and endemic species (Roberts Jr et al. 2004). Rare plant surveys were conducted by BMP staff across multiple habitats including chaparral, coastal sage scrub, montane coniferous forest, oak woodland and grassland. Climatic conditions during the survey period were cooler and wetter than average, with 31.24 cm of precipitation between 1 October 2023 and 30 September 2024, which is about 130% of the long-term average (NWS 2025), and a mean daily temperature of 19.2°Celsius (C), which is lower than the twenty-year average of 20.2°C (NWS 2025).

Protocol Development

We based our initial surveys on the Relevé protocol developed by the California Native Plant Society (CNPS 2004). We modified this protocol in 2008 to better align with monitoring objectives and to improve efficiency. We switched from point-based Relevés to grid-based searches, started characterizing vegetation communities by dominant plant species instead of creating a complete species list, and stopped collecting supplemental data on vegetation structural layers and substrate composition. The survey protocol used in 2024 is described more completely in the *Western Riverside County MSHCP Biological Monitoring Program Rare Plant Monitoring Survey Protocol,* available at http://www.wrc-rca.org/survey_protocols/.

Survey Methods

We chose target plant species for 2024 according to the following priorities: time elapsed since last observation; species sensitivity; and detection probability given environmental conditions. The majority of surveys were focused on reconfirming outdated observation records during each species' eight-year monitoring period (monitoring surveys) with a considerable number focused on unconfirmed historic occurrences or newly acquired lands (inventory surveys).

To assist with surveying effort, we created sampling stations by superimposing a 250-meter (m) x 250-m grid layer over the entire Conservation Area in ArcGIS (Esri 2024) and giving each grid cell a unique identifying name (i.e. Station ID). All surveys were conducted within these grid sampling stations in order to quantify survey areas and survey effort. Focused rare plant surveys began when species were readily identifiable at sentinel sites (via sentinel site surveys) or at times similar to recent, local observation records. We also used the average flowering seasons listed in the Jepson eFlora (Jepson Flora Project 2024) and the observed phenology of co-occurring species to determine optimal timing for rare plant surveys.

We started surveying for covered plant species on 29 January 2024 and we conducted our last survey on 18 October 2024. Staff used handheld GPS units to navigate to the target locations and thoroughly search suitable habitat for Covered Species. Habitat suitability was based off of descriptions in the Species Account (Dudek & Associates 2003), the Jepson Manual (2nd Edition; Baldwin et al. 2012) and previous observations by Biological Monitoring Program staff. Regardless of whether the target species was found, surveyors recorded general site information such as site description, dominant vegetation communities and observable site disturbances. When Covered Species were observed, we collected additional data including UTM coordinates, plant abundance, patch size, phenology and substrate. More information on field data collection can be found in the *Western Riverside County MSHCP Biological Monitoring Program Rare Plant Monitoring Survey Protocol* (http://www.wrc-rca.org/survey_protocols/).

Sentinel Surveys

Some rare plant populations were established as "sentinel sites" based on accessibility and population robustness. Sentinel site surveys were brief and informed whether full monitoring surveys were appropriate at that time. Rare plant populations at sentinel sites may also require full monitoring surveys every eight years to meet species objectives.

Monitoring Surveys

Monitoring surveys are required for Covered Species every eight years unless otherwise indicated in the MSHCP document. The purpose of monitoring surveys is to document the continued presence of confirmed populations, in particular, those

occurrences that meet defined species objectives, and to identify localities that contain a minimum number of individuals as detailed in species-specific objectives. To effectively meet monitoring requirements, we created polygons in ArcGIS representing the locations of the required occurrences as described by the MSHCP document. Due to variance in MSHCP species-specific objectives and precision of historic occurrence data, some locations of required occurrences are very precise, while others are generalized over a large region.

During monitoring surveys, we used GPS coordinates to relocate known species occurrences and to search adjacent habitat. Surveys included a thorough plant search, definitive target species identification, and collection of observational data on the covered plant species and habitat characteristics. Some species had multiple occurrences within an objective polygon that satisfied a single objective requirement. In those instances, we attempted to monitor all known occurrences within the polygon, time allowing. However, we considered the monitoring objective met if only one of those occurrences was reconfirmed. We did not conduct a complete census of species distribution across the Plan Area, although we endeavored to inventory all occurrences as we became aware of them. We collected additional data (e.g. substrate, site impacts, co-occurring species) to better understand species ecology, population trends and potential management needs.

Inventory Surveys

Inventory surveys targeted new populations and unconfirmed historical occurrence records. We prioritized occurrences that met defined species objectives. Surveys involved a thorough search of all suitable habitat within a given sampling station. Survey effort was concentrated on suitable habitat due to staff time constraints; less suitable habitat was spot-checked as per general survey methodology.

We first searched stations containing species records from the MSHCP historical database. If unsuccessful, we expanded the survey effort to surrounding grids with suitable habitat. We do not consider an undetected species a true absence in a given survey area. However, if multiple attempts are made unsuccessfully, we may determine the species is unlikely to be detected at a given site and shift our resources to sites that may yield confirmation of target species.

Training

Rare plant survey training was conducted over multiple days prior to starting field surveys. Surveyors were instructed in identification of common plant families, covered plant species and local vegetation communities. They studied photographs and herbarium specimens of target species as well as closely related or potentially confusing species. Surveyors were required to become familiar with critical identifying features of each species using the dichotomous keys found in The Jepson Manual (2nd Edition; Baldwin et al. 2012) and other resources such as Flora of the Santa Ana River and Environs (Clarke

et al. 2007), Wildflowers of Orange County and the Santa Ana Mountains (Allen and Roberts Jr. 2013), Jepson eFlora (Jepson Flora Project 2024), and the Calflora digital database (Calflora 2024).

Surveyors then participated in field training prior to conducting rare plant surveys. Training focused on field plant identification led by experienced botanists. Staff practiced taking rare plant survey data, conducting sentinel site visits and identifying key features in the field. Inexperienced personnel did not conduct rare plant surveys alone and only botany specialists confirmed Covered Species identifications during rare plant surveys.

Data Analysis

Rare Plant surveys documented the presence of covered plant species to meet species objectives as required by the MSHCP, and as outlined briefly below. We did not perform a complete census of species, nor did we use a sampling design that allowed for statistical analyses, such as trend or covariate correlations. The data we collected were observational, assisted in alerting us to possible threats to plant populations, and provided a "snapshot" of the habitat in which plant species are likely to be found.

The species-specific objectives listed in the MSHCP specify a certain number of locations, occurrences, records, or localities for each species, and often include a list of areas where the species should be found. For distributional objectives, the MSHCP uses—but does not define—the terms: *location*, *locality* and *occurrence*. The MSHCP Species Account utilizes these three terms interchangeably when referring to distributional objectives. We define "occurrence" as the unit to describe a group of individuals meeting the criteria for one location in the species objective. When species objectives have a one-to-one relationship between number of occurrences and locations where they are expected, we have a very clear idea of what constitutes an occurrence. For example, Species Objective 2 for Cleveland's Bush Monkeyflower (*Mimulus clevelandii*) requires that we "include within the MSHCP Conservation Area the two known [occurrences] of this species on Santiago Peak in the Santa Ana Mountains and on the northern slopes of the Agua Tibia Mountains." Other species objectives require a specified number of known occurrences to be included in the Conservation Area without listing each specific site where the species will be conserved. For example, Species Objective 2 for California Beardtongue (*Penstemon californicus*) requires that we "include within the MSHCP Conservation Area at least 15 occurrences in Aguanga, Blackburn Canyon, and the San Jacinto Mountains." When distinct locations for each occurrence are not specified, we are unable to apply a single definition of "occurrence." Instead, we define "occurrence" on a case-by-case basis, factoring in, when available, the typical spatial distribution of the species, general ecology, geography, and conservation intent. In addition, we combine a close reading of the MSHCP Species Account and Fish and Wildlife Service Biological Opinion (USFWS 2004) with points contained within the MSHCP historical database to attempt to delineate objective occurrences. When

populations are continuous and it is difficult to delineate separate occurrences, we use what we call the "quarter-section rule," described below.

Demonstrate-Conservation Objectives

The MSHCP includes 19 plant species that are not considered Adequately Conserved until additional conservation objectives have been met or until a MOU has been executed with the USFS. These 19 plant species are presented in Volume 1, Section 9, Table 9-3, of the MSHCP (Dudek & Associates 2003). We refer to these additional goals as "Demonstrate-Conservation Objectives" or "Table 9-3 objectives." For Demonstrate-Conservation Objectives, the MSHCP uses the term "locality" and defines its minimum dimensions as one-quarter section of a 160-acre U.S. Geological Survey (USGS) topographic quadrangle map. Using a shapefile of the Public Land Survey System (BLM 2008), we interpret this quarter section rule to mean that occurrences located in different quarter sections can be considered different occurrences or localities.

To satisfy a Demonstrate-Conservation Objective, a minimum number of individuals is typically required, unless a smaller population has been demonstrated to be self-sustaining. For example, the conservation objective for Parry's Spine Flower (*Chorizanthe parryi* var. *parryi*) states "within the MSHCP Conservation Area, confirm 10 localities with at least 1000 individuals (unless a smaller population has been demonstrated to be self-sustaining)." When conducting surveys for Parry's Spine Flower, we used pin flags to demarcate boundaries and carefully counted 1000 individuals within a single day to avoid double-counting. Once a specific locality was verified to have 1000 individuals, we estimated the overall population size.

When certain conservation requirements as identified in the species-specific conservation objectives for a plant species listed in MSHCP Table 9-3 have been met, that species becomes a Covered Species Adequately Conserved. Once this occurs for a species, the Species Objectives in the species account are implemented/monitored.

RESULTS

Targeted Surveys

Between 29 January and 18 October 2024, we conducted 337 rare plant surveys (8 sentinel site surveys, 207 monitoring surveys, and 122 inventory surveys) for 43 Covered Species and 107 MSHCP-required occurrences. In total, across all survey types, we successfully confirmed 88 MSHCP-required occurrences of 38 Covered Species (Figure 1a, 1b, 1c; Appendix B). Overall, we documented 244 rare plant occurrences. We detected 14 new rare plant occurrences including five MSHCP-required occurrences for the first time. For the current monitoring period (2017-2024) we improved the number of confirmed occurrences for fifteen species (Appendix A). We did not locate California Muhly (*Muhlenbergia californica*), California Orcutt Grass (*Orcuttia californica*),

Payson's Jewelflower (*Caulanthus simulans*), Shaggy-haired Alumroot (*Heuchera hirsutissima*) or Wright's Trichocoronis (*Trichocoronis wrightii* var. *wrightii*) at the targeted survey locations.

In total, all monitoring requirements have been met for 28 of 63 Covered Species for the 2017-2024 monitoring period (Appendix A; Table 1). The monitoring objectives for Mud Nama (*Nama stenocarpa*), San Jacinto Mountains Bedstraw (*Galium angustifolium* ssp. *jacinticum*), and Yucaipa Onion (*Allium marvinii*) were newly met in 2024. Plummer's Mariposa Lily (*Calochortus plummerae*) was not adequately surveyed and is no longer met for the current monitoring period (Appendix A). Cleveland's Bush Monkeyflower (*Mimulus clevelandii*), Lemon Lily (*Lilium parryi*), Ocellated Humboldt Lily (*Lilium humboldtii* ssp. *ocellatum*) and Sticky-leaved Dudleya (*Dudleya viscida*) have met all monitoring requirements but require a MOU to be executed with the USFS before they can be classified as Covered Species Adequately Conserved.

Demonstrate-Conservation Objectives Species

There are 19 plant species with additional monitoring objectives outlined in Table 9-3 of Volume 1 of the MSHCP that must be met to be considered Covered Species Adequately Conserved (Dudek & Associates 2003). Thirteen species have minimum occurrence or population size requirements while the remaining six species require a MOU to be executed with the USFS. As of December 31, 2024, an MOU has not been executed with the USFS for any of the six species.

In 2024, we surveyed for 13 plant species with Demonstrate-Conservation Objectives: California Muhly (*Muhlenbergia californica*), Cleveland's Bush Monkeyflower, Cliff Cinquefoil (*Potentilla rimicola*), Coulter's Matilija Poppy (*Romneya coulteri*), Fish's Milkwort (*Polygala cornuta* var. *fishiae*), Lemon Lily, Mojave Tarplant (*Deinandra mohavensis*), Ocellated Humboldt Lily, Parry's Spine Flower, Peninsular Spine Flower (*Chorizanthe leptotheca*), Plummer's Mariposa Lily, Shaggy-haired Alumroot (*Heuchera hirsutissima*) and Small-flowered Microseris (*Microseris douglasii* var. *playcarpha*).

We conducted population counts for five occurrences of three species: Fish's Milkwort (3), Peninsular Spine Flower (1) and Plummer's Mariposa Lily (1). We confirmed the requisite population size of 50 individuals for all three targeted locations of Fish's milkwort. We confirmed species presence but not the population size requirements for Peninsular Spine Flower and Plummer's Mariposa Lily.

We have currently met all additional monitoring requirements for nine of the thirteen species with population size requirements for the 2017-2024 monitoring period (Table 1). The four species that we did not meet Demonstrate-Conservation Objective requirements for are: Cliff Cinquefoil, California Muhly, Plummer's Mariposa Lily and Mojave Tarplant.

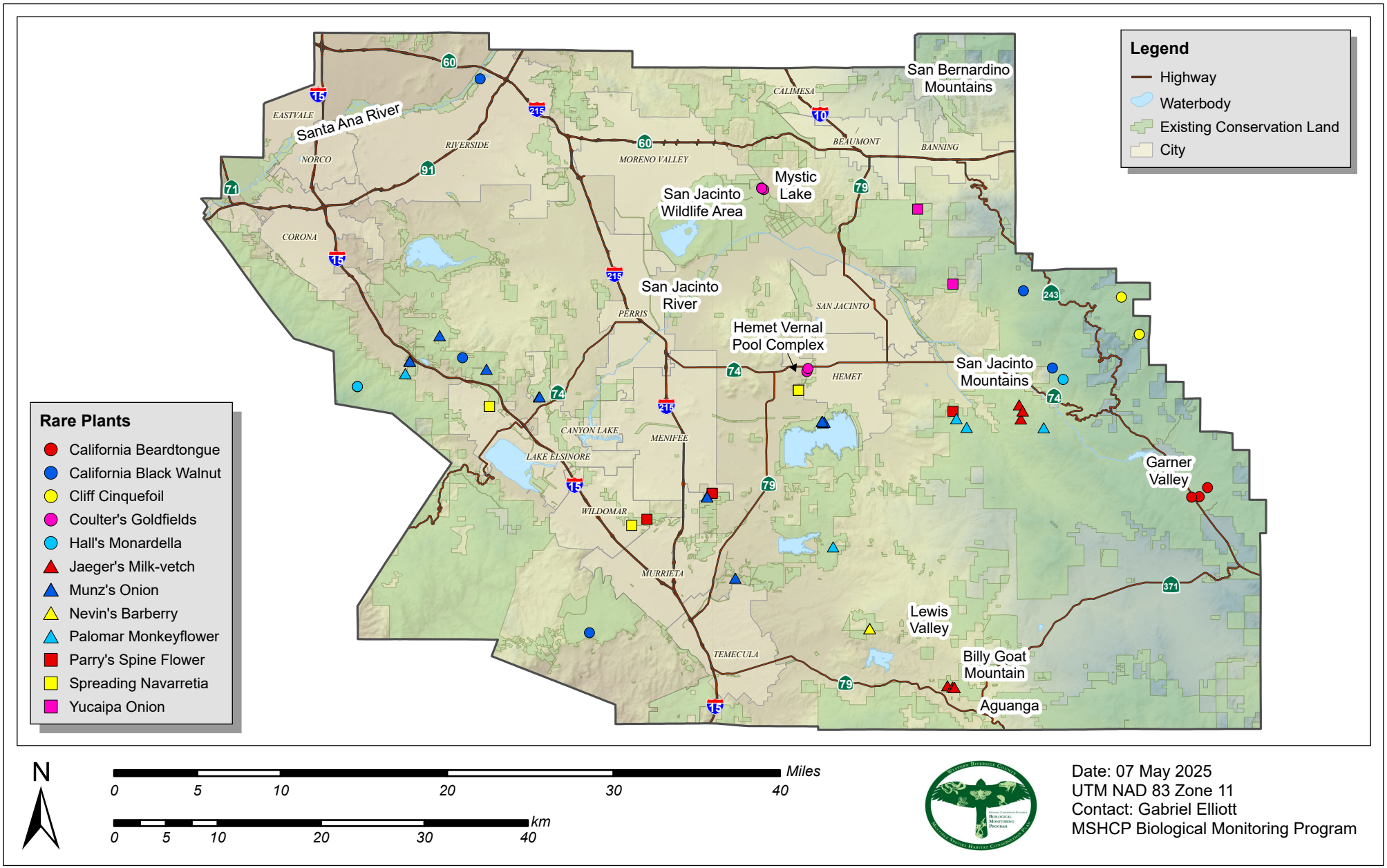

Figure 1a. Covered plant species detected in the Conservation Area in 2024.

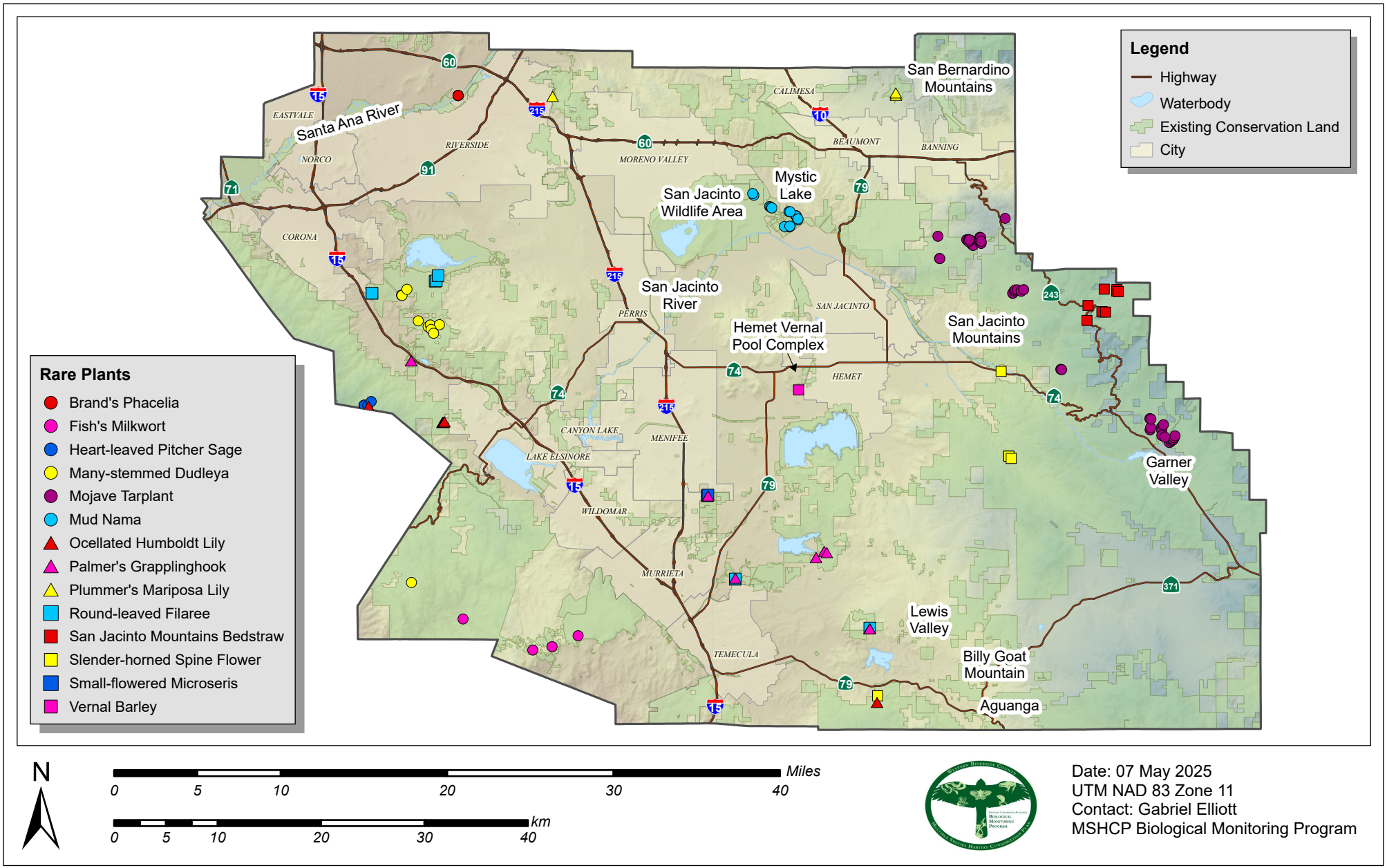

Figure 1b. Covered plant species detected in the Conservation Area in 2024.

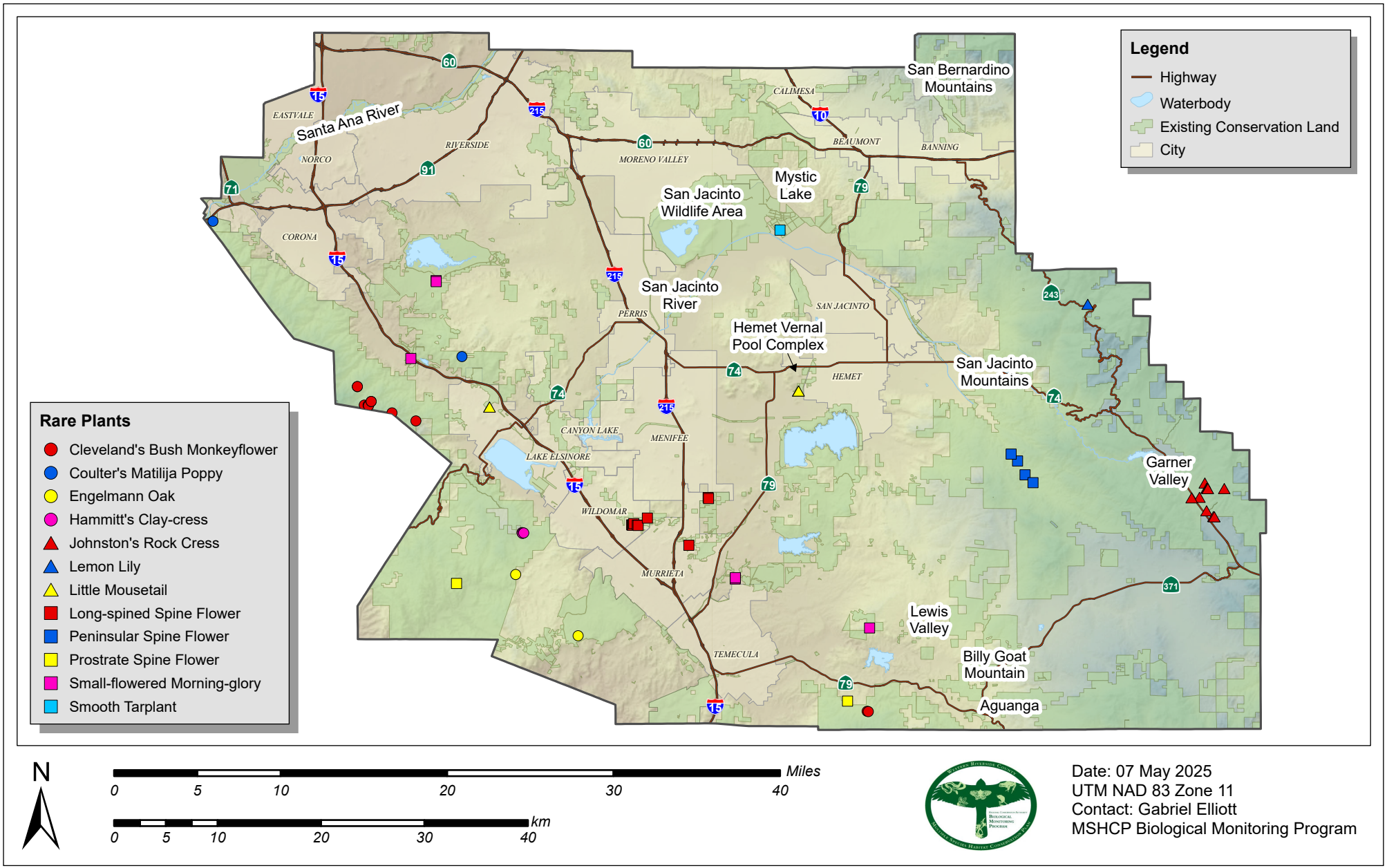

Figure 1c. Covered plant species detected in the Conservation Area in 2024.

Table 1. Summary of MSHCP Table 9-3 Demonstrate-Conservation Objectives. These species are considered adequately conserved only when 100% of required localities have met minimum population size requirements within an eight-year monitoring period. **Bold** text indicates the requirement for this species is currently met.

Species	Objective Requirements		Confirmed Localities°		Obj. Met
	Localities	*Min. Population*	*2017-2024*	*2024*	
Beautiful Hulsea (*Hulsea vestita* ssp. *callicarpha*)	16	50	16	0	**Yes**
California Muhly (*Muhlenbergia californica*)	10	50	0	0	No
Chickweed Oxytheca (*Oxytheca caryophylloides*)	10	1000	10	0	**Yes**
Cliff Cinquefoil (*Potentilla rimicola*)	5	any	2	2	No
Coulter's Matilija Poppy (*Romneya coulteri*)	30	any	30	2	**Yes**
Fish's Milkwort (*Polygala cornuta* var. *fishiae*)	10	50	10	3	**Yes**
Graceful Tarplant (*Holocarpha virgata* ssp. *elongata*)	10	1000	10	0	**Yes**
Mojave Tarplant (*Deinandra mohavensis*)	4	100 acres‡	0	0	No‡
Parry's Spine Flower (*Chorizanthe parryi* var. *parryi*)	10	1000	10	0	**Yes**
Peninsular Spine Flower (*Chorizanthe leptotheca*)	10	1000	10	0	**Yes**
Plummer's Mariposa Lily (*Calochortus plummerae*)	6	500	4	0	No
Rainbow Manzanita (*Arctostaphylos rainbowensis*)	10	50	10	0	**Yes**
Small-flowered Microseris (*Microseris douglasii* var. *platycarpha*)	10	1000	10	0	**Yes**

‡ *Interpretation of 100 acres required.*

° *Localities support minimum population requirement.*

Table does not include species that have a United States Forest Service MOU requirement.

Incidental Observations

We incidentally observed 48 occurrences of 25 rare plant species during surveys for other Covered Species (Figure 2). These observations met 20 MSHCP-required occurrences. We met eight required occurrences of four Covered Species for the first time: Coulter's Matilija Poppy (3), Lemon Lily (3), Long-spined Spine Flower (*Chorizanthe polygonoides* var. *longispina,* 1) and Palomar Monkeyflower (*Mimulus diffusus,* 1). We additionally detected eight new rare plant occurrences that did not meet MSHCP-required species objectives. Incidental observation data are used as applicable to meet monitoring conservation objectives.

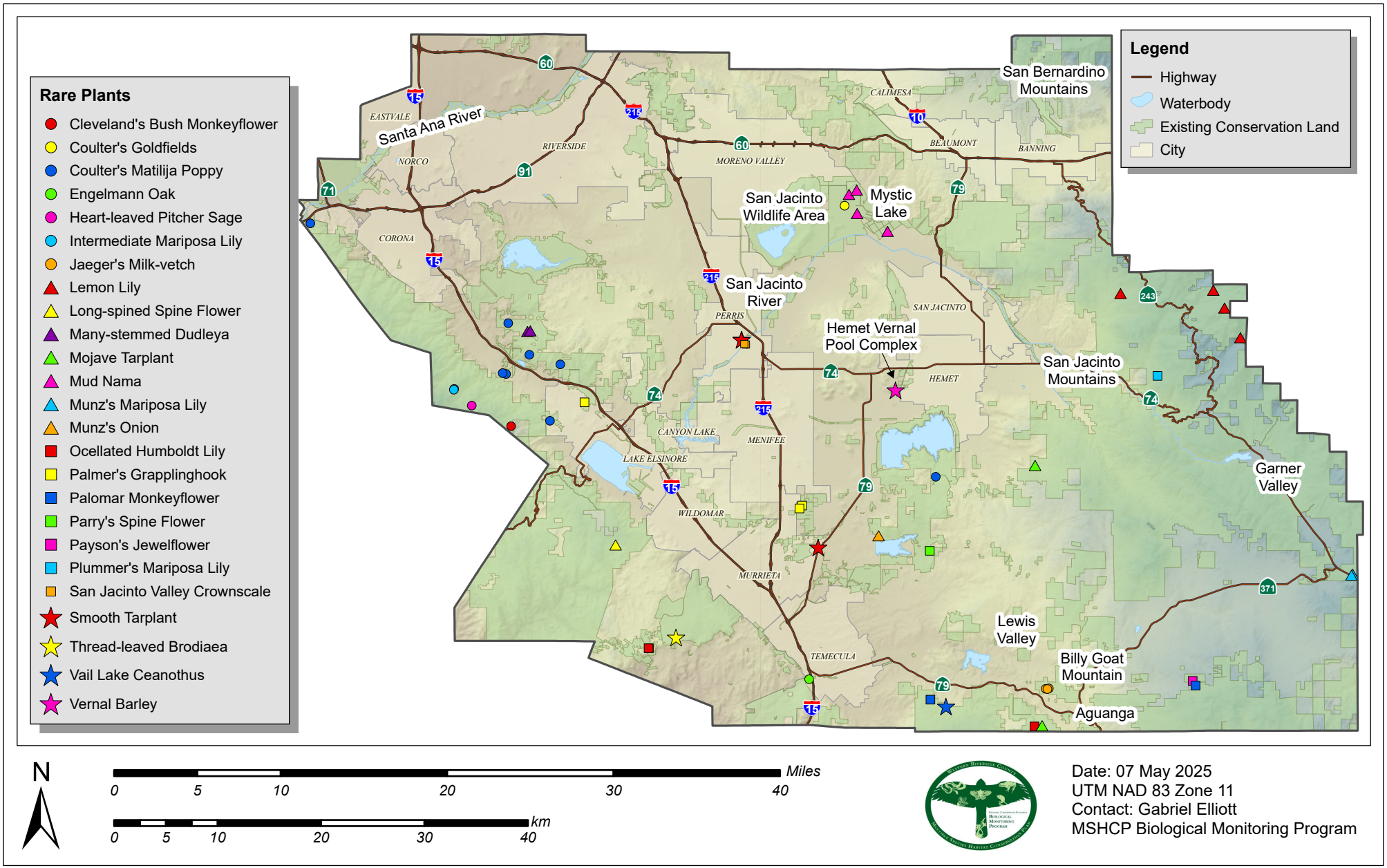

Figure 2. Covered plant species detected incidentally in the Conservation Area in 2024.

DISCUSSION

In 2024, we took advantage of favorable environmental conditions and available staff resources to substantially expand both monitoring and inventory survey efforts. Monitoring surveys remained the main focus, comprising two-thirds of all rare plant surveys. From 2023 to 2024 we increased the number of inventory surveys from 14 to 122, making up almost one-third of total surveys. Overall, we conducted the most rare plant surveys since 2010.

In combination with incidental observations, we confirmed 105 MSHCP-required locations. We observed 30 new rare plant occurrences of 19 Covered Species including 13 MSHCP-required occurrences documented for the first time. In 2024 we added two more species of rare plants that met all monitoring requirements compared to the previous year for the current monitoring period (2017-2024).

We detected the presence of introduced plant species at most survey sites, especially riparian and grassland areas. Frequently encountered exotic species included Mediterranean Grass (*Schismus barbatus*), Red Brome (*Bromus rubens*), Red Stemmed Filaree (*Erodium cicutarium*), Ripgut Brome (*Bromus diandrus*), Short-pod Mustard (*Hirschfeldia incana*) and Stinknet (*Oncosiphon pilulifer*). Encroachment by introduced plant species remained the most frequently observed site impact during rare plant surveys in 2024 (Table 2).

Table 2. Summary of Site Impacts Observed During Rare Plant Surveys in 2024. Site impacts were recorded during rare plant surveys regardless of whether the target rare plant occurrence was located.

Site Impact	Observation Frequency
Exotic Plant Species	220
Dirt Trail	40
Dirt Road	33
Fire (Recent)	32
Off-trail Trampling	21
Litter	9
OHV Use (off trail/road)	7
Paved Road	6
On-site development	3
Artificial inundation	2
Mowing	2
Other (housing development)	1
Dumping	1
Grazing/Browsing	1

Surveys of Interest

A subset of 2024 surveys focused on areas affected by recent major wildfires, as recommended by the 2023 annual rare plant report (BMP 2025). We surveyed for all known rare plant occurrences near or within the Fairview Fire (2022), Highland Fire (2023) and Bonny Fire (2023) perimeters provided by USGS (Figure 3). Within the Fairview Fire we documented the recovery of known populations of Jaeger's Milk-vetch (*Astragalus pachypus* var. *jaegeri*), Palomar Monkeyflower, Peninsular Spine Flower and Slender-horned Spine Flower. We observed a robust population of Jaeger's Milk-vetch unaffected by the Highland Fire. We did not relocate known populations of Payson's Jewelflower that were affected by the Bonny Fire. We did not locate any new populations of rare plant species within the three wildfire perimeters.

We conducted 33 inventory surveys on recently acquired Additional Reserve Lands (ARL) that had not been surveyed by the BMP and observed seven occurrences of six Covered Species. Two of those occurrences met MSHCP-required species objectives for the first time while another four observations expanded the known distribution of required rare plant occurrences that were already met.

We surveyed for various wetland Covered Species at Mystic Lake following its 2023 reemergence. We confirmed an MSHCP-required occurrence of Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*) for the first time and observed several new occurrences of Mud Nama. We were unable to confirm historic records of Wright's Trichocoronis, which was last recorded at Mystic Lake in 1937 (CNDDB 2025).

We continued conducting annual surveys of Brand's Phacelia (*Phacelia stellaris*) at the only known location in western Riverside County (Figure 1b) and documented a record 3749 individuals. Brand's Phacelia is primarily found along the southern California coast and this Santa Ana River occurrence is a remnant of its historic inland range. This population was the subject of a 2019-2022 habitat management study by the BMP which has informed successful land management by the Riverside County Park and Open-Space District. To replicate historic flooding events, we recommended regular disturbance that destabilize soil and maintain open space. The RivCo Parks team conducts an annual event using rakes and biomass removal in late summer, after the population has set seed and before winter rains trigger new germination. The population has remained stable or increased since this treatment has been implemented.

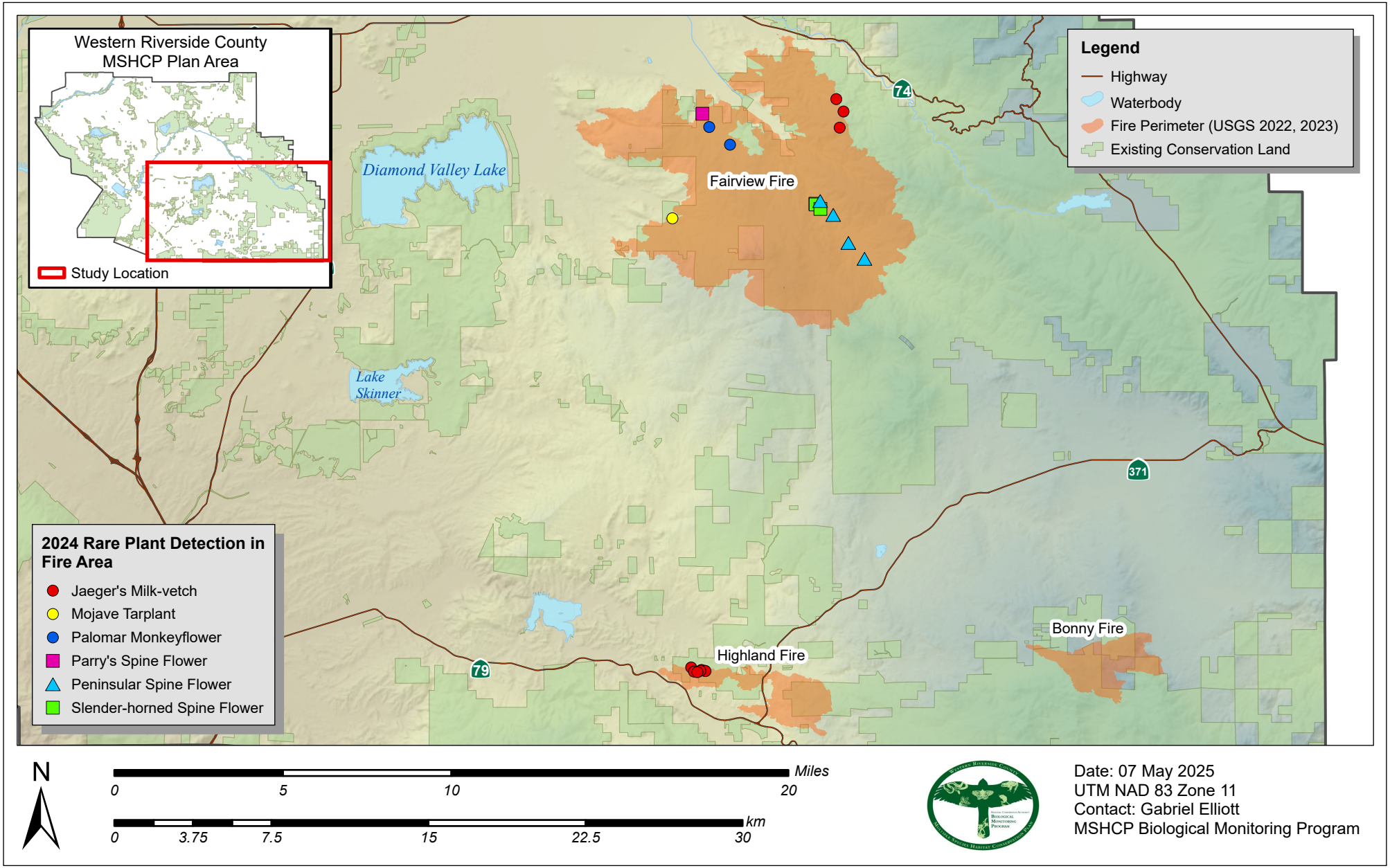

Figure 3. Covered plant species detected within recent wildfire perimeters (2022-2023) in 2024.

We detected a new population of Cliff Cinquefoil (*Potentilla rimicola*) within the San Jacinto Mountains (Figure 1a). This species is restricted to high elevation granitic outcroppings and is only known to two mountain ranges, the other in northern Baja California. This new find is the second population confirmed within the Conservation Area and the ninth occurrence within the San Jacinto Mountains (CNDDB 2025). The newly documented location occurs 200m lower than the listed Jepson elevation range (2400 – 2800 m), contributing to an improved understanding of Cliff Cinquefoil habitat (Jepson Flora Project 2024).

We unsuccessfully surveyed for California Orcutt Grass (*Orcuttia californica*) at a newly acquired Conservation Area within the Hemet Vernal Pool Complex. We detected three other rare plant species associated with vernal pools and will continue surveying in this area due to the potential for California Orcutt Grass to occur. The germination requirements for California Orcutt Grass include a prolonged period of inundation. Going forward, we will record inundation time as a proxy for habitat quality and species occurrence potential.

Demonstrate-Conservation Objective Species

There are 19 plant species with additional species-specific objectives that must be met to be considered Covered Species Adequately Conserved (Dudek & Associates 2003). Thirteen species have minimum occurrence or population size requirements. The remaining six species require a MOU to be executed with the USFS. As of December 31, 2024, an MOU has not been executed with the USFS for any of the six species.

Of the 13 Covered Species with population requirements, we have successfully met nine of them during the 2017-2024 monitoring period (Table 1). The four species that we did not meet Demonstrate-Conservation Objective requirements for are: Cliff Cinquefoil, California Muhly, Plummer's Mariposa Lily and Mojave Tarplant.

Known occurrences of Cliff Cinquefoil and California Muhly are found mostly outside of western Riverside County and we have yet to confirm the required number of occurrences within the Conservation Area. In 2024 we surveyed for both species. We located a new population of Cliff Cinquefoil on the western side of the San Jacinto Mountains. California Muhly has yet to be observed within the Conservation Area but there is potential habitat in northern drainages of the San Jacinto Mountains and southern foothills of the San Bernardino Mountains.

Within western Riverside County, Plummer's Mariposa Lily is found primarily in the foothills of the San Bernardino and San Jacinto Mountains. We were unable to confirm the population size requirements of 500 individuals each for two populations that had previously met the population requirement, and therefore, the Demonstrate-Conservation objective requirement is not met for the 2017-2024 monitoring period.

Mojave Tarplant Species Objective 3 requires further interpretation before we can determine whether the objective of "at least four localities occupying at least 100 acres" has been met. We are working to map known populations in a way that accurately measures the size of the localities. In 2024 we confirmed widespread distribution of the 'Garner Valley' locality and are refining a methodology to accurately map occupancy.

RECOMMENDATIONS

Monitoring Recommendations

Monitoring efforts should continue to focus on both reconfirming known rare plant occurrences within each future eight-year monitoring period and conducting inventory surveys for unmet species objectives. Inventory surveys in recently burned areas, new land acquisitions and remote areas within existing Conservation Area should be done to fully document current rare plant distribution within western Riverside County.

Surveys for Plummer's Mariposa Lily and Payson's Jewelflower should be prioritized in 2025. Both species require the confirmation of additional occurrences in order to meet all monitoring objectives. For Plummer's Mariposa Lily, two population counts of 500 individuals each are required in order to meet the Demonstrate-Conservation objective outlined in Table 9-3 of Volume 1 of the MSHCP (Dudek & Associates 2003). For Payson's Jewelflower, three additional occurrences within Aguanga, Billy Goat Mountain and Lewis Valley are required.

Mojave Tarplant occurrences should be mapped to determine the area occupied by each locality. Mojave Tarplant is known to exist within the Conservation Area but has not been recently mapped in a way that can evaluate whether Species Objective 3, which requires four localities occupying at least 100 acres, has been met.

Land Management Recommendations

California Orcutt Grass is a rare plant species restricted to vernal pools within western Riverside County. We have not yet been able to confirm the presence of California Orcutt Grass within the Hemet Vernal Pool Complex despite the presence of other native vernal pool plant species. We recommend ongoing management of introduced plant species within lands owned and managed by the Regional Conservation Authority (RCA) in order to maintain suitable habitat for this species.

Wright's Trichocoronis is historically known to the San Jacinto River floodplain but has not been observed since 2011. We documented high levels of introduced plant species at the two historic locations within the San Jacinto Wildlife Area that we surveyed in 2024. We recommend targeted non-native plant removal and the

implementation of controlled flooding in areas historically occupied by Wright's Trichocoronis in order to mimic natural habitat requirements for this species.

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Appendix A. Status of Rare Plant Species Objectives (2017-2024).

Status of MSHCP-required rare plant occurrences for the current monitoring period (2017 – 2024). This list reflects the *Summary of Survey Requirements for Covered Species as per the Species Objectives* (MSHCP, Vol. 1, Table 5-8).*

Species Name	Number of Occurrences Identified in MSHCP	Number Confirmed 2017-2024	Percent Confirmed 2017-2024
Beautiful Hulsea (*Hulsea vestita* ssp. *callicarpha*) [1]	12	10	**83%**
Brand's Phacelia (*Phacelia stellaris*)°	2	1	50%
California Beardtongue (*Penstemon californicus*)°	15	5	33%
California Bedstraw (*Galium californicum* ssp. *primum*) [1]	4	2	50%
California Black Walnut (*Juglans californica* var. *californica*)°	7	1	14%
California Muhly (*Muhlenbergia californica*)° [1]	6	0	0%
California Orcutt Grass (*Orcuttia californica*)°	3	2	67%
Chickweed Oxytheca (*Oxytheca caryophylloides*) [1]	5	5	**100%**
Cleveland's Bush Monkeyflower (*Mimulus clevelandii*)° [1]	2	2	**100%**
Cliff Cinquefoil (*Potentilla rimicola*)° [1]	2	1	50%
Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*)°	20	12	60%
Coulter's Matilija Poppy (*Romneya coulteri*)° [1]	30	30	**100%**
Davidson's Saltscale (*Atriplex serenana* var. *davidsonii*)	3	2	67%
Engelmann Oak (*Quercus engelmannii*)°	33	27	**82%**
Fish's Milkwort (*Polygala cornuta* var. *fishiae*)° [1]	3	3	**100%**
Graceful Tarplant (*Holocarpha virgata* ssp. *elongata*) [1]	8	3	38%
Hall's Monardella (*Monardella macrantha* ssp. *hallii*)°	5	4	**80%**
Hammitt's Clay-cress (*Sibaropsis hammittii*)°	1	1	**100%**
Heart-leaved Pitcher Sage (*Lepechinia cardiophylla*)°	6	4	67%
Intermediate Mariposa Lily (*Calochortus weedii* var. *intermedius*)	2	1	50%
Jaeger's Milk-vetch (*Astragalus pachypus* var. *jaegeri*)°	7	4	57%

Appendix A. Continued.

Species Name	Number of Occurrences Identified in MSHCP	Number Confirmed 2017-2024	Percent Confirmed 2017-2024
Johnston's Rock Cress (*Arabis johnstonii*)°	17	6	35%
Lemon Lily (*Lilium parryi*)° [1]	6	6	**100%**
Little Mousetail (*Myosurus minimus* ssp. *apus*)°	5	5	**100%**
Long-spined Spine Flower (*Chorizanthe polygonoides* var. *longispina*)°	32	30	**94%**
Many-stemmed Dudleya (*Dudleya multicaulis*)°	26	6	23%
Mojave Tarplant (*Deinandra mohavensis*)° [1]	5	5	**100%**
Mud Nama (*Nama stenocarpum*)°	2	2	**100%**
Munz's Mariposa Lily (*Calochortus palmeri* var. *munzii*)	10	8	**80%**
Munz's Onion (*Allium munzii*)°	13	12	**92%**
Nevin's Barberry (*Berberis nevinii*)°	3	1	33%
Ocellated Humboldt Lily (*Lilium humboldtii* ssp. *ocellatum*)° [1]	4	3	**75%**
Orcutt's Brodiaea (*Brodiaea orcuttii*)	3	0	0%
Palmer's Grapplinghook (*Harpagonella palmeri*)°	24	21	**88%**
Palomar Monkeyflower (*Mimulus diffusus*)°	18	7	39%
Parish's Brittlescale (*Atriplex parishii*)	3	0	0%
Parish's Meadowfoam (*Limnanthes gracilis* ssp. *parishii*)	1	1	**100%**
Parry's Spine Flower (*Chorizanthe parryi* var. *parryi*)° [1]	20	12	60%
Payson's Jewelflower (*Caulanthus simulans*)°	4	1	25%
Peninsular Spine Flower (*Chorizanthe leptotheca*)° [1]	10	10	**100%**
Plummer's Mariposa Lily (*Calochortus plummerae*)° [1]	8	5	63%
Prostrate Navarretia (*Navarretia prostrata*)	1	1	**100%**
Prostrate Spine Flower (*Chorizanthe procumbens*)°	14	6	43%
Rainbow Manzanita (*Arctostaphylos rainbowensis*) [1]	15	13	**87%**
Round-leaved Filaree (*Erodium macrophyllum*)°	8	4	50%
San Diego Ambrosia (*Ambrosia pumila*)	2	1	50%

Appendix A. Continued.

Species Name	Number of Occurrences Identified in MSHCP	Number Confirmed 2017-2024	Percent Confirmed 2017-2024
San Diego Button-celery (*Eryngium aristulatum* var. *parishii*)	4	4	**100%**
San Jacinto Mountains Bedstraw (*Galium angustifolium* ssp. *jacinticum*)	8	7	**88%**
San Jacinto Valley Crownscale (*Atriplex coronata* var. *notatior*)	4	3	**75%**
San Miguel Savory (*Satureja chandleri*)	7	3	43%
Santa Ana River Woollystar (*Eriastrum densifolium* ssp. *sanctorum*)	3	3	**100%**
Shaggy-haired Alumroot (*Heuchera hirsutissima*)° [1]	2	1	50%
Slender-horned Spine Flower (*Dodecahema leptoceras*)°	11	3	27%
Small-flowered Microseris (*Microseris douglasii* var. *platycarpha*)° [1]	8	4	50%
Small-flowered Morning-glory (*Convolvulus simulans*)°	8	7	**88%**
Smooth Tarplant (*Centromadia pungens* ssp. *laevis*)°	27	18	67%
Spreading Navarretia (*Navarretia fossalis*)°	13	6	46%
Sticky-leaved Dudleya (*Dudleya viscida*) [1]	3	3	**100%**
Thread-leaved Brodiaea (*Brodiaea filifolia*)	12	6	50%
Vail Lake Ceanothus (*Ceanothus ophiochilus*)	3	2	67%
Vernal Barley (*Hordeum intercedens*)°	4	3	**75%**
Wright's Trichocoronis (*Trichocoronis wrightii* var. *wrightii*)°	4	0	0%
Yucaipa Onion (*Allium marvinii*)°	2	2	**100%**

***** The minimum level of occupation of known locations is 75%, except for Engelmann Oak (80%), within the past eight years. Rare Plant Species meeting the minimum level of occupation are in bold text. Additional species-specific monitoring objectives are not included, and the status of additional conservation requirements can be found in Table 1.

° Rare plant species that the BMP conducted targeted surveys for in 2024.

[1] Covered Species with additional species-specific monitoring objectives. The status of additional conservation requirements can be found in Table 1 and are defined in Table 9-3 of Volume 1 of the MSHCP (Dudek & Associates 2003).

Appendix B. Results of the 2024 Rare Plant Surveys.

Summary of occurrence locations attempted and confirmed in 2024.

Species Name	Survey Type [1]	Occurrence Location Name	Monitoring Program Occurrence ID	Targeted Occurrences Confirmed [2]
Brand's Phacelia (*Phacelia stellaris*)	Inventory	Santa Ana River – Fairmont Park	*PHST-01*	0 of 1
Brand's Phacelia (*Phacelia stellaris*)	Monitoring	Santa Ana River	PHST-02	1 of 1
Brand's Phacelia (*Phacelia stellaris*)	Sentinel	Santa Ana River	PHST-02	1 of 1
California Beardtongue (*Penstemon californicus*)	Monitoring	Garner Valley	PECA-04, *PECA-05*, PECA-06	2 of 3
California Black Walnut (*Juglans californica*)	Monitoring	*Santa Rosa Plateau,* Fairmont Park	*JUCA-09,* JUCA-10	1 of 1
California Orcutt Grass (*Orcuttia californica*)	Monitoring	*Upper Salt Creek*	*ORCA-03*	0 of 1
Cleveland's Bush Monkeyflower (*Mimulus clevelandii*)	Monitoring	Santa Ana Mountains, Agua Tibia Wilderness	MICL-01, MICL-02	2 of 2
Cliff Cinquefoil* (*Potentilla rimicola*)	Monitoring	Mt. San Jacinto State Park	PORI-01	1 of 1
Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*)	Inventory	San Jacinto Wildlife Area – Davis Rd Unit, *Upper Salt Creek*	LGCO-02, *LGCO-13*	1 of 2
Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*)	Monitoring	Upper Salt Creek	LGCO-14	1 of 1
Coulter's Matilija Poppy (*Romneya coulteri*)	Inventory	B_Canyon_2	ROCO-48	1 of 1
Coulter's Matilija Poppy (*Romneya coulteri*)	Monitoring	Estelle Mountain	ROCO-14	1 of 1
Engelmann Oak (*Quercus engelmannii*)	Monitoring	Santa Ana Mountains	QUEN-09	1 of 1
Fish's Milkwort* (*Polygala cornuta* var. *fishiae*)	Monitoring	Santa Rosa Plateau, San Mateo Canyon	PCFI-02, PCFI-03, PCFI-04, PCFI-11	4 of 4

Appendix B. Continued.

Species Name	Survey Type [1]	Occurrence Location Name	Monitoring Program Occurrence ID	Targeted Occurrences Confirmed [2]
Hall's Monardella (*Monardella macrantha* ssp. *hallii*)	Monitoring	San Jacinto Mountains, Santiago Peak	MMHA-02, MMHA-05	2 of 2
Hammitt's Clay-cress (*Sibaropsis hammittii*)	Monitoring	Elsinore Peak	SIHA-01	1 of 1
Heart-leaved Pitcher Sage (*Lepechinia cardiophylla*)	Monitoring	Santa Ana Mountains	LECA-03, LECA-04	2 of 2
Jaeger's Milk-vetch (*Astragalus pachypus* var. *jaegeri*)	Inventory	*Aguanga*	*APJA-01*	0 of 1
Jaeger's Milk-vetch (*Astragalus pachypus* var. *jaegeri*)	Monitoring	Rousse Ridge, Wilson Valley	APJA-02, APJA-04	2 of 2
Johnston's Rock Cress (*Arabis johnstonii*)	Monitoring	Garner Valley	ARJO-01, ARJO-02, ARJO-03, ARJO-04, ARJO-05, ARJO-06,	6 of 6
Lemon Lily* (*Lilium parryi*)	Monitoring	Fuller Mills Picnic Area	LIPA-04	1 of 1
Little Mousetail (*Myosurus minimus* ssp. *apus*)	Inventory	Upper Salt Creek	MYMI-03	1 of 1
Long-spined Spine Flower (*Chorizanthe polygonoides* var. *longispina*)	Monitoring	McElhinney-Stimmel, Wildomar	CPLO-29, CPLO-30, CPLO-31, CPLO-51	3 of 3
Many-stemmed Dudleya (*Dudleya multicaulis*)	Inventory	Estelle Mountain	DUMU-01	1 of 1
Many-stemmed Dudleya (*Dudleya multicaulis*)	Monitoring	Oak Flats (CNF), Estelle Mountain, *Alberhill*	DUMU-11 DUMU-12, DUMU-13, *DUMU-15*	3 of 4
Many-stemmed Dudleya (*Dudleya multicaulis*)	Sentinel	Estelle Mountain	DUMU-01	1 of 1
Mojave Tarplant (*Deinandra mohavensis*)	Monitoring	San Jacinto Mountains	DEMO-02, DEMO-05	2 of 2
Mud Nama (*Nama stenocarpum*)	Inventory	Mystic Lake	NAST-02	1 of 1
Mud Nama (*Nama stenocarpum*)	Monitoring	Mystic Lake	NAST-01, NAST-02	2 of 2

Appendix B. Continued.

Species Name	Survey Type [1]	Occurrence Location Name	Monitoring Program Occurrence ID	Targeted Occurrences Confirmed [2]
Munz's Onion (*Allium munzii*)	Monitoring	*Estelle Mountain*, Multi-Species Reserve, North Peak, French Valley	*ALMU-02,* ALMU-04, ALMU-05, ALMU-06, ALMU-10, ALMU-11, ALMU-12, ALMU-13	7 of 8
Nevin's Barberry (*Berberis nevinii*)	Monitoring	Oak Mountain	BENE-03	1 of 1
Ocellated Humboldt Lily (*Lilium humboldtii* ssp. *ocellatum*)	Monitoring	Agua Tibia Wilderness	LHOC-02	1 of 1
Palmer's Grapplinghook (*Harpagonella palmeri*)	Inventory	Mult-Species Reserve (MSR)	HAPA-22	1 of 1
Palmer's Grapplinghook (*Harpagonella palmeri*)	Monitoring	*Santa Ana Mountains*, Temescal Wash, McElhinney-Stimmel, Oak Mountain, Skunk Hollow, MSR	*HAPA-01*, HAPA-02, HAPA-06, HAPA-11, HAPA-21, HAPA-27	5 of 6
Parry's Spine Flower (*Chorizanthe parryi* var. *parryi*)	Monitoring	Iodine Springs, *Diamond Valley Lake,* Bautista Canyon	CPPA-04, *CPPA-19*, CPPA-28	2 of 3
Parry's Spine Flower (*Chorizanthe parryi* var. *parryi*)	Sentinel	McElhinney-Stimmel	CPPA-06	1 of 1
Payson's Jewelflower (*Caulanthus simulans*)	Inventory	*Beauty Mountain*	*CASI-02*	0 of 1
Payson's Jewelflower (*Caulanthus simulans*)	Sentinel	*Tule Valley*	*CASI-01*	0 of 1
Peninsular Spine Flower (*Chorizanthe leptotheca*)	Monitoring	Bautista Canyon	CHLE-06, CHLE-07, CHLE-08, CHLE-09	4 of 4
Peninsular Spine Flower (*Chorizanthe leptotheca*)	Sentinel	Tule Valley	CHLE-17	0 of 1
Plummer's Mariposa Lily* (*Calochortus plummerae*)	Monitoring	Box Springs Preserve, Bogart Park	CAPL-05, CAPL-10	2 of 2
Plummer's Mariposa Lily* (*Calochortus plummerae*)	Sentinel	*Hwy 74 (SBNF)*	*CAPL-16*	0 of 1
Prostrate Spine Flower (*Chorizanthe procumbens*)	Monitoring	San Mateo Wilderness, *Dorland Mountain, Los Alamos (CNF)*	CHPR-04, *CHPR-06, CHPR-08*	1 of 3
Prostrate Spine Flower (*Chorizanthe procumbens*)	Sentinel	Agua Tibia Wilderness	CHPR-10	1 of 1

Appendix B. Continued.

Species Name	Survey Type [1]	Occurrence Location Name	Monitoring Program Occurrence ID	Targeted Occurrences Confirmed [2]
Round-leaved Filaree (*Erodium macrophyllum*)	Monitoring	Gavilan Hills, Lake Mathews, *Estelle Mountain*, Oak Mountain	ERMA-01, *ERMA-02*, ERMA-05, *ERMA-06*, ERMA-08	3 of 5
San Jacinto Mountains Bedstraw (*Galium angustifolium* ssp. *jacinticum*)	Monitoring	Dark Canyon	GAJA-04, GAJA-06, GAJA-07	3 of 3
San Jacinto Mountains Bedstraw (*Galium angustifolium* ssp. *jacinticum*)	Sentinel	Mt. San Jacinto State Park	GAJA-02	1 of 1
Shaggy-haired Alumtroot (*Heuchera hirsutissima*)	Sentinel	Mt. San Jacinto State Park	HEHI-01	0 of 1
Slender-horned Spine Flower (*Dodecahema leptoceras*)	Monitoring	Bautista Canyon	DOLE-02	1 of 1
Slender-horned Spine Flower (*Dodecahema leptoceras*)	Sentinel	Agua Tibia Wilderness	DOLE-04	1 of 1
Small-flowered Morning-glory (*Convolvulus simulans*)	Monitoring	Oak Mountain, Lake Mathews, Temescal Canyon, AD 161	COSI-01, COSI-03, COSI-04, COSI-08	4 of 4
Smooth Tarplant (*Centromadia pungens* ssp. *laevis*)	Monitoring	SJWA – Davis Rd Unit	CPLA-16	1 of 1
Spreading Navarretia (*Navarretia fossalis*)	Inventory	Upper Salt Creek	NAFO-13	1 of 1
Vernal Barley (*Hordeum intercedens*)	Inventory	Upper Salt Creek	HOIN-03	1 of 1
Vernal Barley (*Hordeum intercedens*)	Monitoring	*Alberhill*	*HOIN-04*	0 of 1
Wright's Trichocoronis (*Trichocoronis wrightii* var. *wrightii*)	Inventory	*SJWA – Davis Rd Unit, Mystic Lake*	*TWWR-03, TWWR-04*	0 of 2
Yucaipa Onion (*Allium munzii*)	Monitoring	SJWA – Potrero Unit	ALMA-01, ALMA-02	2 of 2

Asterisks (*) indicate species with additional monitoring requirements (Table 1).

The location names and occurrence IDs are *italicized* for surveys during which the target species were not observed.

[1] Survey types: Sentinel surveys are known locations with reliable populations of target species, visited to assess the timeliness of conducting additional surveys for that species. Inventory surveys are conducted at locations where target species have not yet been observed by Biological Monitoring Program staff, often at newly acquired properties, historical locations, or when conditions are unusually favorable. Monitoring surveys are conducted at locations where target species have previously been observed by Biological Monitoring Program staff and typically occur at 8-year intervals.

[2] Targeted Occurrences Confirmed: Refers to the number of occurrence locations that were attempted and confirmed for that species.