Draft 2016 Rare Plant Monitoring Report

Prepared for:

San Diego Association of Governments

401 B Street, Suite 800

San Diego, CA 92101

Contact: Sarah Pierce

Email: Sarah.Pierce@sandag.org

Prepared by:

Conservation Biology Institute

136 SW Washington Avenue,

Suite 202

Corvallis, OR 97333

Contact: Jessie Vinje

Email: jessie.vinje@consbio.org

AECOM

401 West A Street,

Suite 1200

San Diego, CA 92101

Contact: Sara Motheral

Email: sara.motheral@aecom.com

San Diego Management and Monitoring Program

4165 Spruance Road,

Suite 200

San Diego, CA 92101

Contact: Kris Preston

Email: kpreston@usgs.gov

March 2017

TABLE OF CONTENTS

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

List of Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
CBI	Conservation Biology Institute
EMP	Environmental Mitigation Program
GPS	Global Positioning System
HOA	homeowner association
IMG	Inspect and Manage
MOM	Master Occurrence Matrix
MSCP	Multiple Species Conservation Program
MSP	Management Strategic Plan
MSPA	Management Strategic Planning Area
NCCP	Natural Community Conservation Plan
NCP	North County Plan
SANDAG	San Diego Association of Governments
San Diego MHCP	San Diego Multiple Habitats Conservation Plan
San Diego MSCP	San Diego Multiple Species Conservation Plan
SDMMP	San Diego Management and Monitoring Program
TNC	The Nature Conservancy
USGS	United States Geological Survey

This page intentionally left blank.

Executive Summary

In 2016, the San Diego Association of Governments issued a task order to AECOM Technical Services, Inc. (AECOM) to implement the San Diego Management and Monitoring Program (SDMMP) project, Management Strategic Plan (MSP) 2016 Monitoring Protocol for Rare Plant Occurrences on Conserved Lands in Western San Diego County. The Conservation Biology Institute (CBI) teamed with AECOM (CBI/AECOM team) to coordinate and implement the SDMMP MSP Inspect and Manage (IMG) rare plant monitoring protocol for 26 rare plant species. The regional monitoring protocol was developed by the SDMMP in collaboration with the City of San Diego, CBI, and The Nature Conservancy, and includes portions of existing protocols. The first IMG monitoring was implemented in 2014.

A cohort of 37 entities (e.g., resource agencies, local jurisdictions [cities and the County of San Diego], and non-profits) participated in the 2016 IMG monitoring effort by conducting in-house or volunteer IMG monitoring events, by providing access and permission for the CBI/AECOM team to conduct the monitoring events, by assisting the CBI/AECOM team with monitoring events, or by providing data to assist with rare plant occurrence detection.

A total of 219 occurrences were monitored in 2016. Of the 219 occurrences, 207 were for 24 of the 26 high priority species specifically listed in the CBI/AECOM task order. The additional 12 occurrences were for five species (primarily vernal pool species) monitored by the City of San Diego. The CBI/AECOM team monitored 105 of the 207 occurrences. Heart-leaved pitcher sage (*Lepechinia cardiophylla*) and aphanisma (*Aphanisma blitoides*) were not monitored in 2016; thus, 24 of the 26 species were monitored in 2016 by the CBI/AECOM team.

Occurrence status, habitat attributes, and threats were recorded and analyzed for the 219 occurrences, and management recommendations were made for most of the 2016 monitored occurrences. Ten species had an average of greater than 1,000 plants per occurrence, and 14 species had an average of less than 1,000 plants per occurrence. Nonnative grasses and forbs were listed as the most common threat to the rare plant occurrences, but other threats including recent fire, dumping, trampling, itinerant encampments, vandalism, historic agriculture and grazing, altered hydrology, and soil disturbance were noted as well. Some recommended threats reduction management actions include sign, fence and/or gate installation; weed treatments/management; installation of erosion control devices; and pollinator studies.

Post-monitoring, CBI, AECOM, SDMMP, and various land managers determined the IMG monitoring prioritization and baseline surveys for 30 high priority rare plant species over the next 5 years (2017–2021).

Based on the 2016 IMG monitoring effort, the CBI/AECOM team believes that future IMG monitoring efforts can be sustained and/or improved by implementing the following measures:

- Maintain funding for SDMMP rare plant coordinator position;
- Streamline the access permitting process;
- Begin coordinating with land managers on access permitting and identification of "Gap" occurrences, several (3 to 4) months before the onset of field season;
- Focus monitoring efforts on conserved lands that are managed or owned by entities willing to participate in the monitoring effort;
- Use accurate spatial data for planning and navigation purposes;
- Calibrate data collection methods via annual IMG monitoring training workshops with all participating entities;
- Encourage the use of standard, digital data collection forms or programs (i.e., Survey123); and
- Review species prioritization and monitoring frequency annually at the end of each field season.

1.0 Introduction

The Conservation Biology Institute (CBI) and AECOM Technical Services, Inc. (CBI/AECOM team), in partnership with the San Diego Management and Monitoring Program (SDMMP), coordinated and implemented regional rare plant monitoring on conserved lands in western San Diego County in 2016. This work was conducted with funding from the San Diego Association of Governments (SANDAG) and in support of an Achievement Milestone in the TransNet Environmental Mitigation Program (EMP) Regional Management and Monitoring Fiscal Year 2016–2017 Work Plan, as identified in Strategic Goal 1.1 (EMPWG 2016). As part of this effort, the CBI/AECOM team implemented and coordinated the Management Strategic Plan (MSP) Inspect and Manage (IMG) monitoring in 2016 for 26 rare plant species.

The MSP IMG rare plant monitoring objective included several components: (1) using a regional, standardized protocol to monitor rare plant occurrence status, habitat, and threats; (2) using monitoring results to inform future management needs; (3) identifying routine versus intensive management actions; and (4) prioritizing regional funding for intensive management projects (SDMMP and CBI 2016).

1.1 Background

Most MSP rare plant species are covered under one or more Natural Community Conservation Plans (NCCPs) in the Management Strategic Planning Area (MSPA), including the San Diego Multiple Species Conservation Plan (San Diego MSCP), San Diego Multiple Habitats Conservation Plan (San Diego MHCP), and the proposed San Diego North County Plan (NCP). Two MSP species, Jennifer's monardella (*Monardella stoneana*) and Mexican flannelbush (*Fremontodendron mexicanum*), are not covered under any NCCP but are included as MSP species because they are considered species of concern by SDMMP (2014).

MSP species are prioritized for management based on risk of loss; "priority" species require species-specific management (species management focus group) for persistence or, in some cases, specific vegetation characteristics requiring management (vegetation management focus group) (SDMMP 2014). The MSP identifies the following five management categories:

SL = Species at risk of loss from MSPA

SO = Significant occurrence(s) at risk of loss from MSPA

SS = Species more stable but still requires species-specific management to persist in MSPA

VF = Species with limited distribution in the MSPA or needing specific vegetation characteristics requiring management

VG = Species not specifically managed for, but may benefit from vegetation management for VF species

All MSP rare plants included in the 2016 monitoring effort are in Management Categories SL, SO, or SS; however, not all species in these three categories were included in the 2016 effort. SDMMP identified the 2016 IMG rare plants based on previous IMG monitoring and survey data, species and population status within the county, and species habit.

In 2014, SDMMP created the MSP Monitoring Protocol for Rare Plant Occurrences on Conserved Lands in Western San Diego County, with input received from The Nature Conservancy (TNC), the City of San Diego, and CBI (SDMMP 2014). This standardized rare plant monitoring method allows land managers and biologists to collect quantitative and qualitative data on MSP-covered rare plants in a consistent manner within the San Diego MSPA.

The 2014 monitoring method was based on several documents and monitoring forms including: (1) United States Geological Survey (USGS) assessments of City of San Diego long-term rare plant monitoring data (McEachern et al. 2007; McEachern and Sutter 2010); (2) the City of San Diego Multiple Species Conservation Program (MSCP) Rare Plant Field Survey Form; (3) the South San Diego County Grasslands Habitat Assessment field form (TNC and CBI 2011); and (4) feedback from land managers and volunteers implementing the method.

In 2014 and 2015, SDMMP coordinated with land managers to implement the MSP IMG method (IMG monitoring method). In 2016, SANDAG issued a task order to AECOM that provided funding and support for AECOM and its subconsultant, CBI, to coordinate monitoring efforts for land managers and assist with monitoring implementation to ensure maximum monitoring and threat evaluations at high-priority rare plant occurrences using the MSP IMG protocol. Specifically, the CBI/AECOM team was tasked with coordinating monitoring among land managers and volunteers, conducting outreach and training to increase participation in the monitoring program, facilitating data management and submission to SDMMP, identifying and prioritizing "Gap" occurrences that would not be monitored by land managers in 2016, and implementing the monitoring using the IMG protocol at these priority locations.

As part of the 2016 MSP IMG monitoring effort, SDMMP was tasked with analyzing 2014–2016 data, to detect species trends and identify species threats post-2016 MSP IMG data submittal.

1.2 2016 Monitoring Locations

All eight management units within the MSPA supported rare plant occurrences that were targeted for monitoring in 2016 (Figure 1). The occurrences were located as far north as Mt. Olympus (north of the Pala Indian Reservation), as far south as the United States–Mexico border, westward along beaches and estuaries, and eastward to Hellhole Canyon (Valley Center) and Viejas and Tecate Peaks.

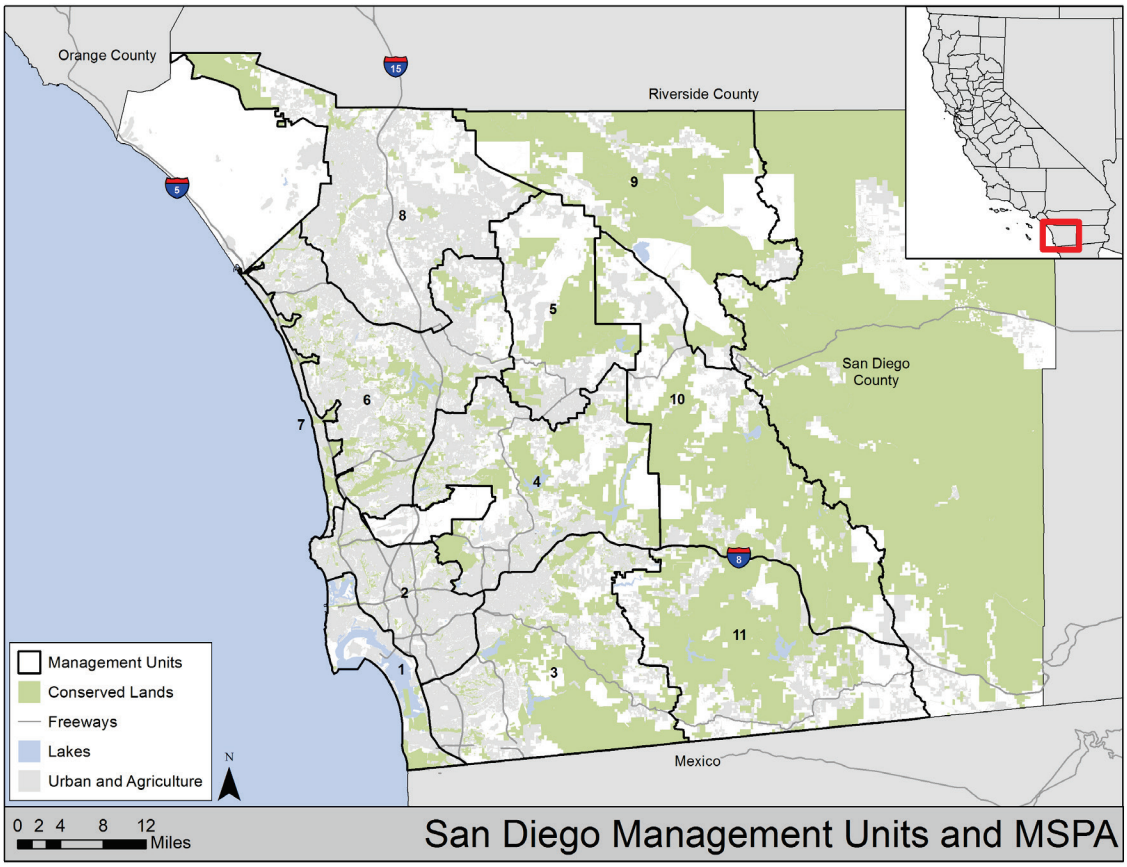


Figure 1. San Diego County MUs and MSPA Boundary

2.0 Methods

2.1 2016 MSP Rare Plant Species

SDMMP identified 26 high priority rare plant species to monitor in 2016. The targeted species and monitoring time frame are shown in Table 1. The City of San Diego also included additional rare plants to monitor in 2016 that were not included in the 26 high priority species identified by SDMMP. These species include vernal pool rare plants and snake cholla (*Cylindropuntia californica*).

Land managers, volunteers, and the CBI/AECOM team monitored these 26 high priority species using the IMG monitoring method (Appendix A). The IMG monitoring method included several main components: (1) establishment of 10-meter-radius monitoring plots (sample plots) within target populations; (2) counting/estimating the number of plants within the target population sample plots; (3) mapping the target species maximum population extent; (4) counting/estimating the number of plants within the target species maximum population extent; (5) conducting a habitat assessment within the sample plot; and (6) collecting threats data in the mapped population extent in addition to a 10-meter buffer placed around the mapped population extent.

IMG monitoring data were collected using paper and electronic data forms. In most cases an electronic excel version of the data form was used, via a tablet computer in the field. The paper data collection form is included in Appendix A, and the Excel data collection forms are available online at the SDMMP website (https://portal.sdmmp.com/view_project.php?sdid=SDID_sarah.mccutcheon%40aecom.com_57cf0196dff76).

Table 1
2016 IMG Rare Plant Species and Monitoring Time Frames

Target Species[1]	Monitoring Time Frame
Aphanisma (*Aphanisma blitoides*), SL	June – September
Blochman's dudleya (*Dudleya blochmaniae*), SL	April
Chaparral nolina (*Nolina cismontana*), SL	Year-round
Coast wallflower (*Erysimum ammophilum*), SL	April – May
Encinitas baccharis (*Baccharis vanessae*), SO	April – May (inland populations only) Coastal populations = September - October
Gander's ragwort (*Packera ganderi*), SO	April – May
Heart-leaved pitcher sage (*Lepechinia cardiophylla*), SL	June

Target Species[1]	Monitoring Time Frame
Jennifer's monardella (*Monardella stoneana*), SL	May – June
Mexican flannelbush (*Fremontodendron mexicanum*), SL	Year-round
Nuttall's acmispon (*Acmispon prostratus*), SO	March – May
Orcutt's birds-beak (*Dicranostegia orcuttiana*), SL	April – May
Orcutt's brodiaea (*Brodiaea orcuttii*), SO	May
Orcutt's hazardia (*Hazardia orcuttii*), SL	Year-round
Otay tarplant (*Deinandra conjugens*), SS	April (end) – June
Salt marsh bird's-beak (*Chloropyron maritimum* ssp *maritimum*), SL	May – June
San Diego ambrosia (*Ambrosia pumila*), SO	April – June
San Diego goldenstar (*Bloomeria clevelandii*), SS	May
San Diego thornmint (*Acanthomintha ilicifolia*), SO	End of March – Beginning of May
San Miguel savory (*Clinopodium chandleri*), SL	April
Shaw's agave (*Agave shawii* var. *shawii*), SL	Year-round
Short-leaved dudleya (*Dudleya brevifolia*), SL	April
Small-leaved rose (*Rosa minutifolia*), SS	April – May
Sticky dudleya (*Dudleya viscida*), SS	Year-round
Thread-leaf brodiaea (*Brodiaea filifolia*), SS	May
Variegated dudleya (*Dudleya variegata*), SS	May
Willowy monardella (*Monardella linoides* ssp. *viminea*), SS	May – June

[1] SL = species at risk of loss from MSPA; SO = significant occurrence(s) at risk of loss from MSPA; SS = species more stable but still requires species-specific management to persist in MSPA

2.2 2016 Outreach and Training

The CBI/AECOM team worked with SDMMP to identify and prioritize monitoring of "Gap" rare plant occurrences on conserved lands. "Gap" occurrences are defined as occurrences of rare plant species that were not included in regular land manager monitoring and management efforts and/or had not been observed for a number of years; thus, their status was unknown. The CBI/AECOM team contacted land managers and landowners to identify and prioritize "Gap" occurrences for the 2016 monitoring effort.

CBI created spreadsheets, using the SDMMP Master Occurrence Matrix (MOM) database to identify MSP rare plant occurrences by land owner and manager to determine occurrence status. The team sent these spreadsheets to the appropriate land manager or owner to identify which occurrences they would monitor in 2016. Occurrences not included in a land manager's 2016 monitoring effort were considered "Gap" occurrences and were included in the team monitoring effort. Required permission and access agreements/letters were obtained from the appropriate land managers before the start of monitoring.

In coordination with SDMMP, CBI/AECOM held an IMG monitoring method workshop on March 9, 2016, to train land managers, biologists, botanists, and volunteers on IMG method implementation. The training workshop consisted of an indoor presentation and an outdoor field methods demonstration.

2.3 2016 Field Effort

The CBI/AECOM team made every effort to monitor occurrences during the appropriate phenological period for each species, to maximize detection (Table 1). The surveyors from CBI and AECOM were botanists who were familiar with the target species.

The surveyors navigated to each occurrence using PDF maps that were created on the Environmental Systems Research Institute's Geographic Information System software (ESRI ArcGIS version 10.1) using spatial information obtained from the SDMMP MOM database and the California Natural Diversity Database (CDFW 2016). In many cases, the surveyors also used spatial data (i.e., maps, coordinates), obtained from the San Diego Natural History Museum, land managers, and others familiar with the target occurrences.

Monitoring data were collected using paper field forms or field computers equipped with electronic (Excel) versions of the paper field form, following the methods provided in Appendix A and summarized in Section 2.1. Spatial data (i.e., monitoring point, photo points, and population polygons) were collected using hand-held sub-meter Global Positioning System (GPS) devices. In some cases (where spatial extent was large), population locations were denoted using paper maps and later were digitized using ArcGIS software.

At each occurrence location, the surveyors collected qualitative and quantitative monitoring data within a minimum of one 10-meter-radius sample plot, as described in the IMG monitoring method. If a rare plant occurrence was greater than 1 or 2 acres in size, an additional sample plot was installed. For very large occurrences with extents that encompassed several acres, three or more sample plots were installed where possible.

Habitat assessment and threats data were collected in the sample plots and maximum population extent.

IMG monitoring was conducted even in the absence of plants, but in habitat that previously supported the target species. Monitoring was conducted in these situations to collect baseline data and correlate attribute information in previously occupied habitat.

2.4 2016 Data Outreach

After the 2016 monitoring effort was complete, CBI conducted land manager outreach to obtain monitoring data and compiled all CBI/AECOM team monitoring data for submittal to SDMMP. A contact sheet documenting the land manager outreach effort is shown in Table 2.

2.5 2016 Data Analysis

SDMMP compiled monitoring data into a database, and descriptive statistics were calculated and graphed to characterize the status and threat levels for the 219 occurrences of species. Overall threat levels also were calculated across species, and the 20 most prevalent plant species were identified and characterized as to frequency of occurrence and average percent cover.

2.6 2017–2021 Monitoring Prioritization and Frequency

On September 8 and October 13, 2016, CBI and SDMMP met internally and with land managers to prioritize MSP rare plant monitoring efforts for 2017–2021, after the 2016 IMG monitoring effort was complete. Thirty high priority rare plant species were included in the discussion and prioritization efforts. The monitoring prioritization was based on 2014–2016 IMG monitoring results (i.e., population status and threats), land manager experience and expertise, current monitoring frequencies (as conducted by land managers), species habit, and spatial extent within the county.

3.0 Results

3.1 2016 MSP Rare Plant Species

The CBI/AECOM team and land managers conducted monitoring for 24 of the 26 rare plant species prioritized for the 2016 monitoring effort. Monitoring was not conducted for heart-leaved pitcher sage (*Lepechinia cardiophylla*) because previously identified locations were erroneous (Jonathan Dunn and Margie Mulligan, pers. comm., 2016). In addition, one land manager did not monitor the only known aphanisma (*Aphanisma blitoides*) population on conserved lands as originally intended, because of unforeseen circumstances; thus, the species was not monitored in 2016. Photographs of some of the target species are shown in Figures 2 through 5.

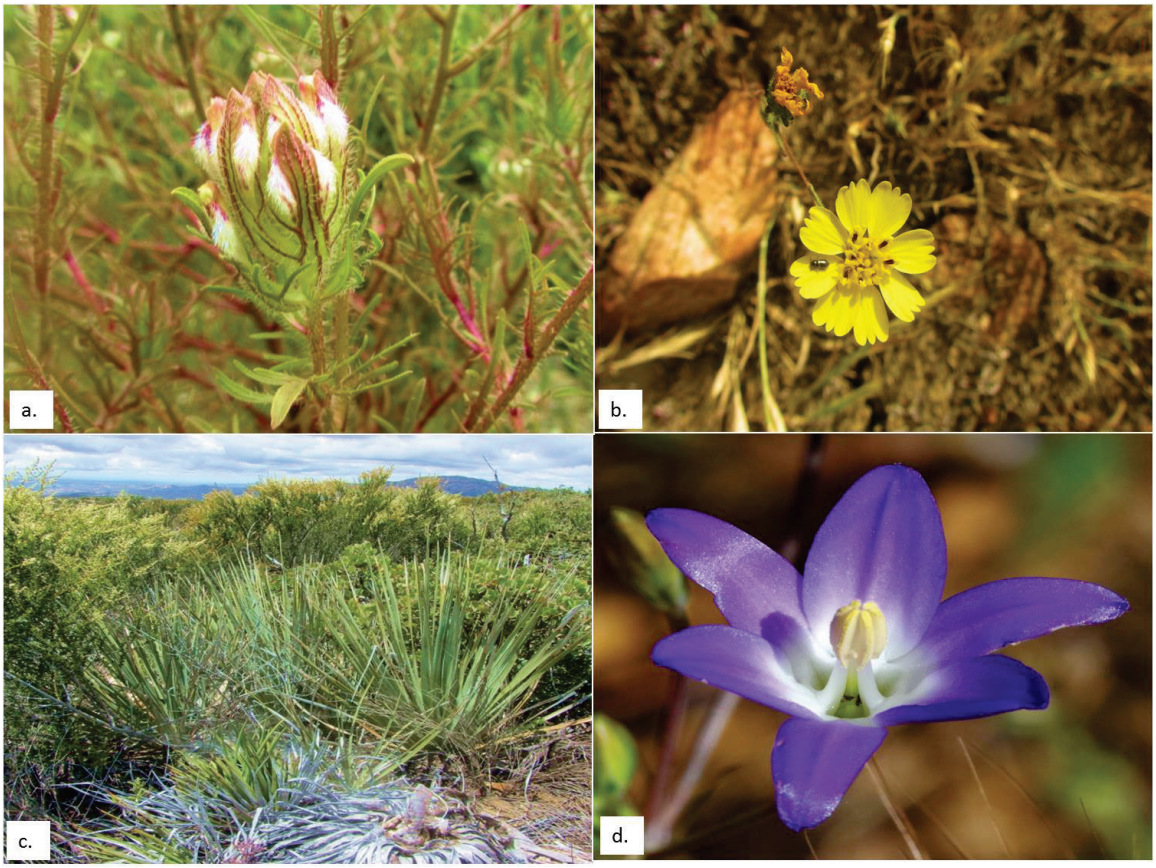


Figure 2. MSP Rare Plants: a. Orcutt's birds-beak (*Dicranostegia orcuttiana*), b. Otay tarplant (*Deinandra conjugens*), c. chaparral nolina (*Nolina cismontana*), and d. Orcutt's brodiaea (*Brodiaea orcuttii*)

Photo credits: Jessie Vinje (a-c), Patricia Gordon-Reedy (d)

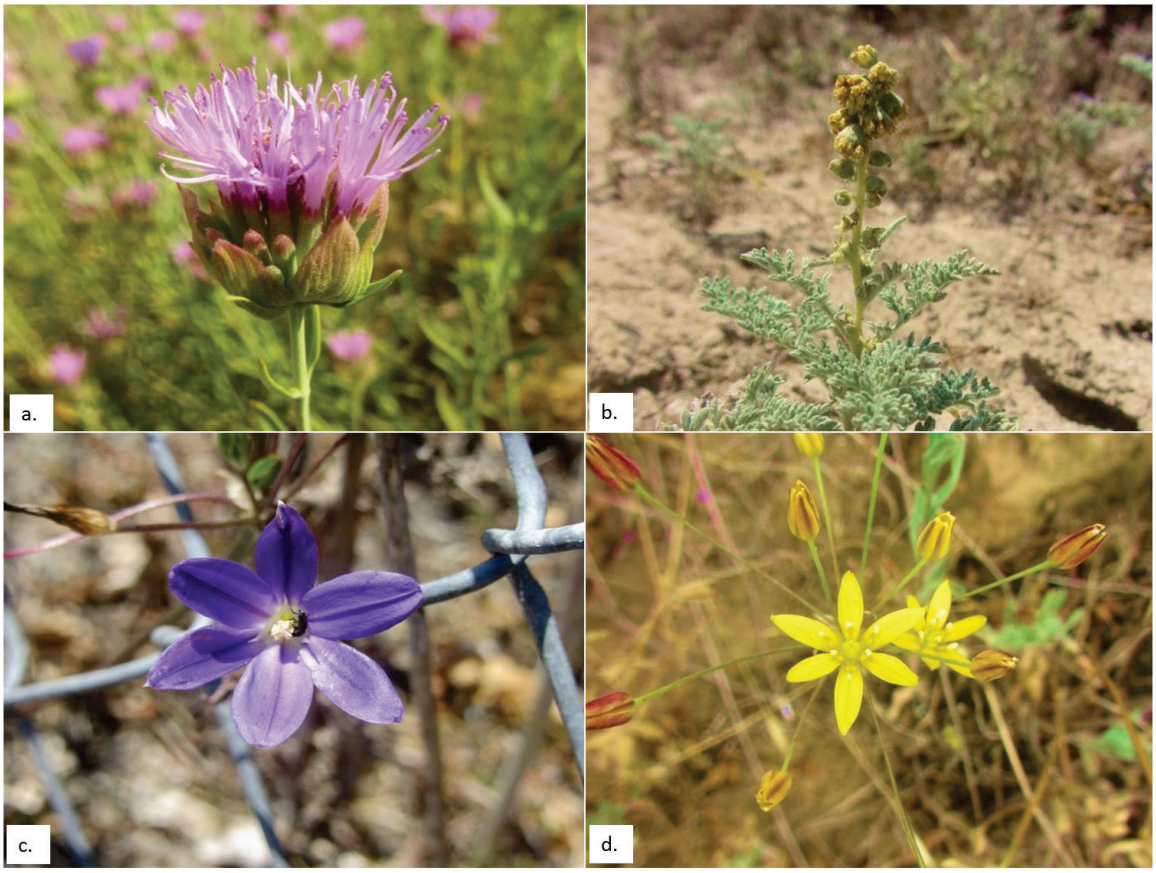


Figure 3. MSP Rare Plants: a. willowy monardella (*Monardella linoides* ssp. *viminea*), b. San Diego ambrosia (*Ambrosia pumila*), c. thread-leaf brodiaea (*Brodiaea filifolia*), and d. Cleveland's goldenstar (*Bloomeria clevelandii*)

Photo credits: Jessie Vinje

Figure 4. MSP Rare Plants: a. short-leaved dudleya (*Dudleya brevifolia*), b. San Diego thornmint (*Acanthomintha ilicifolia*), c. salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*), and d. Nuttall's acmispon (*Acmispon prostratus*)

Photo credits: Patricia Gordon-Reedy (a), Jessie Vinje (b-d)

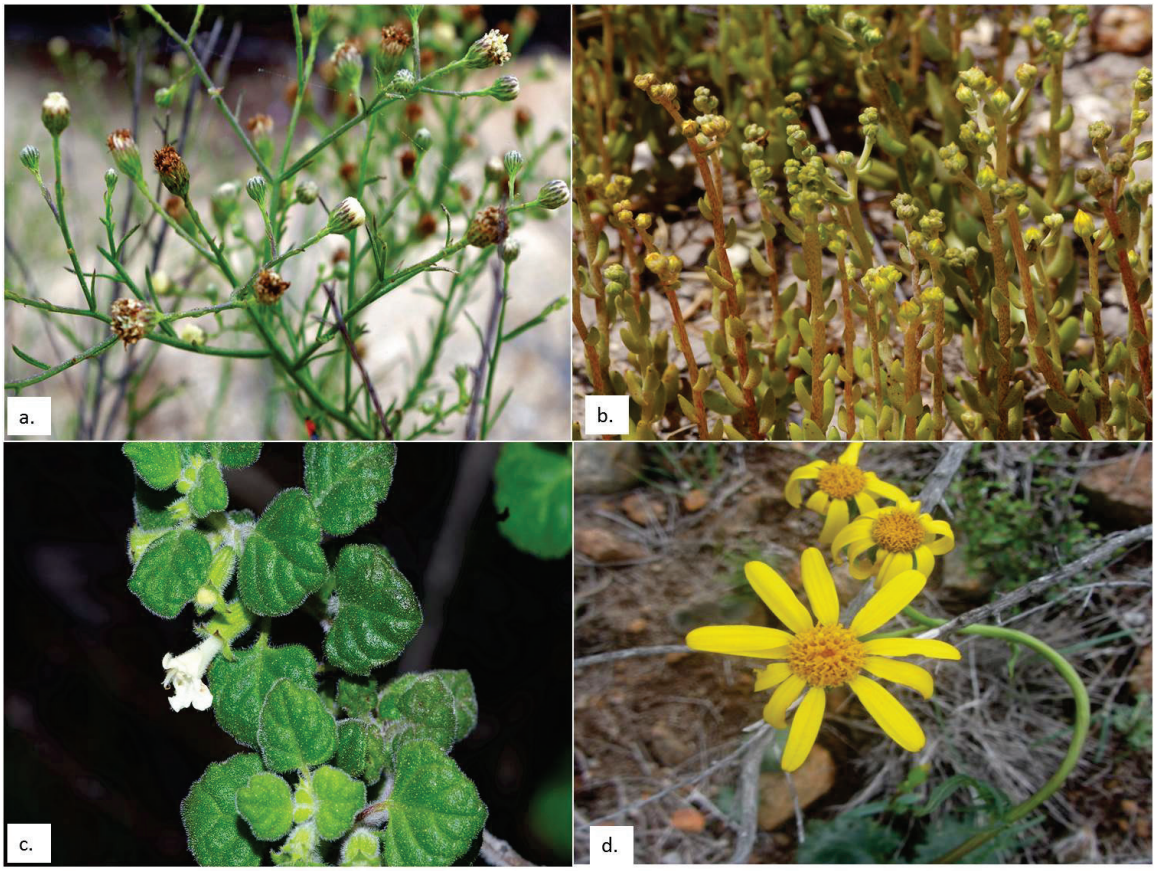


Figure 5. MSP Rare Plants: a. Encinitas baccharis (*Baccharis vanessae*), b. variegated dudleya (*Dudleya variegata*), c. San Miguel savory (*Clinopodium chandleri*), and d. Gander's ragwort (*Packera ganderi*)

Photo credits: Patricia Gordon-Reedy (a-c), Jessie Vinje (d)

3.2 2016 Outreach and Training

A total of 43 individuals participated in the March 9, 2016 IMG monitoring method training workshop. Participants included staff from State and federal wildlife agencies, various San Diego County cities, military installations, consultants, non-profit organizations, and volunteer organizations, or individual volunteers. Many of the participants already manage and/or monitor rare plant species on San Diego County conserved lands.

In addition to the group training effort, CBI staff provided field training for 11 land managers or associated staff from the following entities: Cabrillo National Monument, California Department of Fish and Wildlife, University of California at San Diego, Endangered Habitats Conservancy, and Escondido Creek Conservancy.

3.3 2016 Field Effort

3.3.1 Participants

A total of 37 groups and associated entities assisted with or conducted monitoring during 2016 (Table 2). Each entity participated by conducting in-house or volunteer IMG monitoring events, providing access and permission for the CBI/AECOM team to conduct the monitoring events, assisting the CBI/AECOM team with monitoring events, or providing data (i.e., shape files, maps, photographs, reports) to assist with rare plant occurrence detection. Several entities participated for the first time in the 2016 effort, by collecting IMG data or allowing the CBI/AECOM team to collect IMG data. Those 14 new entities are denoted by an asterisk in the list of entities in Table 2.

Table 2
2016 IMG Monitoring Participants

Category	Entity
Resource Agencies	Bureau of Land Management
	California Department of Fish and Wildlife
	California Department of Transportation*
	California State Parks
	National Park Service*
	Olivenhain Water District*
	United States Border Patrol
	United States Fish and Wildlife Service – San Diego Bay/Tijuana Slough National Wildlife Refuge*
	United States Fish and Wildlife Service – San Diego National Wildlife Refuge
	United States Forest Service*
Military Installations	MCAS Miramar
	Naval Base Coronado
Jurisdictions (Cities, County)	City of Carlsbad*
	City of Chula Vista
	City of Encinitas*
	City of Escondido*
	City of Oceanside*
	City of Poway*
	City of San Diego
	County of San Diego
Museums or Universities	San Diego Natural History Museum
	UC San Diego Natural Reserve System*

Category	Entity
Non-profit or Volunteer Organizations	California Native Plant Society
	Center for Natural Lands Management
	Endangered Habitats Conservancy
	Escondido Creek Conservancy*
	Friends of Sycamore Canyon/Goodan Ranch
	San Diego Audubon Society*
	San Diego Habitat Conservancy
	San Dieguito River Valley Conservancy
	San Elijo Lagoon Conservancy
	The Nature Conservancy
Private Consulting Firms	AECOM Technical Services, Inc.
	Habitat Restoration Sciences
	Helix Environmental, Inc.
	Recon Environmental
Development Community	ACI Sunbow, LLC*

* Entities new to collecting IMG monitoring data in 2016.

3.3.2 MSP Rare Plant Species and Occurrences

The CBI/AECOM team began monitoring on March 31 and completed monitoring by November 8, 2016. Collectively, CBI, AECOM, the land managers, and the volunteers monitored 219 MSP rare plant occurrences in 2016 and collected data for 300 sample plots (Appendix B and Figure 6). However, not all occurrences supported plants. Of the 219 occurrences, 207 were for 24 of the 26 high priority species included in the CBI/AECOM task order. The additional 12 occurrences were for five species (primarily vernal pool species) monitored by the City of San Diego that were not included in the CBI/AECOM task order. The CBI/AECOM team monitored 105 (of the 207) occurrences and 140 (of the 300) samples, respectively.

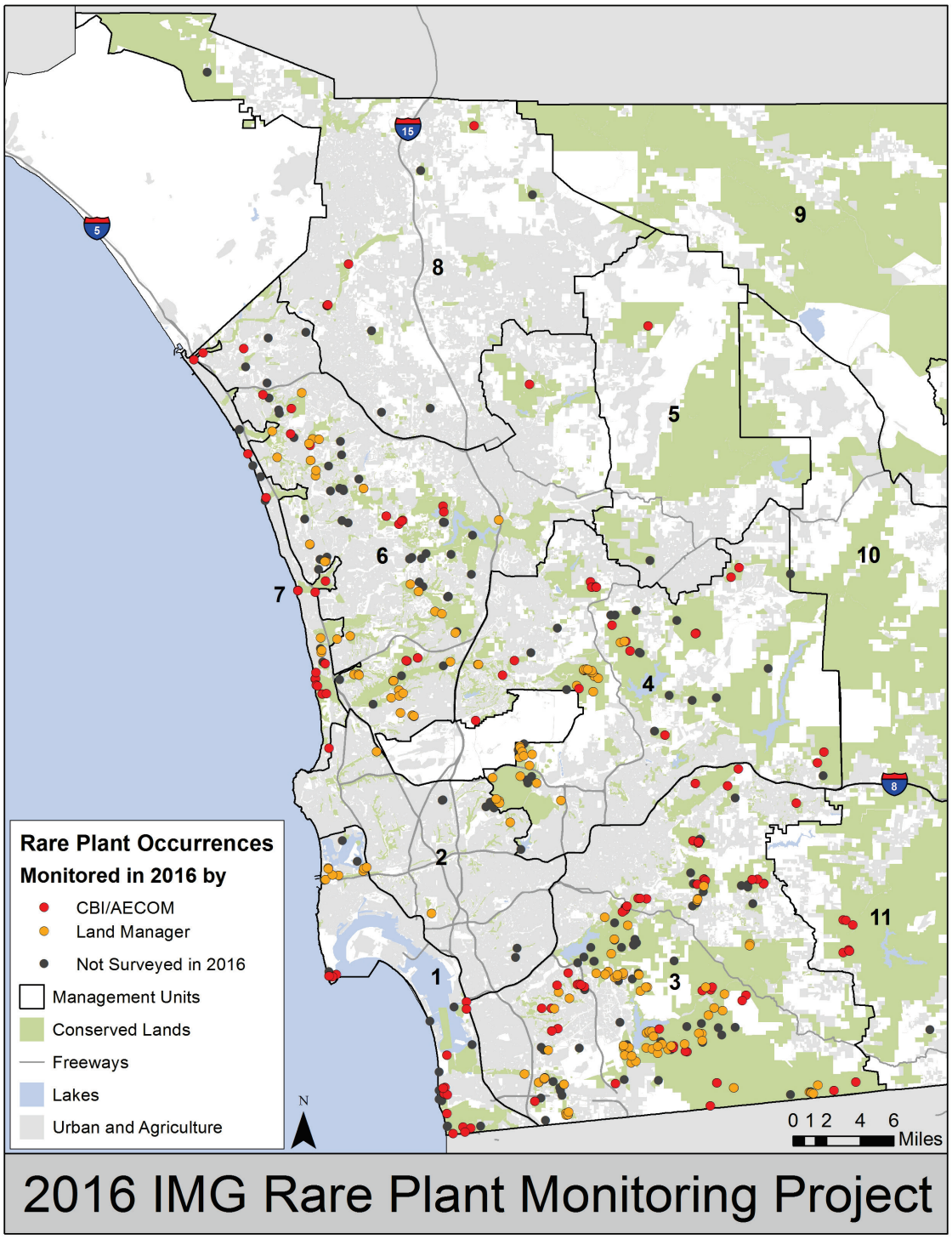


Figure 6. Rare Plant Occurrences Monitored in 2016

During the 2016 monitoring effort, several new (previously not included in the MOM database) occurrences were located and/or monitored. These new occurrences included the following species: Cleveland's goldenstar (*Bloomeria clevelandii*), Mexican flannelbush (*Fremontodendron mexicanum*), Orcutt's bird's-beak (*Dicranostegia orcuttiana*), Orcutt's brodiaea (*Brodiaea orcuttii*), Otay tarplant (*Deinandra conjugens*), saltmarsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*), and variegated dudleya (*Dudleya variegata*).

3.3.3 Threats

As part of the monitoring effort, land managers, volunteers, and the CBI/AECOM team identified localized threats at the majority of the rare plant occurrences. Nonnative grasses and forbs were the most commonly identified threat, but other identified threats included altered hydrology, off-road vehicles, unauthorized trails, trash, erosion, vandalism, itinerant encampments, road and trail maintenance, herbivory, and edge effects (Figures 7 through 10).

3.3.4 Management Recommendations

Land managers, volunteers, and the CBI/AECOM team recommended management actions for the majority of occurrences included in the 2016 monitoring effort. Examples of recommended management actions include sign installation, herbivore exclusionary fencing, fence and/or gate installation to prevent/dissuade trespassing, invasive species treatments, restoration, erosion control device installation, continued monitoring, bulk seeding, and genetic and pollinator studies.

3.4 2016 Data Outreach

The CBI/AECOM team was tasked with collecting and submitting all land manager and volunteer IMG rare plant monitoring data to SDMMP. This included obtaining monitoring spreadsheets, photographs, and spatial data. Land manager outreach began in May 2016 and was completed by January 2017. Outreach consisted of presentations, e-mails (individual and group), phone calls, and in-person requests with land managers, consultants, and volunteers. CBI entered data from paper datasheets to electronic datasheets when needed, and worked with land managers to resolve data issues and inconsistencies. The team obtained data from all land managers that participated in the 2016 IMG monitoring effort. Land manager outreach activities are shown in Table 3.

Figure 7. Threats to MSP Plants: a. altered hydrology, b. off-road vehicles, and c. unauthorized trails (bisecting salt marsh bird's-beak population)

Photo credits: Patricia Gordon-Reedy (a,b), Jessie Vinje (c)

Figure 8. Threats to MSP Rare Plants: a. trash, b. trash (dumped trash adjacent to Cleveland's goldenstar population) and c. erosion

Photo credits: Patricia Gordon-Reedy (a), Jessie Vinje (b,c)

Figure 9. Threats to MSP Plants: a. vandalism (cut and resprouting Encinitas baccharis), b. itinerant encampments, and c. road and trail maintenance (San Diego goldenstar and Cleveland's goldenstar growing along maintained trail)

Photo credits: Jessie Vinje

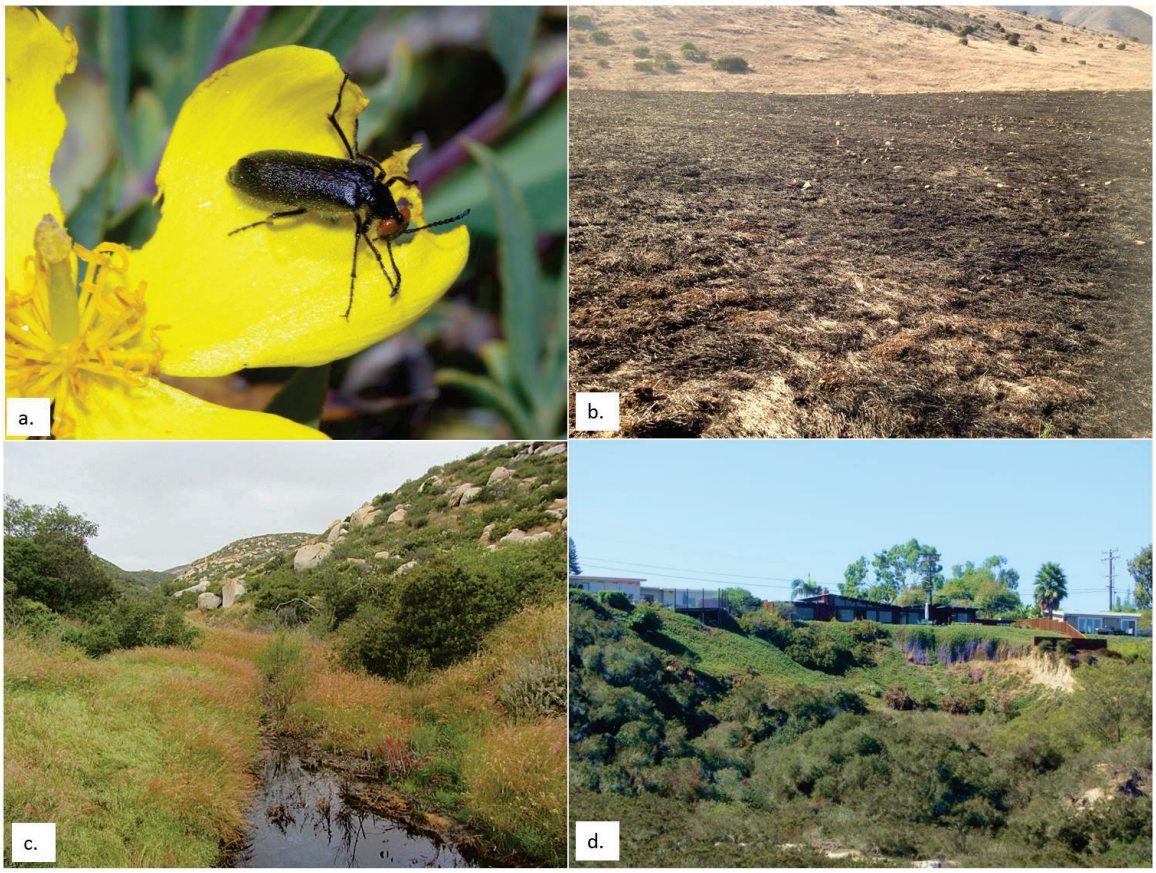


Figure 10. Threats to MSP Plants: a. herbivory, b. recent burn, c. invasive species (*Ehrharta longiflora* infestation), and d. edge effects

Photo credits: Patricia Gordon-Reedy (a), Jessie Vinje (b-d)

Table 3
2016 IMG Rare Plant Monitoring Data Submission Outreach Documentation

Entity	Contact(s)	Contact Type	Contact Date(s)[1]
AECOM	Sara Motheral	E-mail, Phone	12/16/16, 12/29/16
All[2]	All[2]	E-mail, Meeting Announcement	8/24/16, 10/13/16, 11/22/16
Bureau of Land Management	Josue Campos	E-mail	6/28/16, 12/30/16, 1/5/17
California Department of Fish and Wildlife	Christine Beck, John Ekhoff, Meredith Osborne, Paul Schlitt, Tracie Nelson	E-mail, Phone	8/22/16, 9/22/16, 9/25/16, 9/29/16, 11/1/16, 12/6/16, 12/16/16, 12/28/16
California Native Plant Society	Frank Landis	E-mail	12/30/16
Center for Natural Lands Management	Markus Spiegelberg	E-mail, Phone, In-person Discussion	10/9/16, 10/10/16, 10/16/16, 11/30/16, 12/14/16, 12/27/16, 12/29/16
City of Chula Vista/ Recon Environmental, Inc.	Anna Leavitt, Cheryl Goddard, Chris Nixon, Mark Dodero	E-mail	11/20/16, 12/8/16, 12/28/16
City of San Diego	Betsy Miller, Hayley Heiner, Kim Roeland, Olivia Koziel	E-mail	10/31/16, 11/2/16, 11/11/16, 11/21/16
Helix Environmental, Inc.	Amy Matson, Jasmine Bakker, Talaya Rachels	E-mail	10/31/16, 12/13/16, 12/27/16, 12/28/16, 1/9/17
Rincon Consultants, Inc.	Amber Bruno	E-mail	12/27/16
San Diego Audubon	Jonathan Appelbaum, Rebecca Schwartz	E-mail	9/12/16
County of San Diego	Jennifer Price, Carol Crafts, Lance Woolley	E-mail, Phone, In-person Discussion	10/20/16, 11/10/16, 12/29/16, 1/25/17, 1/26/17
San Dieguito River Park Conservancy	Jess Norton	E-mail	5/11/16
The Nature Conservancy	Jean Jancaitis, Zach Principe	E-mail	6/30/16, 1/23/17
United States Fish and Wildlife Service	John Martin	E-mail, In-person Discussion	10/2016, 12/13/16, 12/14/16

[1] Dates only represent initial or subsequent follow-up e-mail(s) or phone conversation(s) by day and do not include the number of e-mails exchanged or phone calls made on the date provided. In most cases, many e-mails were exchanged with the land managers or volunteers on a given day.
[2] E-mails sent to SDMMP rare plant participant e-mail contact list or announcement made to participants at the 2016 year-end wrap-up meeting (10/13/16).

3.5 2016 Data Analysis

A total of 219 occurrences were monitored during 2016, but data were collected at 218 occurrence locations. No data was collected for one of the 219 occurrences because its location was determined to be erroneous (no plants were found and the habitat was not appropriate for that species), and thus SDMMP analyzed occurrence status, habitat associations, and threat levels data for 218 occurrences (n=218). The analysis sample sizes (n) in the figures also vary because some occurrence data entries were missing or incomplete.

The analysis presented in this section is a preliminary summary analysis for data collected in 2016. Additional in-depth analyses can be performed using the combined 2014, 2015 and 2016 datasets to determine population trends over time, overall changes in prevalence of threats, and detailed threats assessments for specific regions and/or species. The results of such analyses could help inform local management priorities and provide support for management actions where they are most needed.

Occurrence Status

A total of 207 occurrences were determined with IMG monitoring data for the 24 priority species. Ten rare plant species had an average of greater than 1,000 plants per occurrence (Figure 11). Otay tarplant (*Deinandra conjugens*), San Diego goldenstar (*Bloomeria clevelandii*), San Diego ambrosia (*Ambrosia pumila*), and Nuttall's acmispon (*Acmispon prostratus*) had the largest occurrences, with averages of 10,000 to 25,000 plants per occurrence. A substantial range existed in the size of occurrences of Otay tarplant (from two to 116,000 plants), San Diego goldenstar (zero to 140,000 plants) and San Diego ambrosia (1,408 to 65,000 plants). Coast wallflower (*Erysimum ammophilum*), salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *maritimus*), and thread-leaved brodiaea (*Brodiaea filifolia*) had smaller average occurrences of between 1,000 and 1,500 plants, and the remaining three species ranged from an average of 1,500 to 10,000 plants per occurrence.

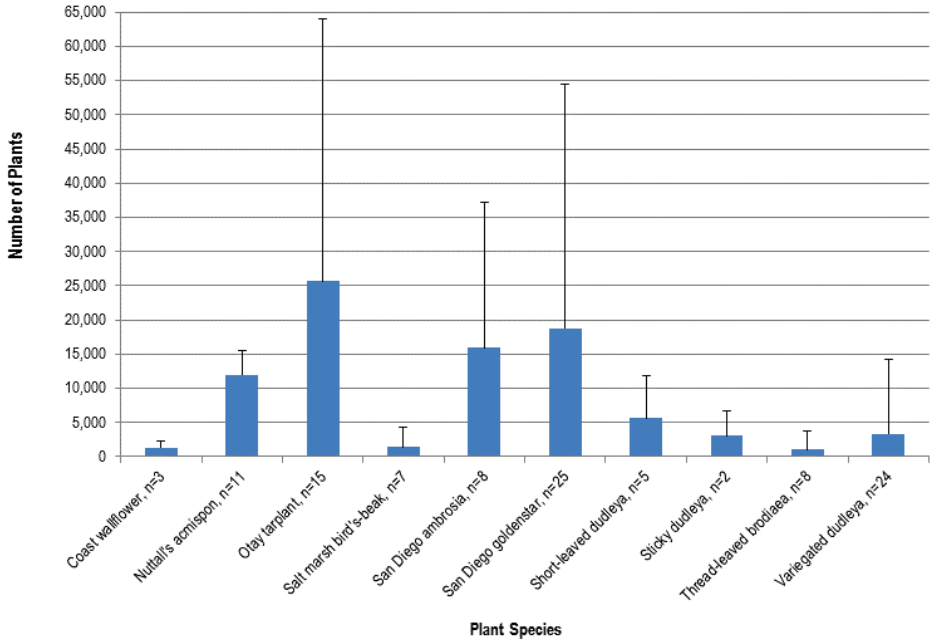


Figure 11. Average + Standard Deviation Number of Plants Per Occurrence for Rare Plant Species with an Average of 1,000 or More Plants Counted or Estimated during 2016 IMG Monitoring

A total of 14 species had average occurrences of less than 1,000 plants (Figure 12). Orcutt's bird's-beak (*Dicranostegia orcuttiana*), Orcutt's brodiaea (*Brodiaea orcuttii*), and San Diego thornmint (*Acanthomintha ilicifolia*) had the largest occurrences in this group, of between 700 and 900 plants, with high variability among occurrences ranging from 20 to 2,350, zero to 4,400, and zero to 15,586 plants per occurrence, respectively. No plants were detected at the single chaparral nolina (*Nolina cismontana*) occurrence. Jennifer's Monardella (*Monardella stoneana*), Mexican flannelbush (*Fremontodendron mexicanum*), San Miguel savory (*Clinopodium chandleri*), small-leaved rose (*Rosa minutifolia*), and willowy monardella (*Monardella linoides* ssp. *viminea*) had averages of less than 100 plants per occurrence. The remaining five species had average occurrence counts ranging from 100 to 700 plants.

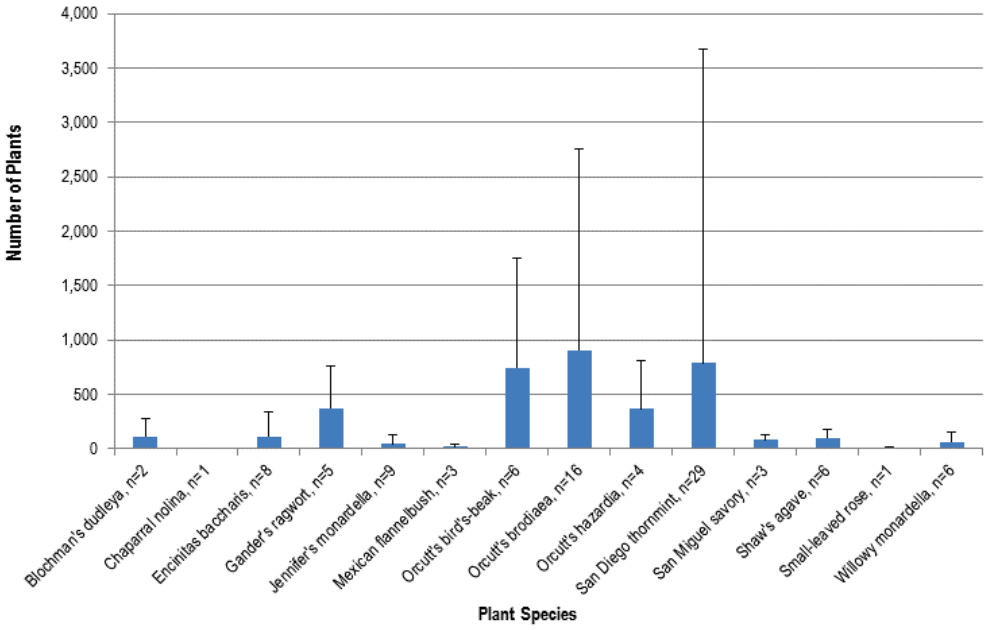


Figure 12. Average + Standard Deviation Number of Plants per Occurrence for Rare Plant Species with an Average of Less than 1,000 Plants Counted or Estimated during 2016 IMG Monitoring

Habitat Associations

Of the 20 most prevalent plant species detected at one or more sample plots per occurrence, 12 were nonnative annual grasses or forbs (Table 4). Red brome (*Bromus madritensis* ssp. *rubens*), and tocalote (*Centaurea melitensis*) were the most frequently sampled species, at 70 percent and 56 percent of occurrences, respectively. Four native species were sampled at 41 to 53 percent of occurrences and included California sagebrush (*Artemisia californica*), clustered tarweed (*Deinandra fasciculata*), California buckwheat (*Eriogonum fasciculatum*), and common deerweed (*Acmispon glaber*). Clustered tarweed was the only annual native plant that was sampled at more than 25 percent of occurrences. Of the 20 most commonly detected species, only chamise (*Adenostoma fasciculata*) and purple false brome (*Brachypodium distachyon*) had average cover greater than 10 percent. Purple false brome cover was highly variable, ranging from 0.2 to 75 percent at sampled occurrences, with eight occurrences having at least 50 percent cover.

Table 4. Prevalence Ranking, Number and Percent of Occurrences Sampled, and Average ± Standard Deviation Percent Cover of the 20 Most Prevalent Native and Nonnative Plant Species Detected during IMG Sampling of 218 Rare Plant Occurrences

Species	Native to California	Prevalence Ranking	Number of Occurrences Detected	Percent of Occurrences Detected	Average ± Standard Deviation Percent Cover
Red brome *(Bromus madritensis* ssp. *rubens)*	No	1	152	70	3.7 ± 6.1
Tocalote *(Centaurea melitensis)*	No	2	121	56	2.4 ± 3.5
California sagebrush *(Artemisia californica)*	Yes	3	115	53	5.6 ± 9.4
Clustered tarweed *(Deinandra fasciculata)*	Yes	4	105	48	5.0 ± 8.1
California buckwheat *(Eriogonum fasciculatum)*	Yes	5	101	46	5.9 ± 8.8
Common deerweed *(Acmispon glaber)*	Yes	6	89	41	1.8 ± 5.5
Purple false brome *(Brachypodium distachyon)*	No	7	87	40	13.7 ± 17.4
Soft chess *(Bromus hordeaceus)*	No	8	83	38	1.6 ± 3.4
Redstem filaree *(Erodium cicutarium)*	No	9	81	37	3.1 ± 5.3
Rat tail's fescue *(Festuca myuros)*	No	10	77	35	2.7 ± 5.3
Smooth cat's ear *(Hypochaeris glabra)*	No	11	77	35	2.1 ± 6.0
Broad leaf filaree *(Erodium botrys)*	No	12	71	33	9.1 ± 12.3
Laurel sumac *(Malosma laurina)*	Yes	13	70	32	4.0 ± 4.4
Scarlet pimpernel *(Lysimachia arvensis)*	No	14	69	32	1.0 ± 2.2
Common sow thistle *(Sonchus oleraceus)*	No	15	68	31	0.4 ± 0.3
Purple needle grass *(Stipa pulchra)*	Yes	16	64	29	5.2 ± 11.2
Narrowleaf cottonrose *(Logfia gallica)*	No	17	60	28	0.7 ± 0.9
Golden yarrow *(Eriophyllum confertiflorum)*	Yes	18	59	27	0.8 ± 1.0
Chamise *(Adenostoma fasciculatum)*	Yes	19	57	26	14.6 ± 14.6
Slender wild oat *(Avena barbata)*	No	20	57	26	5.5 ± 8.8

Mammal activity was recorded at sample plots for three species (i.e., feral pigs, California ground squirrel, and Botta's pocket gopher) that burrow or dig up and disturb

the soil (Figure 13). No feral pigs were detected at rare plant occurrences, and pocket gophers and ground squirrels were detected infrequently.

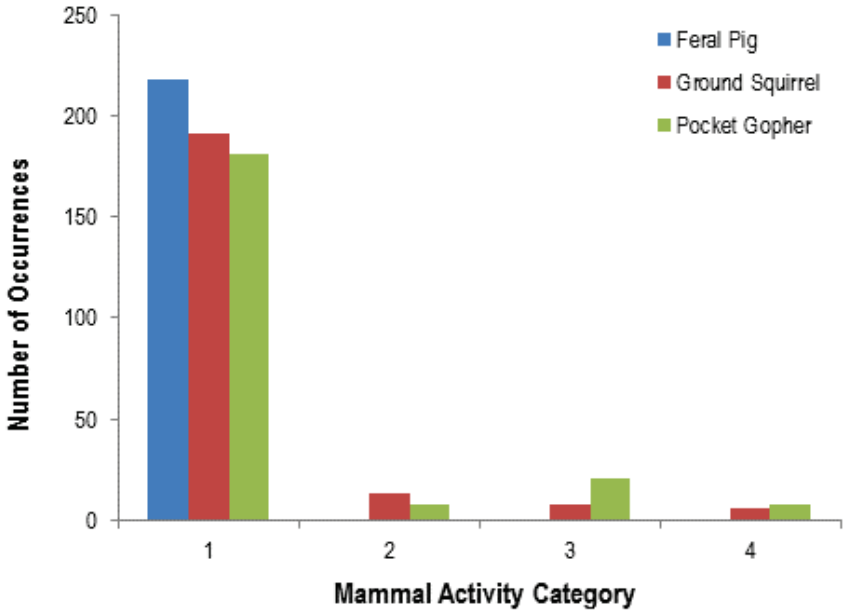


Figure 13. Frequency of Mammal Activity Categories Recorded for Feral Pig, California Ground Squirrel and Botta's Pocket Gopher at 218 Rare Plant Occurrences

Threat Levels

The greatest level of threats to rare plants across all occurrences was from nonnative grasses and forbs, with 86 percent of occurrences supporting nonnative grasses and forbs within their mapped extents (Figure 14). Greater than 50 percent of the mapped extent was disturbed by nonnative grasses, at 33 percent of rare plant occurrences and 28 percent of nonnative forbs occurrences. Species with more than 50 percent of their occurrences disturbed by nonnative grasses over 50 percent or more of their mapped extent included Jennifer's monardella (*Monardella stoneana*), Orcutt's brodiaea (*Brodiaea orcuttii*), San Diego ambrosia (*Ambrosia pumila*), sticky dudleya (*Dudleya viscida*), and thread-leaved brodiaea (*Brodiaea filifolia*).

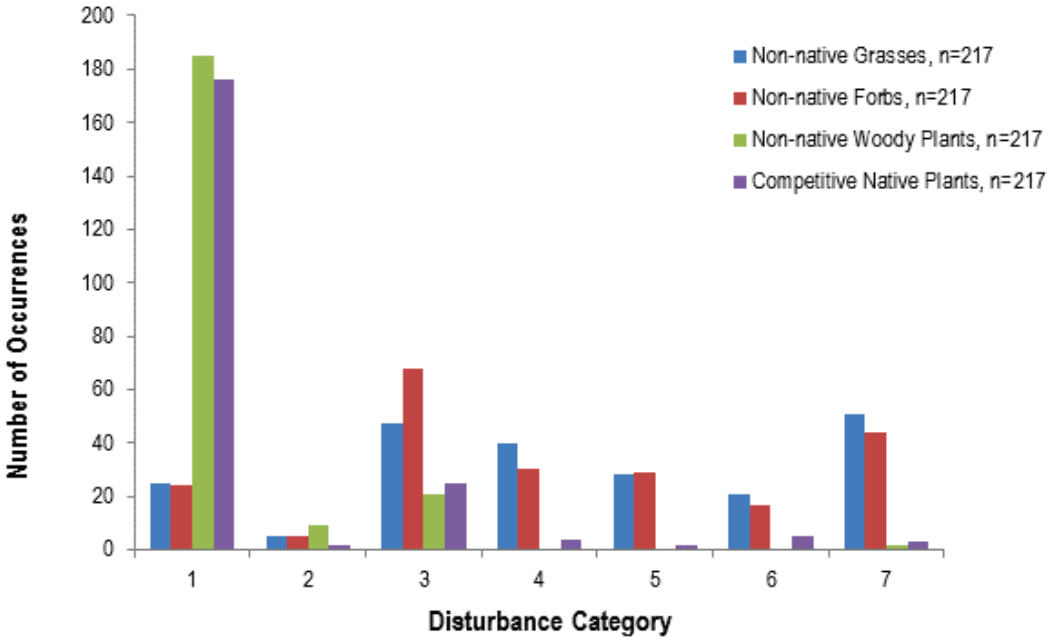


Figure 14. Levels of Disturbance from Nonnative Grasses, Nonnative Forbs, Nonnative Woody Plants and Competitive Native Plants during 2016 IMG Monitoring of 217 Rare Plant Occurrences

Depending on the number of occurrences monitored, this varied from one of two sticky dudleya occurrences affected over 50 percent of the mapped extent by nonnative grasses versus 11 of 16 occurrences for Orcutt's brodiaea. Those species disturbed similarly by nonnative forbs included San Diego ambrosia, sticky dudleya and thread-leaved brodiaea. Only one of two sticky dudleya occurrences was affected over 50 percent of the mapped extent by nonnative forbs versus six of eight San Diego ambrosia occurrences.

Nonnative woody plants invaded over 50 percent of the mapped extent for one occurrence each of Otay tarplant and sticky dudleya. Competitive native plants similarly affected three occurrences of Encinitas baccharis (*Baccharis vanessae*), two occurrences of San Diego golden star, and one occurrence each of Blochman's dudleya (*Dudleya*

blochmaniae), Jennifer's monardella (*Monardella stoneana*), and Otay tarplant (*Deinandra conjugens*).

Various human uses and signs of recent fire were documented at a number of rare plant occurrences (Figure 15). Signs of recent fire encompassing more than 75 percent of the mapped extent were detected at 53 (24 percent) rare plant occurrences. Species with more than 40 percent of occurrences affected by fire included: Encinitas baccharis (*Baccharis vanessae*) (five of eight occurrences); Jennifer's monardella (*Monardella stoneana*) (seven of nine occurrences); Mexican flannelbush (*Fremontodendron mexicanum*) (two of three occurrences); San Diego goldenstar (*Bloomeria clevelandii*) (12 of 25 occurrences), San Diego thornmint (*Acanthomintha ilicifolia*) (11 of 28 occurrences); and willowy monardella (*Monardella viminea*) (four of six occurrences). Dumping within the mapped extent was observed at 25 percent of monitored occurrences, trampling at 21 percent, illegal encampments at 2 percent, and vandalism at 1 percent. Trail disturbance values indicate confusion with data sheet instructions, and this variable is available only for 29 percent of occurrences. Approximately 13 percent of 63 occurrences showed signs of trails within the rare plant's mapped extent. Off-road vehicle and mountain biking were mapped in only five of 218 occurrences, in less than 10 percent of the plants' mapped extent.

In evaluating current and past agricultural land uses within rare plant mapped extents, no evidence of current livestock grazing was noted; 33 percent of occurrences were identified as supporting historic grazing, and 3 percent showed evidence of historical agriculture (e.g., orchards, row crops) (Figure 16).

Signs of altered hydrology and soil disturbances were documented infrequently at rare plant occurrences monitored in 2016 (Figure 17). The following species' occurrences were affected by hydrological and soil processes in over 75 percent of their mapped extent:

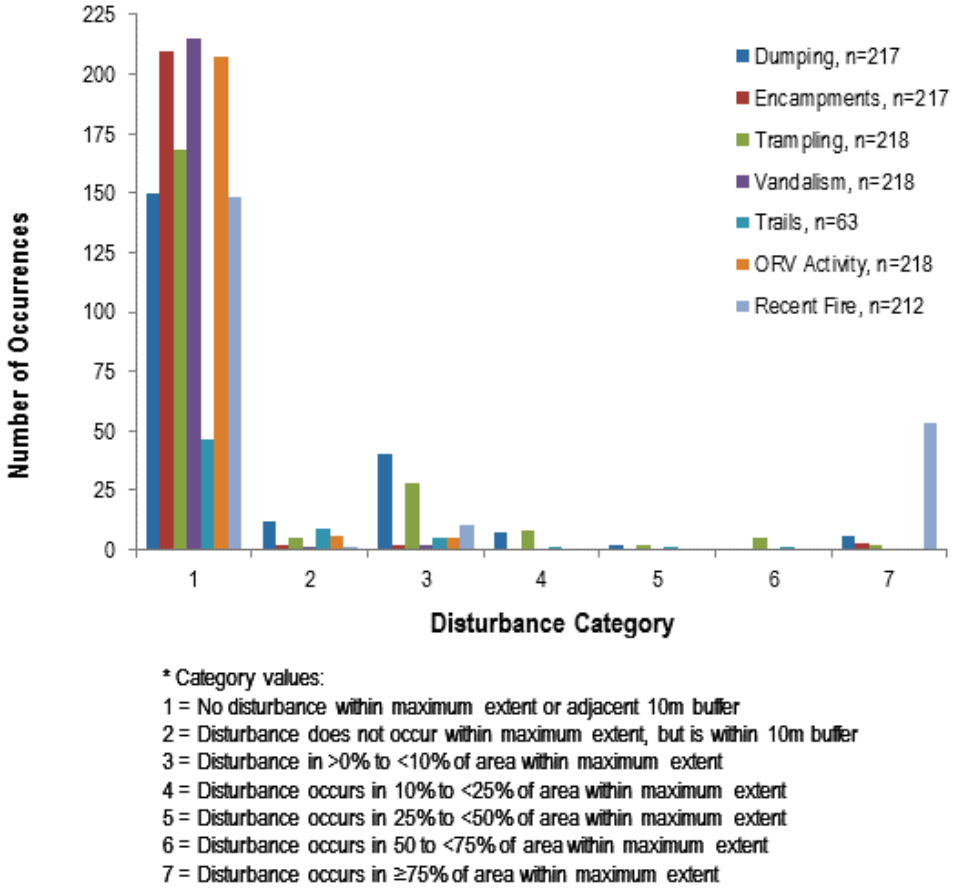


Figure 15. Disturbance Levels from Human Use and Fire at 218 Rare Plant Occurrences Monitored in 2016

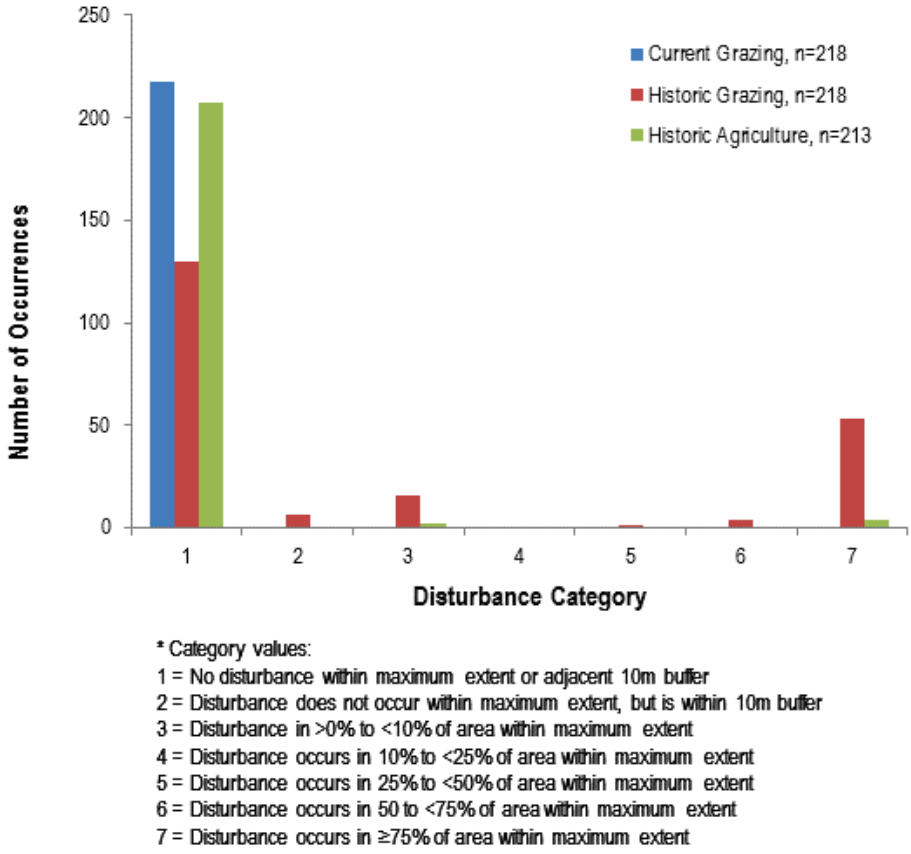


Figure 16. Signs of Disturbance from Current and Historic Grazing and Historic Agriculture at 218 Rare Plant Occurrences Monitored in 2016

- One Blochman's dudleya by altered hydrology, erosion, and urban runoff ;
- Two Jennifer's monardella by erosion;
- Two Nuttall's acmispon (*Acmispon prostratus*) by altered hydrology and urban runoff;
- One Otay tarplant by altered hydrology and urban runoff;
- Two salt marsh bird's-beak (*Chloropyron maritimum ssp. maritimum*) by altered hydrology and soil compaction;
- One Shaw's agave (*Agave Shawii*) by altered hydrology and urban runoff; and
- Two willowy monardella by erosion.

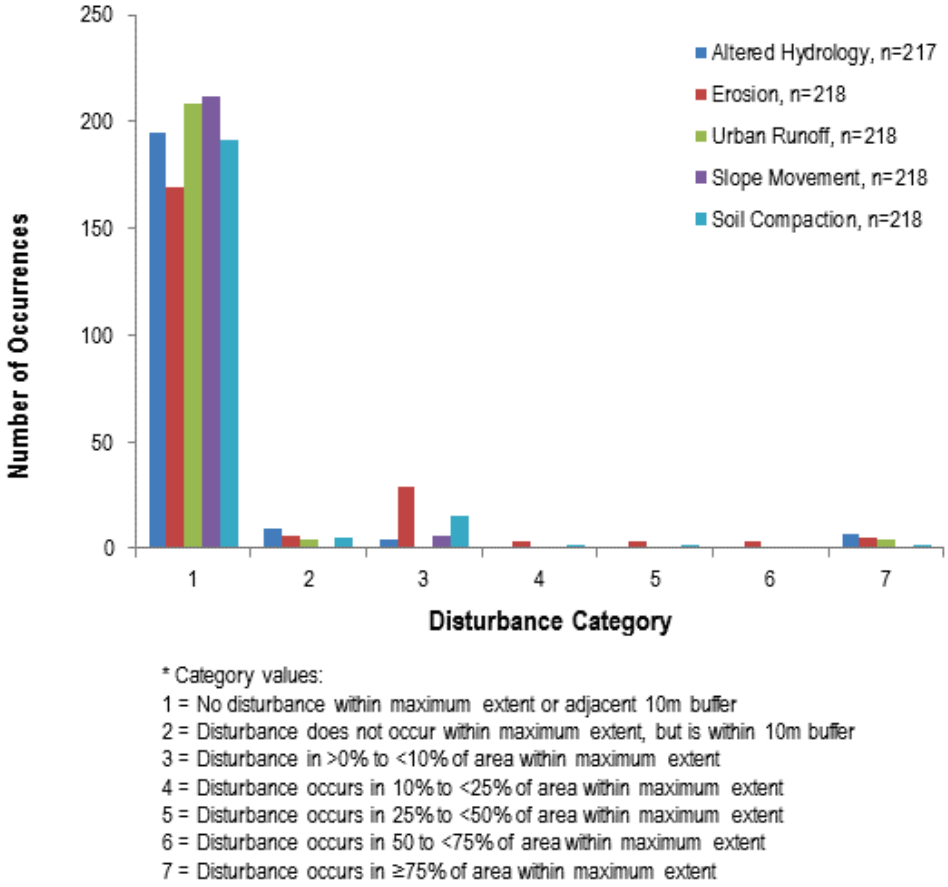


Figure 17. Signs of Altered Hydrology and Soil Disturbance at 218 Rare Plant Occurrences Monitored in 2016

Vegetation management within the rare plants' 2016 mapped extent included four instances of fuel modification, 17 instances of road maintenance, and three instances of vegetation clearing. Restoration activities, including brush management, were observed in the mapped extents of 23 occurrences.

3.6 2017–2021 Monitoring Prioritization and Frequency

The monitoring prioritization and frequency for the 30 MSP rare plant species are shown in Table 5. Each species will be monitored at least once over the next 5 years (2017–2021). Because specific data are lacking for some species, baseline surveys to locate new occurrences also are recommended over the next 5 years, in conjunction with IMG monitoring of known occurrences.

Table 5
Recommended MSP IMG Rare Plant Monitoring Prioritization and Frequency, 2017–2021

Species	2017	2018	2019	2020	2021	IMG Monitoring Frequency 2014–2021	Prioritization and Monitoring Frequency Rationale
Aphanisma (*Aphanisma blitoides*)	IMG*		1 BS, IMG*		IMG	Monitor every 2 years after 2017	Conduct baseline surveys in 2019 because only one known occurrence is documented on conserved lands and the species has disappeared from much of its former range. Monitor every 2 years after 2017 to minimize shrub impacts and avoid trail creation from frequent monitoring. Monitor frequently enough to determine trends in status (i.e., annual affected by drought) and identify management needs.
Blochman's dudleya (*Dudleya blochmaniae)*	IMG	IMG	IMG	IMG	IMG	Monitor annually	Conduct baseline surveys in 2019. Monitor annually to increase knowledge about species status, threats, and management needs. Little information exists on this species.
Chaparral nolina (*Nolina cismontana*)			BS, IMG			Monitor every 5 years after 2019	Conduct baseline surveys in 2019 and monitor at 5-year intervals after 2019 if species is located. No known occurrences on conserved lands within the MSPA. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub).
Coast wallflower (*Erysimum ammophilum*)	IMG		BS, IMG		IMG	Monitor every 2 years after 2017	Conduct baseline surveys in 2019. Monitor every 2 years after 2017 to minimize shrub impacts and avoid trail creation from frequent monitoring.
Dehesa beargrass (*Nolina interrata*)	IMG					Monitor every 5 years after 2017	Monitor every 5 years after 2017. Species has a restricted distribution and should be monitored frequently enough to track threats to determine management needs. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub) and large spatial extents.

Species	2017	2018	2019	2020	2021	IMG Monitoring Frequency 2014–2021	Prioritization and Monitoring Frequency Rationale
Encinitas baccharis (*Baccharis vanessae*)	IMG		IMG		IMG	Monitor every 2 years after 2017	Monitor every 2 years after 2017 to minimize shrub impacts and avoid trail creation from frequent monitoring. The County of San Diego is monitoring every 2 years over a 5-year period (2015, 2017, and 2019), and other occurrences should be monitored at the same time. Large occurrences may have a lower level of threats than small occurrences, but monitoring needs to continue to make a determination. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub).
Gander's ragwort (*Packera ganderi*)		IMG			IMG	Monitor every 3 years after 2018	Monitor every 3 years after 2018. Modify IMG monitoring protocol to map large populations in 2018. Survey and map all occurrences and historical locations for 1 to 3 years post-fire.
Heart-leaved pitcher sage (*Lepechinia cardiophylla)*			BS, IMG		IMG	Monitor every 2 years after 2019	Conduct baseline surveys in 2019 to determine whether any occurrences are on conserved lands. If so, implement monitoring in 2019 and then every 2 years after 2019. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub).
Jennifer's monardella (*Monardella stoneana*)			BS, IMG			Monitor every 3 years after 2016	Conduct baseline surveys in 2019 to determine spatial extent because some occurrence extents are not fully mapped, and to locate any new occurrences. Monitor every 3 years after 2016. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub) and note if recruitment is occurring.
Mexican flannelbush (*Fremontodendron mexicanum*)	IMG		BS, IMG			Monitor every 3 years after 2019	Conduct baseline surveys in 2019. Monitor every 3 years after 2019. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub) and large spatial extents. Translocated occurrences have low survivorship. Survey and map all occurrences and historical locations for 1 to 3 years post-fire.
Nuttall's acmispon (*Acmispon prostratus*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually because this is an annual species and most populations are small and highly threatened. Annual monitoring will help refine management recommendations. The City of San Diego monitors this species annually.
Orcutt's birds-beak (*Dicranostegia orcuttiana*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Conduct baseline surveys in 2019 and monitor annually to characterize population fluctuations because it is an annual species and threats vary by population. The City of San Diego monitors annually.

Species	2017	2018	2019	2020	2021	IMG Monitoring Frequency 2014–2021	Prioritization and Monitoring Frequency Rationale
Orcutt's brodiaea (*Brodiaea orcuttii*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Conduct baseline surveys in 2019 and survey in a variety of habitat types (i.e., grasslands, along creeks, vernal pools, rocky stream bottoms [Otay Mesa]). Monitor annually because populations are mostly small, isolated, and have a high degree of threats. The City of San Diego monitors annually. Consider modifying IMG protocol to include monitoring during both vegetative and flowering stages.
Orcutt's hazardia *(Hazardia orcuttii)*		IMG		IMG		Monitor every 2 years after 2016	Monitor every 2 years after 2016. The Center for Natural Lands Management (CNLM) monitors annually and has concerns about some occurrences. Consider modifying the protocol to include monitoring of individual shrubs.
Orcutt's spineflower (*Chorizanthe orcuttiana*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually because this is an annual species, very few populations exist, and known populations are small and highly threatened. Annual monitoring will help track threats and assess Chaparral Land Conservancy management efforts.
Otay tarplant (*Deinandra conjugens*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually to identify population fluctuations and management needs. A number of unmanaged occurrences exist, and populations are highly affected by nonnative grasses and thatch. The City of San Diego monitors annually.
Parry's tetracoccus (*Tetracoccus dioicus*)			BS, IMG			Monitor in 2019	Conduct baseline surveys in 2019. Monitor every 3 to 5 years, beginning in 2019. This species has not been mapped or monitored extensively, but it is believed that threats are relatively low. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub) and large spatial extents.
Salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually because a high degree of threat exists to this species based on 2016 IMG monitoring and genetic sampling surveys. The City of San Diego monitors annually.
San Diego ambrosia (*Ambrosia pumila*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually to evaluate population fluctuations, identify threats, and determine management actions. Some populations may be highly threatened and need management, but overall a lack of monitoring data exist for this species. The City of San Diego monitors annually.

Species	2017	2018	2019	2020	2021	IMG Monitoring Frequency 2014–2021	Prioritization and Monitoring Frequency Rationale
San Diego goldenstar (*Bloomeria clevelandii*)		IMG		IMG		Monitor every 2 years after 2016	Monitor every 2 years after 2016. Many populations were monitored in 2016, but some very large populations were not fully mapped. Because this species was monitored adequately in 2016, monitoring was deferred to every 2 years, to allow monitoring of more threatened species. Consider modifying IMG protocol to include monitoring during both vegetative and flowering stages. The City of San Diego monitors annually.
San Diego thornmint *(Acanthomintha ilicifolia)*	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually between 2017 and 2021 because most occurrences are declining and a need exists to track population changes and determine responses to changing conditions. Annual monitoring also is needed to identify appropriate management actions. May reduce monitoring frequency after 2021, because annual monitoring may be affecting large populations (crushing plants). The City San Diego and CNLM monitor annually. The County of San Diego will monitor annually between 2016 and 2021.
San Miguel savory (*Clinopodium chandleri*)		IMG		IMG		Monitor every 2 years after 2016	Monitor every 2 years after 2016. Species may be under-reported. Species may be vulnerable to drought. Survey and map all occurrences and historical locations for 1 to 3 years post-fire. Modify the IMG monitoring protocol between 2017 and 2021 to account species habit (i.e., shrub). The County of San Diego monitors annually.
Santa Rosa basalt brodiaea (*Brodiaea santarosae*)		BS, IMG				Monitor in 2018	Monitor in 2018 because threats are likely low. Species is in remote location on United States Forest Service lands. Consider modifying IMG protocol to include monitoring during both vegetative and flowering stages.
Shaw's agave (*Agave shawii* var. *shawii*)					IMG	Monitor every 5 years after 2016	Monitor every 5 years after 2016. Modify monitoring protocol to count individuals (i.e., clonal species). Threats are low and populations are stable.
Small-leaved rose (*Rosa minutifolia*)					IMG	Monitor every 5 years after 2016	Monitor every 5 years after 2016. Modify monitoring protocol to track individual shrubs over time. Threats are low and populations are stable.
Short-leaved dudleya (*Dudleya brevifolia*)	IMG	IMG	IMG	IMG	IMG	Monitor annually	Monitor annually because few populations exist and several of them are doing poorly. Threats to this species are high. The City of San Diego monitors annually.

Species	2017	2018	2019	2020	2021	IMG Monitoring Frequency 2014–2021	Prioritization and Monitoring Frequency Rationale
Sticky dudleya (*Dudleya viscida*)					IMG	Monitor every 5 years after 2016	Monitor every 5 years after 2016. Threats to this species are low in most locations. Modify protocol to obtain monitoring information on steep cliffs and cliff faces. Conduct surveys post-fire to map population extents.
Thread-leaf brodiaea (*Brodiaea filifolia*)	IMG		BS, IMG		IMG	Monitor every 2 years after 2017	Conduct baseline surveys in 2019. Monitor every 2 years after 2017. Several large populations occur on privately conserved lands. Obtaining permission to monitor these populations has not been possible. Consider modifying IMG protocol to include monitoring during both vegetative and flowering stages. The City of San Diego monitors annually.
Variegated dudleya (*Dudleya variegata*)		IMG		IMG		Monitor every 2 years after 2016	Monitor every 2 years after 2016. Consider baseline surveys in the future because many historic occurrences exist that are not being monitored. The City of San Diego monitors annually and the County of San Diego will monitor annually from 2016 through 2020. Consider modifying IMG protocol to include monitoring during both vegetative and flowering stages.
Willowy monardella (*Monardella viminea*)	IMG	BS, IMG	IMG	IMG	IMG	Monitor annually	Conduct baseline surveys in 2018 and include a hydrology study in the baseline surveys. Monitor annually because a high degree of threats exist and many populations (outside of military lands) are small and unmanaged. During monitoring, note recruitment (if any). The City of San Diego monitors annually and the County of San Diego is monitoring annually for 5 years.

***** IMG = conduct Inspect and Manage monitoring; BS = conduct baseline surveys.

4.0 Discussion

4.1 2016 Outreach and Training

Outreach and training were imperative to the success of this monitoring effort. The team detected very few data errors from those individuals that attended the pre-season field training and/or that received training in the field from CBI/AECOM staff. Data errors were more common for individuals and groups that had not received any or very little IMG monitoring training.

4.2 2016 Field Effort

4.2.1 Participants

The outreach effort and training conducted by SDMMP and the CBI/AECOM team led to high levels of participation in the 2016 IMG monitoring effort. Fourteen new entities either collected IMG monitoring data or allowed the CBI/AECOM team to collect monitoring data in 2016. None of these entities participated or collected data in 2014 or 2015. Multiple e-mails, phone calls, training events/workshops, and in-person discussions/meetings were necessary to coordinate access, and to conduct and assist with monitoring events. This level of coordination required extensive levels of CBI/ACECOM staff time.

4.2.2 MSP Rare Plant Species and Occurrences

A total of 24 high priority species and five additional rare plant species making up 219 occurrences were monitored in 2016. This was an increase in IMG monitoring over the previous 2 years. The increase in occurrence monitoring is attributed to the coordination and assistance provided by SDMMP and the CBI/AECOM team. Not only did the CBI/AECOM team monitor many "Gap" occurrences, but the team also assisted and motivated land managers to monitor occurrences under their management, using the IMG monitoring method.

4.2.3 Threats

As part of the monitoring effort, the surveyors identified threats at the majority of the rare plant occurrences. Threat identification allows land managers to implement routine management actions and apply for regional funding for intensive management that is beyond the scope of routine management.

For some occurrences, few threats were identified and the population was considered stable and healthy. For other occurrences, threats were numerous, and thus intense management will be necessary to ensure population resilience and persistence.

4.2.4 Management Recommendations

Most occurrences received some level of management recommendations during the 2016 monitoring effort. The CBI/AECOM team provided rare plant occurrence management recommendations for "Gap" occurrences during monitoring events. In some cases, monitoring data was sent to land managers to solicit feedback on management recommendations, but in most cases, recommendations were based on land management experience and familiarity with the target species.

4.3 2016 Data Outreach

Although the CBI/AECOM team received all 2016 monitoring data, a significant level of effort (i.e., phone calls, e-mails, in-person meetings) was expended to collect these data and perform quality assurance/quality control before submission to SDMMP. The levels of effort for obtaining and processing data were lowest for data submitted electronically, while the majority of data management time was spent transcribing data from written paper into electronic format. Therefore, a continued focus on electronic data collection is warranted.

4.4 2016 Data Analysis

The results of the 2016 rare plant IMG analyses show that many species have small populations and significant threats exist to a number of occurrences, particularly from nonnative plant species. IMG monitoring data can be compared over time, to determine whether occurrence status is improving because of management, and to track long-term trends. These data identify occurrences most at risk, based on their status and the types and levels of threat. This information is used to determine management needs and classify management as either routine or more intensive. IMG monitoring results are used to prioritize species and occurrences for regional, State, and federal funding opportunities that focus on management, such as competitive land manger grants.

The SDMMP currently is evaluating monitored occurrences to inform prioritization and development of management recommendations, including MSP objectives, to develop detailed species management plans. Comparisons are being made between 2014 and 2015 IMG monitoring data, and with long-term City of San Diego rare plant monitoring data. These analyses are investigating population trends and responses to environmental and management covariates.

Based on the 2016 data compilation and initial analyses, several areas of confusion were identified in the protocol and data sheets including collection of associated plant species percent cover (actual percent cover values versus percent cover categories), maximum extent population size versus sample plot population size, and missing threats data. These shortcomings are being addressed to improve ease of data collection and enhance data quality for the 2017 IMG monitoring efforts.

4.5 2016 Difficulties Encountered

As with any large-scale monitoring project, the AECOM/CBI team encountered difficulties that precluded completing all targeted monitoring events. Difficulties included: (1) obtaining permits and access agreements in a timely manner; (2) obtaining landowner permission for privately conserved or not-yet conserved lands; (3) navigating to occurrence locations using inaccurate spatial data; and (4) relying on some land managers and volunteers to complete monitoring events. Each of these is addressed in more detail next.

4.5.1 Permitting and Access Agreements

The CBI/AECOM team received a Notice to Proceed with the IMG rare plant monitoring project on March 7, 2016. At that time, the San Diego County field season was well underway, and thus many land managers already were conducting fieldwork when contacted about this project and were not readily available. Because of the late project start and consequent difficulties coordinating with busy land managers, one access permit was received too late in the season to conduct monitoring for one target species (which already had already senesced and was no longer visible in the field).

4.5.2 Privately Conserved or Not-yet Conserved Lands

The CBI/AECOM team was unable to determine ownership and contact information in a timely manner for many of the privately owned conserved properties (e.g., homeowner associations [HOAs] and conserved properties not yet conveyed to a long-term land management entity), because of the time constraints.

In some cases, the team did not receive permission to monitor specific occurrences or populations. In at least one case, the team was denied access to an HOA-owned property, although the property was conserved and included in the City of Carlsbad Habitat Management Plan preserve system. In several cases, the team did not receive correspondence from property owners because the property title had not been conveyed yet to a long-term management entity and/or because the property owner and wildlife agencies had not yet reached an agreement about property or mitigation status. The team

decided not to prioritize monitoring of the privately owned (conserved) and HOA-owned properties in 2016 because obtaining access to these properties was both difficult and time consuming.

4.5.3 Spatial Data

The CBI/AECOM team navigated to the majority of the rare plant "Gap" occurrences using coordinates provided by SDMMP. These coordinates were based on previous spatial data, obtained from CNDDB, land managers, biological and technical reports, and herbarium records. In many cases, the coordinates were not representative of the rare plant occurrence locations in the field. The team had to spend many hours surveying for these occurrences, and in some cases, never could locate any plants.

The difficulty in locating rare plant occurrences is attributed to inaccurate or historic CNDDB and land manager spatial data and spatial data, derived by SDMMP from preserve related biological and technical reports. The spatial data collected by the CBI/AECOM team in 2016 is spatially accurate and should allow more efficient relocation in subsequent years.

The SDMMP spatial dataset that the CBI/AECOM team used for IMG monitoring contained only occurrence point data. No polygon/extent data were associated with the dataset. In some cases, single points actually represented very large populations, but because of the delay in the project start date and issues with access, the team was unable to survey and fully map all occurrences. The team also was unable to install multiple monitoring samples as required by the IMG monitoring method because the full spatial extent for some occurrences was unknown.

4.5.4 Land Managers and Volunteers

In several cases, land managers or volunteers did not monitor occurrences although these individuals had agreed to perform the monitoring events. Poor communication, onset of the field season, heavy workloads, and staff turnover resulted in a lower number of monitoring events conducted by land managers than originally anticipated.

5.0 Recommendations

Based on the 2016 IMG monitoring effort, the CBI/AECOM team believes that future IMG monitoring efforts can be sustained and/or improved by implementing the following measures:

- Maintain funding for SDMMP rare plant coordinator position;
- Streamline the access permitting process;
- Begin coordinating with land managers on access permitting and identification of "Gap" occurrences, several (3–4) months before the onset of field season;
- Focus monitoring efforts on conserved lands managed or owned by entities willing to participate in the monitoring effort;
- Use accurate spatial data for planning and navigation purposes;
- Calibrate data collection methods via annual IMG monitoring training workshops with all participating entities;
- Encourage the use of standard, digital data collection forms or programs (i.e., Survey123); and
- Review species prioritization and monitoring frequency annually at the end of each field season.

To sustain the high levels of IMG monitoring participation on an annual basis, SDMMP should continue to fund the rare plant coordinator position. This position is integral to the success of the IMG monitoring program because of the following requirements: (1) coordinating with participating entities; (2) directing and coordinating the annual IMG monitoring effort; (3) implementing IMG monitoring for land managers where necessary; and (4) coordinating data outreach post-field season. Most importantly, the CBI/AECOM team noted that without a dedicated rare plant monitoring coordinator, certain entities would not participate in IMG monitoring because of staffing and time constraints and lack of the skill set necessary to conduct IMG monitoring.

Permitting and access agreement paperwork should begin several months before the onset of the field season (i.e., begin contacting land managers in November), so that occurrences can be monitored at the appropriate phenological period and allow land managers/owners sufficient time to complete the application process. Accurate population counts and estimates, and identification of all threats are more likely when the target species are easy to locate.

Monitoring efforts should be prioritized for publically owned occurrences or those occurrences where obtaining monitoring permission is likely. Identifying landowners and

contacts for privately owned and HOA occurrences is very time consuming, with little return.

To the extent possible, accurate and recent spatial data should be used for planning and navigation purposes, and all locations should be verified with land managers, reports, and/or herbarium records before beginning field surveys and monitoring. Accurate and recent spatial data will allow time efficient navigation and data collection, and the collection of the appropriate number of monitoring samples.

Annual, on-going training will be necessary for land managers and volunteers to implement the MSP IMG method without assistance and to generate fewer errors. SDMMP also should provide land managers with field training and assistance on request. Frequent and clear communication with land managers and volunteers about those occurrences on their monitoring lists will ensure that all occurrences are monitored using the MSP IMG method as intended.

Transitioning to a standard electronic data collection system (i.e., Excel field forms and/or Survey 123) will reduce data errors, data outreach time, and transcription time. Instructions and/or a demonstration on the use of electronic forms should be included in the annual training workshops.

The MSP rare plant prioritization and frequency timeline should be reviewed annually after the field season, to determine whether monitoring frequency or prioritization should be changed based on data collected as part of the monitoring effort and/or other field observations. Land managers and other experts should be included in this discussion.

In all cases, the CBI/AECOM team recommends continued IMG monitoring for prioritized rare plant occurrences and increased management for some occurrences, where threats are significant and the risk of population extirpation is high and/or eminent without threats reduction.

6.0 References

California Department of Fish and Wildlife. 2016. *California Natural Diversity Database* (CNDDB). RareFind 5, version 5.1.1. Available: https://map.dfg.ca.gov/rarefind/view/RareFind.aspx.

Dunn, Jonathan. Senior Botanist, AECOM. March 24, 2016—meeting with AECOM, CBI, and SDMMP regarding the 2016 Rare Plant Monitoring Work Plan.

Margie Mulligan. Botanist, AECOM. March 2016—phone conversation with Jessie Vinje of Conservation Biology Institute regarding the 2016 Rare Plant Monitoring Work Plan.

Environmental Mitigation Program Working Group (EMPWG). 2016 (July 12). *Ad Hoc Committee Recommendation: Fiscal Year 2017–2018 Work Plan and Fiscal Year 2017 Annual Funding*. Meeting notice and agenda.

McEachern, K., B. Pavlik, J. Rebman, and R. Sutter. 2007. *San Diego Multiple Species Conservation Program (MSCP) Rare Plant Monitoring Review and Revision*. U.S. Geological Survey Scientific Investigations report 2007-5016.

McEachern, K., and R. Sutter. 2010. *Assessment of Eleven Years of Rare Plant Monitoring Data from the San Diego Multiple Species Conservation Plan*. Draft final report for Contract 08W3CA5001030 between the U.S. Geological Survey and the San Diego Area Governments.

San Diego Management and Monitoring Program (SDMMP). 2014 (March 11). *Management Strategic Plan (MSP) 2014 Monitoring Protocol for Rare Plant Occurrences on Conserved Lands in Western San Diego County*.

San Diego Management and Monitoring Program (SDMMP) and Conservation Biology Institute (CBI). 2016 (October 13). *Management Strategic Plan (MSP) 2016 Rare Plant Monitoring Presentation*.

The Nature Conservancy (TNC) and Conservation Biology Institute (CBI). 2011. *South San Diego County Grasslands Habitat Assessment Field Form*.

APPENDIX A

MANAGEMENT STRATEGIC PLAN (MSP)
2016 MONITORING PROTOCOL FOR
RARE PLANT OCCURRENCES ON CONSERVED
LANDS IN WESTERN SAN DIEGO COUNTY

Management Strategic Plan (MSP) 2016 Monitoring Protocol for Rare Plant Occurrences on Conserved Lands in Western San Diego County

Prepared by San Diego Management and Monitoring Program (SDMMP) 3-11-14; revised 3-5-15 & 3-8-16

Introduction

A Management Strategic Plan (MSP) was developed for western San Diego County to provide a biological-based foundation to support decision making and funding priorities for managing species and vegetation communities on Conserved Lands (San Diego Management and Monitoring Program 2013). There is a gap in our knowledge of the current status of many rare plant populations in the MSP area (MSPA) and an even greater deficit in our knowledge of the specific threats faced by each occurrence. In 2016, a top priority of the MSP is to obtain rare plant status and threat data across the MSPA in order to identify needed management actions and to prioritize regional funding for management over the remainder of the five year planning horizon.

MSP Rare Plant Objectives to Conduct Baseline Surveys and Inspect and Manage Occurrences (IMG)

In 2016, a MSP objective is to inspect rare plant occurrences and to conduct routine management (IMG). The objective is to survey existing occurrences for 26 species (see page 11) to document their status and assess threats in order to develop specific management recommendations. Surveys for these species will be implemented by a combination of land managers and volunteers in coordination with the San Diego Management and Monitoring Program (SDMMP).

To ensure consistency in data collection, this protocol and associated data forms have been developed to document occurrence status and to assess habitat and threats for the "IMG" species. Critical to the development of the monitoring methods are recommendations from a comprehensive review of rare plant monitoring in the San Diego Multiple Species Conservation Plan (McEachern et al. 2007, 2010a,b, Tracey et al. 2011). The MSP rare plant occurrence monitoring component was adapted from methods used by the City of San Diego since 2006 (City San Diego Plant Survey Form 2013, City San Diego Plant Field Form Instructions 2013, B. Miller and K. Roeland pers. comm.). The habitat and threat assessment component incorporates covariates used by the Conservation Biology Institute and The Nature Conservancy in some of their projects (South County Grasslands Data Sheet 2011, Crestridge Qualitative Monitoring Data Sheet 2013, Habitat Assessment Form 2013, P. Gordon-Reedy, T. Smith, and J. Vinje pers. comm.). In addition, discussions with the County of San Diego (M. Hamilton, J. Price, and R. Humphrey, pers. comm.), Center for Natural Lands Management (CNLM; M. Spiegelberg and P. McConnell, pers. comm.), US Fish and Wildlife Service (USFWS; J. Martin, pers. comm.), AECOM (J. Dunn, T. Oberbauer, F. Sproul, L. Woolley, pers. comm.), and K. Greer (pers. comm.) have made significant contributions to the overall approach and development of covariates included in the 2014 monitoring protocol. A rare plant training session was held in February 2014 and participants offered additional suggestions for clarifying and improving the protocol and field forms. Finally, land managers field tested the protocol in 2014 and at an October 21, 2014 meeting provided feedback for revising the protocol for 2015. A meeting with land managers in October 2015 provided feedback, and resulted in minor changes to the protocol for 2016.

Master Occurrence Matrix (MSP-MOM)

As part of the MSP, a Master Occurrence Matrix (MSP-MOM or MOM) database was developed to provide information on rare plant occurrences documented since 2000 on Conserved Lands in the MSPA. This database in Excel, GIS and KML format is available at http://sdmmp.com/monitoring/MSP_Rare_Plant_Monitoring.aspx

An occurrence is considered a unit of management and is similar to a "population" without regard to whether individuals interbreed (Figure 1). Following California Natural Diversity Database (CNDDB) definitions of an Element Occurrence (CNDDB 2011), two occurrences are generally considered unique if the distance between their closest parts is ≥0.25 mile. Where a CNDDB polygon encompasses an occurrence, the occurrence is assigned the corresponding CNDDB Element Number. An occurrence can include multiple plant locations that extend over different land ownerships. Occurrence data were obtained from the CNDDB, San Diego Natural History Museum's Plant Atlas (SDNHM), Consortium of California Herbaria (CCH), SANBIOS, and from rare plant monitoring reports and GIS shapefiles provided by land owners and land managers (e.g., CBI, City San Diego, County of San Diego, CNLM, USFWS). Preserve reports

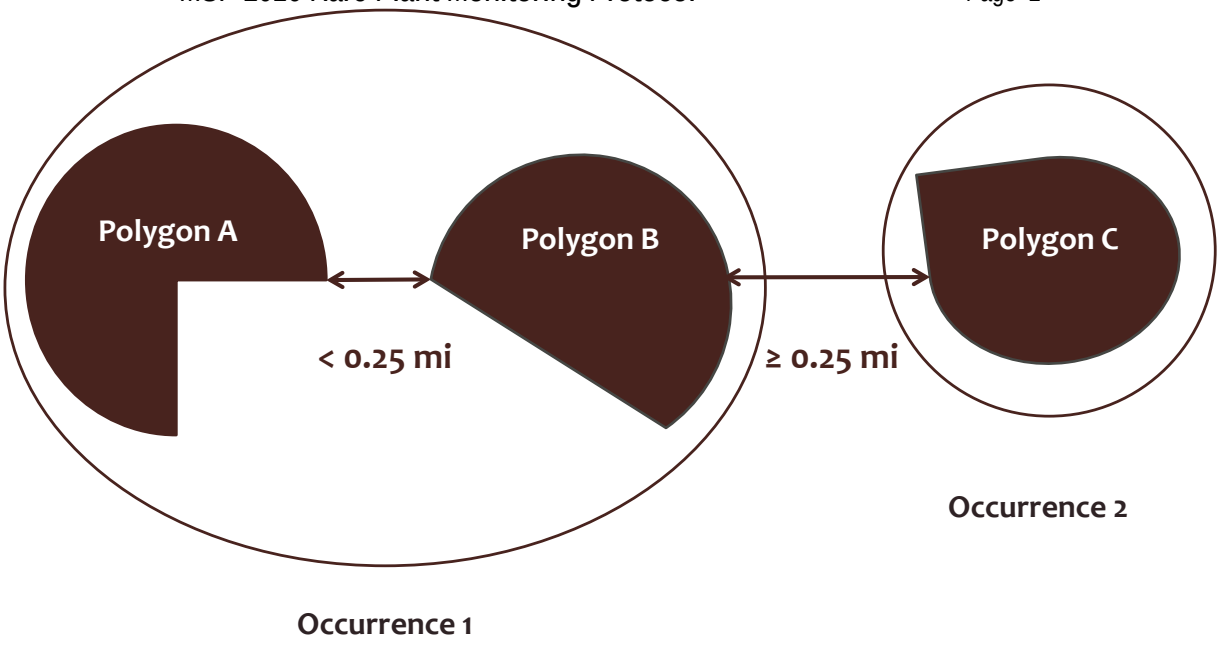


Figure 1. Example of how to determine what is an occurrence. An occurrence is a unit of management and similar to a population without regard to interbreeding. The definition follows a CNDDB Element Occurrence with two occurrences considered unique if their closest parts are ≥ 0.25 mile.

and resource management plans were searched for additional rare plant occurrences. Personal communications and comments on the MSP by land managers and species experts also added more occurrences to the database.

MOM contains information on the general location of each plant occurrence, the occurrence name, preserve, land owner and land manager. When available, there is information on population abundance, areal extent, threats, management recommendations and management actions that have been performed. The coordinates for an occurrence location may be general and approximated from the center of multiple point locations or from one or more polygons in a GIS shapefile. Where there is no available GIS information, occurrence coordinates are estimated from a map in a report or from a text description. Occurrence locations may also have precise coordinates representing a single GIS point within the occurrence. To provide more accurate location information for field surveys, separate GIS shapefiles can be provided by SDMMP that include all available point and polygon data for an occurrence.

Each occurrence in MOM has an Occurrence Identification Code that is comprised of the USDA plant code for the species or subspecies, followed by an underscored space and the MU number. This is followed by a 4 digit alphanumeric code representing the occurrence site. Typically, this site code designates the geographic area, feature or preserve where the occurrence is found. The site code is followed by a three digit number unique to that occurrence. If there are multiple occurrences with the same site name, then each occurrence is assigned a unique number. Following are examples of occurrence IDs with the information embedded in the ID:

ACPR_ 1DUTR005	*Acmispon prostratus*, MU1, Dune Triangle, 005
ACPR_7BALA020	*Acmispon prostratus*, MU7, Batiquitos Lagoon, 020
ARGLC4_6MAMI016	*Arctostaphlyos glandulosa* ssp. *crassifolia*, MU6, Manchester Mitigation Bank, 016
DUBLB2_6CMPR001	*Dudleya brevifolia*, MU6, Carmel Mountain Preserve, 001
LEGA_3OTMT003	*Lepechinia ganderi,* MU3, Otay Mountain, 003
LEGA_3OTMT004	*Lepechinia ganderi,* MU3, Otay Mountain, 004

The last two examples have the same site code as they both occur on Otay Mountain, but they are different occurrences as they are ≥0.25 miles apart. These different occurrences are distinguished by unique numbers.

IMG Monitoring Approach

MOM includes recent rare plant occurrences on Conserved Lands. Of these occurrences, a *"significant occurrence"* is "defined by one of the following criteria: relatively abundant at a distinct location or site; sustainable as indicated by repeated observations over time or evidence of reproduction; important for ensuring connectivity; or represents the only known occurrence or one of only few occurrences remaining in the MSPA" (San Diego Management and Monitoring Program 2013). Significant occurrences are those that will be prioritized for management. The purpose of the IMG objective is to provide current information on the status of each occurrence in the MSPA and an assessment of threats and management needs. This information will be used to identify management actions that can be implemented by land managers and to identify significant occurrences requiring more extensive management actions and that may be prioritized for regional funding.

IMG monitoring involves 1) establishing permanent sampling areas for monitoring occurrence status; 2) mapping the perimeter of the current extent of the occurrence and monitoring occurrence status; 3) photo-monitoring; 4) conducting a habitat assessment within the sampling area; and 5) conducting a threats assessment within the maximum extent of the occurrence and an adjacent 10-m buffer. In many cases, the maximum extent is larger than the sampling area for an occurrence. Figure 2 shows the relationship between maximum extent, current mapped extent, and the sampling area.

Current Mapped Extent and Maximum Extents

The first time that an occurrence's perimeter is mapped will establish the current extent for that year and will also represent the maximum extent of the occurrence. In subsequent survey years, the occurrence may vary in size and the maximum extent will expand to include all areas occupied by the plant across survey years. Thus, the maximum extent is the cumulative area where the plant has been mapped over time and is the minimum area searched for the plant during each survey. If there is suitable habitat in the vicinity of the occurrence where the plant has not been searched for, this can also be surveyed and may result in an increase of the maximum extent. During each survey the current extent of the occurrence will be mapped so that the distribution of the plant can be tracked over time and areas for management can be identified. *It is important when mapping the current extent to minimize impacts to plants by avoiding trampling or creating trails through the population.*

Sampling Area

Within the maximum occupied extent, sampling areas will be established for each occurrence. The size of the sampling area may vary for each species, but is generally a 10-m radius circle for annuals and narrowly distributed perennials. For shrubs or trees that occur over a large area (e.g., Lakeside ceanothus, Dehesa nolina, etc.), the sampling area can be increased and it may not be possible to map the maximum extent. More detailed information on sampling area and placement of sampling points for shrub species is being developed and will be posted on the SDMMP website.

For annuals and narrowly distributed perennials, the sampling area can include the entire mapped occurrence or only a portion of the occurrence, depending on the size of the occurrence and annual changes in distribution. When an occurrence is large (≥3 acres) at least three permanent sampling areas should be established within the occurrence perimeter. Sampling areas should be placed in locations where the plants are most likely to be found each year and that are similar in environmental characteristics. If there is substantial site variation within the occurrence perimeter (e.g. degree slope, aspect, vegetative community) or variation in plant densities, then the occurrence may need to be stratified into areas with similar environmental characteristics and plant densities. Ideally, three sampling areas will be placed within each stratum. To minimize impacts to plants, sampling areas can be established so that the photo monitoring point is at the edge of the occurrence and faces into the plant population. The sampling area should be originally situated so that it encompasses as much of the occurrence as possible. SDMMP can provide assistance in establishing sampling areas and can provide GIS or kml files for making maps showing occurrence perimeters and sampling areas.

Because rare plant populations can fluctuate temporally and spatially, there may be times when the sampling area is no longer within the current mapped extent of the occurrence. It is important to continue collecting data at the established sampling area instead of moving it to encompass the new location of the occurrence. If it is moved, then differences in habitat attributes cannot be compared over time. The current mapped extent, number of plants, and threat assessment will still be recorded for the occurrence at its new location. In situations where the sampling area is no longer within the current mapped extent for a species, one can choose to implement an additional sampling area in the new extent for the species, while continuing to collect data in the previously established sampling area.

Data can be collected with pen and paper in the field and when back in the office can be entered into an Excel data entry form provided by SDMMP. Alternatively, data can be entered directly into the data entry form in the field using a tablet or other portable computer that supports Microsoft Excel. All data collected during rare plant monitoring surveys should be submitted by August 1 of the year it was collected to the SDMMP (currently via email or on CD; future via the regional SC-MTX web portal accessed at www.sdmmp.com). Specific data to be submitted include:

- Completed Excel files that have been reviewed for errors (1 per occurrence sampling point)
- Photos
- Copies of field forms (if not entered electronically into a personal computing device in the field)
- GIS files

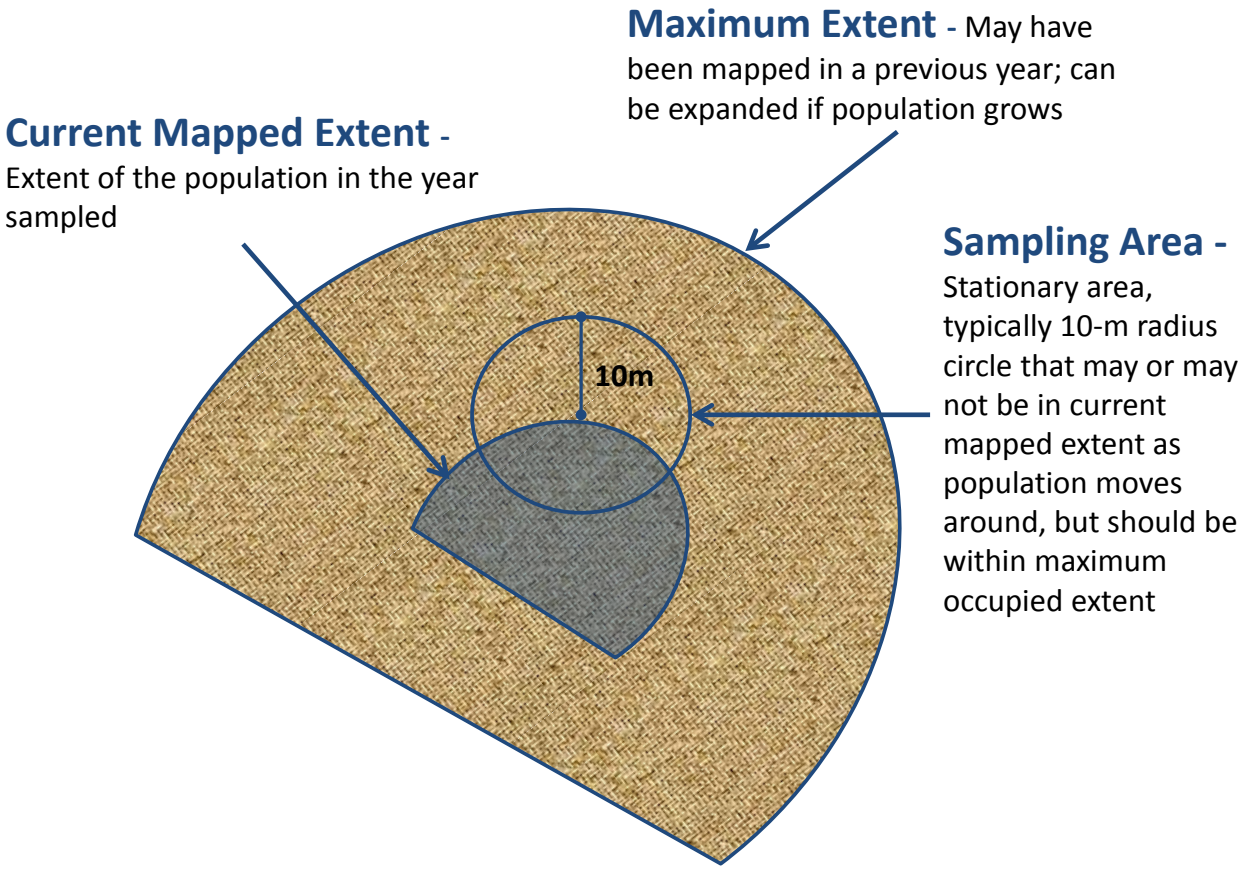


Figure 2. Diagram showing the relationship between maximum extent, current mapped extent, and sampling area.

In preparing for 2016 rare plant surveys, surveyors should ensure they have all the required access permits and have been trained in the data collection protocol. It is assumed that the survey team has members experienced with identifying the rare plant species being inspected. Ideally, two to three people comprise a monitoring team as this can improve estimates and makes it easier to delineate occurrence perimeters. Surveys should be conducted when plants are flowering and annuals are most detectable. SDMMP has a calendar on the website's rare plant monitoring page with suggested survey periods for each species.

Specific information for each rare plant occurrence is found in MOM (see previous section). Occurrences may also have additional GIS shapefiles with point coordinates and polygon perimeters that are linked to MOM records through the occurrence ID. MOM is available in ARCGIS shapefile, kml, and Excel spreadsheet formats and may be downloaded from: http://sdmmp.com/monitoring/MSP_Rare_Plant_Monitoring.aspx

An ArcGIS viewer is available at http://sdmmp.com/Online_Map.aspx to view MOM occurrences and to create maps using various GIS layers. GIS shapefiles or kmls with available point coordinates and polygon perimeters can be obtained from SDMMP before going into the field. These files are helpful if the occurrence location is not familiar to the surveyor. Surveyors should prepare maps that identify access routes to rare plant occurrences. To improve efficiency and reduce data errors it is recommended that prior to going into the field any information in MOM that does not change from year to year be typed into the data sheet for each survey site. This includes scientific and common names, MSP Occurrence ID, CNDDB EO#, preserve, land owner, land manager, and occurrence location information. A data entry template is being developed that shows information that can be entered in advance of doing the survey.

The following is a check-list of equipment needed during rare plant surveys.

Field Equipment Needed for Surveys

☐ Global Positioning System (GPS) submeter unit with sampling location coordinates and polygon perimeters (if available) already entered. Alternatively, smartphone (Android, iphone) acceptable if no GPS unit available.

☐ Camera that can attach to tripod
☐ Tripod with camera mounting attachment (extendable to 5-6' and with bubble level, if possible)
☐ Compass (or a smartphone with an app for compass directions)
☐ Survey field forms & pens
☐ Ruler to measure thatch depth
☐ Cover estimate diagram (see page 4 of data form)
☐ Habitat and threat assessment category definitions (see page 2 of data form)
☐ Trudgen & Keighery habitat quality assessment (see page 4 of data form)
☐ Plant press and/or other plant collecting materials
☐ Aerial photograph (optional, for mapping population, threats, etc.)

☐ Two measuring tapes (meters)

Instructions for Completing the MSP - Rare Plant Occurrence Monitoring Form, Page 1

After arriving at the site, the surveyors should go to the occurrence location and identify the occurrence sampling area. The sampling area is a 10-m radius circle, unless specified otherwise for a species. The boundaries of the sampling area can be temporarily flagged if needed. If the occurrence has not been previously sampled using this protocol, then the monitoring location needs to be established (see pages 1- 3). *It is very important to minimize impacts to the plants as a result of monitoring activities. Try to avoid creation of paths or stepping on plants during the surveys. Biosecurity measures should also be undertaken to reduce transmission of invasive plant seeds, pathogens, etc. from one occurrence to the next. Biosecurity protocols will be posted on the SDMMP rare plant monitoring page.*

Scientific Name: Record the monitored species' scientific name, including subspecies or variety, if applicable. Current scientific names are provided in MOM in the column "SName" field.

Common Name: The species common name can be obtained from the column "CName" in MOM.

MSP Occurrence ID: The occurrence ID can be obtained from the "OccID" column in MOM (see previous sections for a description of the occurrence identification code). Please indicate whether this is an existing occurrence in MOM or a new occurrence that needs to be assigned an ID number and entered into MOM. If you are unsure, enter "unknown".

CNDDB EO#: If the occurrence has a CNDDB EO#, this will be listed in the "OtherID" column in MOM as "EOXX" (e.g., EO4, EO15).

Translocated?: Enter whether the occurrence is translocated or not. MOM has a "Transloc" field that can help to complete this field.

Preserve, Land Owner, Land Manager: This information can be found in MOM.

Occurrence Name: Record the occurrence name from the "OccName" field in MOM. The occurrence name represents the site where the occurrence is found and is often named after a preserve, geographic area or feature, road, etc. If there are two different occurrences with the same site name, then they are differentiated with a number. For example, MOST_3MAVA002 and MOST_3MAVA003 are two different occurrences of *Monardella stoneana* in Marron Valley and their occurrence names are Marron Valley #1 and Marron Valley #2, respectively.

Sample Point: There can be multiple sampling areas that are part of the same occurrence. These are designated in the occurrence name as "-Obs. #X" (e.g., Carmel Mountain - Obs. #1, Carmel Mountain - Obs. #2) or as unique names (e.g., Crest Canyon North, Crest Canyon South). For the sample point, enter an observation number or name only if there are multiple sampling areas for that occurrence.

Surveyors and Affiliation/Agency: Record names and agencies of all field personnel (use full names).

Date, Time Start, Time Finish: When in the field, record the date (MM/DD/YYYY), time start and time finish of data collection for both the occurrence status and habitat/threat assessment portions of the data form. This information will allow us to track the time it takes to complete surveys for budgeting purposes and so we determine if changes to the protocol are needed to make it more efficient.

I. OCCURRENCE STATUS:

 # Plants/Current Mapped Extent: If the mapped occurrence perimeter falls entirely within the sampling area, then this number is the same as that entered for "# Plants/Sampling Area". If this is the case, enter the number in both places. If the occurrence perimeter is larger than the sampling area, then count or estimate the number of plants within the entire occurrence perimeter. Round off estimates to the order of magnitude that you are most comfortable estimating. Describe the uncertainty of your estimate as very high, high, medium, low, very low. If the occurrence is so large that a numeric estimate is uncertain, give a "ball park" estimate and indicate in the "Uncertainty?" field that uncertainty is "very high. Indicate whether counts/estimates were of individual plants, or clusters of plants. Also indicate whether counts/estimates were of flowering individuals, or of vegetative individuals (latter applies primarily to geophytes).

Instructions for Completing the MSP - Rare Plant Occurrence Monitoring Form, Page 1 (continued)

Area of Current Mapped Extent: GPS the perimeter of the occurrence and enter the size of the area and specify units (e.g., square meters, square feet). The size will most likely be entered back in the office using GIS to calculate the area. If you do not have access to GIS, SDMMP can calculate this variable once the GPS points are received. If the occurrence perimeter is not delineated with GPS, then record an estimate of the occurrence size. Indicate whether the area was GPS mapped or estimated. Indicate whether the perimeter of the current extent was determined by walking it and recording with a GPS unit, or whether the perimeter was determined by other means (in ArcGIS and/or using aerials, etc.).

Species Found? Check off whether or not the species was located. If the species is not found, note if there are potential explanations for why the species wasn't detected.

 # Plants/Sampling Area: Count or estimate the total number of plants in the sampling area. Use estimates for dense occurrences where it is not feasible to count every individual or where there is a risk of impacting the population by trampling. Estimates for the sampling area can be based on counting a portion of the sampling area and then extrapolating to a total number of plants for the sampling area. Criteria for classifying "individual plants" need to be specifically delineated for hard to count species. Describe the uncertainty of your estimate as above. Enter the radius (m) of the sampling area. Indicate whether counts/estimates were of individual plants, or clusters of plants. Also indicate whether counts/estimates were of flowering individuals, or of vegetative individuals (latter applies primarily to geophytes).

Phenological Stages and Evidence of Herbivory, Disease, and Stunted Growth: For each phenological stage (vegetative, flowering, fruiting, mixed flowering and fruiting, dead) and for evidence of herbivory, disease, or stunted growth, enter the number of the category representing the range in % of plants in the sampling area that exhibit that trait. The categories are defined as:

1 (0%) 2 (>0% to <10%) 3 (10% to <25%) 4 (25 to <50%) 5 (≥50 to <75%) 6 (≥75%)

Notes with additional details can be recorded on page 3.

Is Sampling Area within Current Mapped Extent? Check yes or no to indicate whether the current distribution of the plant is outside of the sampling area.

Collection? Indicate whether a collection of plants within the sampling area was taken or has previously been done. If there is a collection, complete the section on collector, collection number, and museum/herbarium where the collection was submitted.

II. SAMPLING AREA LOCATION & SITE PHOTOMONITORING

Note: If the location has been monitored previously using the MSP Rare Plant Monitoring Protocol, coordinates for the center or the plot and for the photo point(s) will appear on the coordinates list provided by SDMMP. Please consult that list to confirm the correct coordinates; if corrections need to be made to the coordinates provided, indicate correct coordinates on the data form.

GPS /smartphone Accuracy: Record the accuracy of the GPS unit (or smartphone if not GPS unit available) and specify the units (e.g., meters, feet). .

GPS Datum: Record the datum setting for the GPS unit (e.g., NAD83, WGS84). NAD83 is the preferred projection for submitting data to the regional SC-MTX web portal. Also indicate whether the coordinates are State Plane, UTM, or "other."

Coordinates: If the location has been monitoring previously and the coordinates on the list provided by SDMMP are correct, indicate "no change" on the form. If the monitoring is a new location, indicate "new location" and provide the coordinates. If you have reason to believe that the coordinates on the list provided by SDMMP are incorrect, indicate "correction" and provide new coordinates. Based on the GPS reading, record the easting and northing coordinates at the center of the sampling area and at the photo point. Record the coordinate system.

Instructions for Completing the MSP - Rare Plant Occurrence Monitoring Form, Page 1 (continued)

Photos should be taken from the exact same viewing location during each occurrence monitoring visit. Typically, this location is at the edge of the sampling area looking toward the rare plant population; alternatively, the photo can be taken at the center of the sampling circle. Use a tripod with an elevation/bubble feature if possible, and avoid using camera zoom features unless exact zoom level can be recorded.

Camera Type: Record the type of camera being used for photo monitoring, including make, model, and lens type.

Location 1: The coordinates for this location are recorded above. If photos are taken from a secondary location, then the coordinates should be entered under "*Location 2*" . If photos have been taken at this location previously and the coordinates on the list provided by SDMMP are correct, indicate "no change" on the form. If the monitoring is a new location, indicate "new location" and provide the photo coordinates. If you have reason to believe that the photo coordinates on the list provided by SDMMP are incorrect, indicate "correction" and provide new coordinates.

Direction: Using a compass, note the direction that photo(s) are taken using either cardinal directions and/or degrees.

Height: Measure the height of the camera *in meters* (taken from the ground to the bottom of the camera body, unless otherwise noted).

Camera Angle: Record the angle that the photo(s) are taken, whether level or at an upward or downward facing angle. Include degree of angle, if possible.

File Location: Once monitoring photos are downloaded and filed, record the file location of photographs taken during monitoring visit (e.g., E:\Monitoring\Arct_gland\2006).

III. ASSOCIATED SPECIES IN SAMPLING AREA

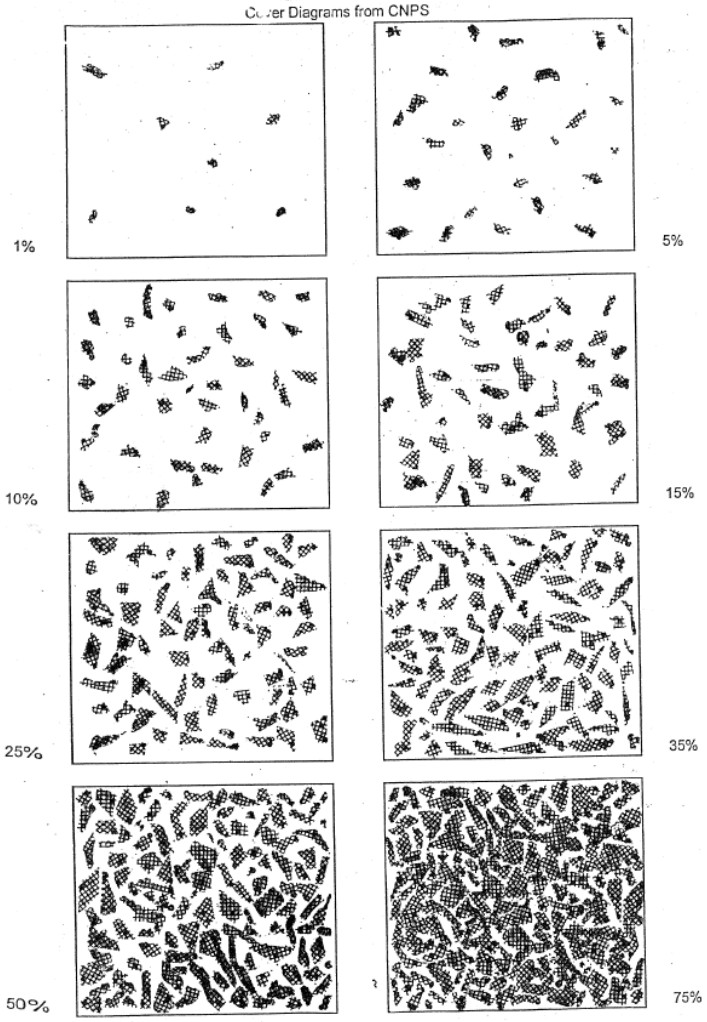
List all *native* and *nonnative* plant species, bare ground, litter, and rock with estimates of percent cover within the sampling area. It is important to record *all* non-native plant species in order to identify if management actions are needed. The preferred reference for species names is "Checklist of the vascular plants of San Diego County, 5th Edition (2014)" by Jon P. Rebman and Michael G. Simpson which can be downloaded at is the San Diego Natural History Museum's website (http://www.sdnhm.org/science/botany/projects/checklist/).

Nonnative: Check this column if the species is known to be nonnative.

Species/Substrate: Record species' scientific name. If plants cannot be identified in the field with certainty, a collection should be made for later identification and/or verification. If a specimen is submitted to a herbarium, note the collection number in the third column and the herbarium name. Three substrates: bare ground; litter; and rock should also be recorded in the designated rows. Litter includes undecomposed organic matter such as fallen logs or branches, leaves, and twigs that are not attached to the ground, such as thatch or standing biomass. Bare ground is dirt or sand without litter or with few rocks. The rock category includes gravel, cobble, stones, boulders and bedrock (continuous exposed rock).

Cover: Record absolute % cover of species/substrates listed. A cover diagram (see below) should always be used for this analysis; estimates without such a guide tend to be inflated. Copying the diagram onto a clear plastic sheet (like an overhead) is recommended for field use. Additionally, it is recommended that two surveyors make individual estimates, then compare estimates and come to agreement on a final cover estimate. Provide overall estimates of % total cover, % herbaceous cover, % shrub cover, and % tree cover.

Cover Diagrams from CNPS



Instructions for Completing the MSP - Rare Plant Habitat and Threats Assessment Form, Page 2

IV. HABITAT ASSESSMENT IN SAMPLING AREA

The habitat assessment is conducted within the sampling area, which is typically a 10-m radius circle (as described above).

SANDAG 2012 Vegetation Alliance/Association: At the sampling point determine the vegetation alliance/association based upon the data collected in "Associated Species" and using the vegetation key that will be posted on the SDMMP Rare Plant Monitoring webpage. This is typically done in the office after the fieldwork is completed.

Surrounding Land Use/Activity: Record the land use or human activities adjacent or surrounding the preserve (e.g., residential, road, open space, etc) and indicate the distance to the sampling area.

Cryptogamic Crust Cover, Thatch Cover: Record the number of the % cover class for cryptogamic crust and thatch cover within the sampling area. Cover classes are defined as:

1 (0%) 2 (>0 to <10%) 3 (10% to <25%) 4 (25% to <50%) 5 (50 to <75%) 6 (≥75%)

Thatch Depth: Estimate average thatch depth using the following categories: 1 (no thatch); 2 (<1 cm); 3 (1 to <5 cm); 4 (5 to <10 cm); 5 (10 to <15 cm); 6 (15 to < 20 cm); 7 (>= to 25 cm). Estimate maximum thatch depth in cm within the sampling area. Thatch consists of dead dry grass that lays over on the ground or is attached and upright and can build up over years.

Dead Standing Biomass: Record whether there is dead standing biomass and if it is present, record the dominant species and cover class (above) and average height in cm. Standing biomass is typically larger dead forbs, such as fennel, mustard, dock, and even taller oats (*Avena* spp.) that are attached to the ground.

Mammal Species Activity Categories: Assign the number of the appropriate activity category for feral pigs, ground squirrels, and pocket gophers. Activity categories numbered from 1-4 are defined as:

Feral pig activity within sampling area:

1 = No feral pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pig) detected.

2 = Signs of pig activity (rooting, wallowing, vegetation destruction) in sampling area appear months old.

3 = Signs of recent pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pig) in adjacent area but not within sampling area.

4 = Recent signs of pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pigs) within sampling area.

Ground squirrel activity within sampling area:

1 = No ground squirrel burrows detected.

2 = Burrows and/or ground squirrels observed adjacent to sampling area but not within sampling area.

3 = Single squirrel or burrow seen within sampling area.

4 = Multiple burrows and/or squirrels seen within sampling area.

Gopher activity within sampling area:

1 = No pocket gopher mounds detected.

2 = Mounds or gophers observed adjacent to sampling area but not within sampling area.

3 = <10 mounds observed within sampling area.

4 = ≥10 mounds or one or more gophers seen within sampling area.

Sampling Area Representative? Indicate whether the sampling area appears representative of the maximum extent. If the sampling area encompasses the entire maximum extent of the occurrence, then enter yes. If the sampling area appears to differ substantially from the maximum extent, then note the differences in the notes section on page 3 of the data form. Be sure to specify which covariates differ and how they differ

V. THREATS ASSESSMENT IN MAXIMUM EXTENT

The threats assessment includes the maximum extent of the occurrence plus a 10-m buffer. The area may be substantially larger than the sampling area, depending on the size of the occurrence.

Disturbances: There are a number of disturbances that may threaten rare plant populations, such as invasive plants, soil disturbance from a number of activities, altered hydrology, etc. For all disturbances detected within the occurrence's maximum extent and adjacent 10-m buffer, rank the level of disturbance and enter the numeric category code (1- 7) using the following criteria:

Disturbance categories within the maximum extent:

1 = No sign of disturbance within maximum extent or in adjacent 10 m buffer.

2 = Disturbance does not occur within maximum extent but is detected within the surrounding 10 m buffer area.

3 = Disturbance present in >0% to <10% of area within maximum extent.

4 = Disturbance occurs in 10% to <25% of area within maximum extent.

5 = Disturbance occurs in 25% to <50% of area within maximum extent.

6 = Disturbance occurs 50% to <75% of area within maximum extent.

7 = Disturbance occurs ≥75% of area within maximum extent.

Provide additional information into the designated fields on the data form if trails or recent fire are detected in the occurrence or buffer area. Record and rank if there are other potential threats that are not listed on the form.

Instructions for Completing the MSP – Management Needs and Notes Form, Page 3

VI. MANAGEMENT RECOMMENDATIONS

Based on disturbances and threats noted previously, provide management recommendations for the site.

VII. MANAGEMENT ACTIONS IN LAST YEAR

Record any known management actions that have been implemented at the rare plant occurrence over the last year.

VII. CNDDB SPECIES DETECTED & NOTES

Record detailed notes and any other useful field comments that have not been previously addressed, e.g., other sensitive species sightings.

References

CNDDB. 2009. *California Natural Diversity Database (CNDDB) Data Use Guidelines*. http://www.dfg.ca.gov/biogeodata/cnddb/

McEachern, B. Pavlik, J. Rebman, and R. Sutter. 2007. *San Diego Multiple Species Conservation Program (MSCP) Rare Plant Monitoring Review and Revision*. U.S. Geological Survey Scientific Investigations Report 2007-5016, 68 p..

McEachern, K. and R. Sutter. 2010a. *Assessment of Eleven Years of Rare Plant Monitoring Data from the San Diego Multiple Species Conservation Plan*. USGS-WERC-Channel Islands Field Station. Administrative Report 2010-01. Ventura, California, 146 p.

McEachern, K. and R. Sutter. 2010b. *San Diego MSCP Rare Plant Monitoring Data Review*. Presentation, February 10, 2010, San Diego, CA.

San Diego Management and Monitoring Program. 2013. *Management Strategic Plan for Conserved Lands in Western San Diego County. Vol. 1-3*. Prepared for the San Diego Association of Governments, San Diego. Version 08.27.2013. http://www.sdmmp.com/reports_and_products/Management_Strategic_Plan.aspx

Tracey, J., K. McEachern, and K. Greer. 2011. *San Diego Rare Plant Monitoring Plan: Fiscal Year 2011*.

Management Strategic Plan (MSP) Rare Plant Species with 2016 "Inspect & Manage" Objective

Scientific Name	Common Name
Acanthomintha ilicifolia	San Diego thornmint
Acmispon prostratus	Nuttall's acmispon
Agave shawii var shawii	Shaw's agave
Ambrosia pumila	San Diego ambrosia
Aphanisma blitoides	Aphanisma
Baccharis vanessae	Encinitas baccharis
Bloomeria clevelandii	San Diego goldenstar
Brodiaea filifolia	Thread-leaved brodiaea
Brodiaea orcuttii	Orcutt's brodiaea
Chloropyron maritimum ssp maritimus	Salt marsh bird's-beak
Clinopodium chandleri	San Miguel savory
Deinandra conjugens	Otay tarplant
Dicranostegia orcuttiana	Orcutt's birds-beak
Dudleya blochmaniae	Blochmann's dudleya
Dudleya brevifolia	Short-leaved dudleya
Dudleya variegata	Variegated dudleya
Dudleya viscida	Sticky dudleya
Erysimum ammophilum	Coast wallflower
Fremontodendron mexicanum	Mexican flannelbush
Hazardia orcuttii	Orcutt's hazardia
Lepechinia cardiophylla	Heart-leaved pitcher sage
Monardella stoneana	Jennifer's monardella
Monardella viminea	Willowy monardella
Nolina cismontana	Chaparral nolina
Packera ganderi	Gander's ragwort
Rosa minutifolia	Small-leaved rose

Species not prioritized for 2016 "IMG" Monitoring

Noline interrata is not prioritized for 2016 monitoring as it was well surveyed and assessed in 2015. Threats were and there is active management at locations with the highest degrees of threat.

Brodiaea santarosae is not prioritized for 2016 monitoring as baseline surveys were conducted in 2015.

Chorizanthe orcuttiana is not prioritized for 2016 IMG monitoring as occurrences will be actively managed under

Some shrub occurrences (e.g., *Fremontodendron mexicanum, Hazardia orcuttii, Tetracoccus dioicus*) are not surveys in 2016 if they were monitored with IMG protocol in 2015 and appear stable with low threat risk.

Scientific Name: *Common Name:*

MSP Occurrence ID: *Existing MSP Occurrence?* ☐ Yes ☐ No ☐ Unknown

CNDDB EO#: *Translocated?*

Preserve:

Land Owner: *Land Manager:*

Occurrence Name: *Sample Point #:*

Surveyors & Affiliation:

Date: *Time Start:* *Time Finish:*

I. OCCURRENCE STATUS - *Assess # plants in both species-specific sampling area (typically 10-m radius circle) & in current mapped extent. See p. 4 for cat. definitions describing phenology, evidence of herbivory, disease & stunted growth within sampling area. Record notes on p 3.*

Plants/Current Mapped Extent:_____ ☐ Exact Count ☐ Estimate (1,000s, 10k's) Uncertainty?_____

For both exact counts and estimates, indicate: ☐ Counted/estimated indiv. plants OR ☐ Counted/estimated clusters of plants

Are counts/estimates of flowering individuals, or of vegetative individuals? (latter applies primarily to geophytes) ☐ flowering ☐ vegetative

Area of Current Mapped Extent:_____ _____ units ☐ Exact (GPS mapping) ☐ Estimate

Was perimeter of current extent determined by walking it, or estimated by other means (GIS, aerials)? ☐ walked ☐ other (describe p. 3)

Species Found in Maximum Extent? ☐ Yes ☐ No If not, why? (known or suspected) _____

Plants/Sampling Area:_____ ☐ Exact ☐ Estimate Uncertainty?_____ Sample Area Radius_____m

For both exact counts and estimates, indicate: ☐ Counted/estimated indiv. plants OR ☐ Counted/estimated clusters of plants

Are counts/estimates of flowering individuals, or of vegetative individuals? (latter applies primarily to geophytes) ☐ flowering ☐ vegetative

Phenology in Sampling Area (Categories 1-6): Vegetative: _____ Flowering:_____ Fruiting:_____ Flowering & Fruiting:_____ Dead:_____

Evidence in Sampling Area (Categories 1-6) of: Herbivory: _____ Disease:_____ Stunted Growth:_____

Is Sampling Area within Current Mapped Extent? ☐ Yes ☐ No

Collection (if not collected previously)? ☐ Yes ☐ No ☐ Collected Previously

If yes, Collector: _____ Collection #_____ Museum/Herbar. _____

II. SAMPLING AREA LOCATION & SITE PHOTOMONITORING--*consult provided list of GPS coordinates for plot center and photo locations. Enter here only if new sampling location or to make a correction to coordinates in list provided.*

GPS or Smartphone Accuracy: +/- _____ ☐ meters ☐ feet Datum: _____ ☐ State Plane ☐ UTM Other:_____

Center of Plot Coord.: E: _____ N:_____ ☐ no change ☐ new location ☐ correction

Camera type: _____ Photo Pt Coord: E: _____ N: _____ ☐ no change ☐ new ☐ correction

	Direction (facing)	Height (m)	Camera Angle	Photo #	File location
Location 1 (see Center of Plot coord.'s above					
E:_____ N:_____ Location 2 [Coordinates]					

III. ASSOCIATED SPECIES IN SAMPLING AREA *If need more room, record additional data and any notes on page 3.*

Nonnative?	Species/Substrate	% Cover	Coll?/	Coll. #/	Nonnative?	Species/Substrate	% Cover	Coll?/	Coll. #/
					Bare Ground:				
					Litter:				
					Rock:				

Total % Cover: _____ % Herb Cover: _____ % Shrub Cover:_____ % Tree Cover:_____

Scientific Name: *MSP Occurrence ID:*

Preserve: *Occurrence Name:*

Date: *Time Start:* *Time Finish:*

Surveyors & Affiliation/Agency:

IV. HABITAT ASSESSMENT IN SAMPLING AREA - *Assess habitat covariates within* ***species-specific sampling area (typically 10-m radius circle)****. Vegetation alliance/association can be assigned using San Diego vegetation key (AECOM 2012) in the office or field, using "Associated Species" data from page 1. See page 4 for definitions of habitat assessment categories. Record any notes on page 3.*

SANDAG 2012 Vegetation Alliance/Association: _____

Cover Classes: 1 (0%); 2 (>0 - <10%); 3 (10 to <25%); 4 (25 to <50%); 5 (50% to <75%); 6 (≥75%)

Cryptogamic Crust Cover: _____ (category) Thatch Cover: _____ (category)

Thatch Depth categories: 1 (no thatch); 2 (<1 cm); 3 (1 to <5 cm); 4 (5 to <10 cm); 5 (10 to <15 cm); 6 (15 to < 20 cm); 7 (>= to 25 cm)

Thatch Depth: Ave. _____ (category) Thatch Depth: Max: _____ cm

Dead Standing Biomass? ☐ Yes ☐ No If Yes, Species/Cover Class: _____ Ave. Height? _____ cm

Mammal Species Activity Categories (1-4): Feral Pig Activity:_____ Ground Squirrel Activity:_____ Gopher Activity: _____

Sampling Area Representative of Maximum Extent? ☐ Yes ☐ No If No, Note Differences on Page 3.

V. THREATS ASSESSMENT IN MAXIMUM EXTENT - *Assess threats within the* ***occurrence's maximum extent*** *(cumulative extent over years of monitoring)* ***plus 10-m surrounding buffer****. See page 4 for definitions of threat assessment categories. Record notes on page 3. See Argentine Ant Protocol (USGS 2015) for setting up the bait station and instructions on recording data.*

Surrounding Land Use/Activity at or Adjacent to Site: _____

Disturbances (rank each as 1-7):

Non-Native Forbs _____	Feral Pig Activity _____	Altered Hydrology _____
Non-Native Grasses _____	Trampling _____	Erosion _____
Non-Native Woody Plants _____	Vandalism _____	Urban Runoff _____
Competitive Native Plants _____	Current Grazing _____	Slope Movement _____
Dumping/Trash _____	Historic Grazing _____	Soil Compaction _____
Encampments _____	Historic Agriculture _____	

Fuel Modification Zone/Fire Break _____

Road Construction/Maintenance _____ If Observed, Briefly Describe: _____

Illegal Vegetation Clearing _____ If Observed, Briefly Describe: _____

Brush Management/Restoration _____ If Observed, Briefly Describe: _____

ORV Activity _____ If Observed, List Type(s) of ORV Activity: _____

Evidence of Recent Fire _____ If Sign of Recent Fire: Year Burned? _____ Unknown Burn Year? _____

If Trails are Present, are they Authorized? Yes / No / Unknown

Type of Trail Use? Hiking _____ Biking _____ Equestrian _____ Dog _____ Service Vehicles _____ Other_____

Illegal Trail Use? List & Rank: _____

Other Disturbance? List & Rank: _____

Occurrence ID:_____ Species:_____ Date:_____

VI. MANAGEMENT RECOMMENDATIONS

VII. MANAGEMENT ACTIONS IN LAST YEAR

VIII. CNDDB SPECIES DETECTED & NOTES

List any sensitive plant or animal species to add to the CNDDB:

% Categories for phenological stages (vegetative, flowering, fruiting & dead)
& evidence of herbivory, disease & stunted growth.

Categories: 1 (0%); 2 (>0% to <10%); 3 (10% to <25%); 4 (25% to <50%); 5 (50% to <75%); 6 (≥75%)

Cover class definitions within sampling area for Cryptogamic Crust Cover, Thatch Cover.
See page 4 for illustrations of different cover classes.

1 = 0% cover (not detected)

2 = >0% to <10% cover

3 = 10% to <25% cover

4 = 25% to <50%

5 = 50% to <75% cover

6 = ≥75% cover

Feral pig activity within sampling area:

1 = No feral pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pig) detected.

2 = Signs of pig activity (rooting, wallowing, vegetation destruction) in sampling area appear months old.

3 = Signs of recent pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pig) in adjacent area but not within sampling area.

4 = Recent signs of pig activity (rooting, wallowing, vegetation destruction, tracks, scat, pigs) within sampling area.

Ground squirrel activity within sampling area:

1 = No ground squirrel burrows detected.

2 = Burrows and/or ground squirrels observed adjacent to sampling area but not within sampling area.

3 = Single squirrel or burrow seen within sampling area.

4 = Multiple burrows and/or squirrels seen within sampling area.

Gopher activity within sampling area:

1 = No pocket gopher mounds detected.

2 = Mounds or gophers observed adjacent to sampling area but not within sampling area.

3 = <10 mounds observed within sampling area.

4 = ≥10 mounds or one or more gophers seen within sampling area.

Estimated Argentine Ant Abundance at Bait Station:

1 = No ants detected at bait station or in vicinity.

2 = 1-50 ants detected at bait station.

3 = 51-100 ants detected at bait station.

4 = ≥100 ants detected at bait station.

Disturbance categories within the maximum extent:

1 = No sign of disturbance within maximum extent or in adjacent 10 m buffer.

2 = Disturbance does not occur within maximum extent but is detected within the surrounding 10 m buffer area.

3 = Disturbance present in >0% to <10% of area within maximum extent.

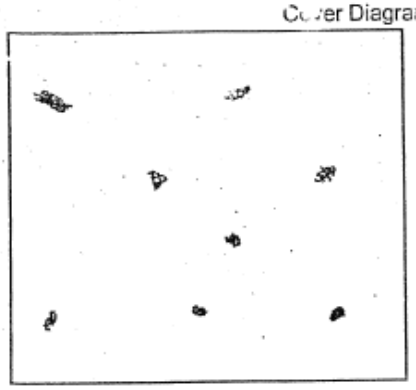
4 = Disturbance occurs in 10% to <25% of area within maximum extent.

5 = Disturbance occurs in 25% to <50% of area within maximum extent.

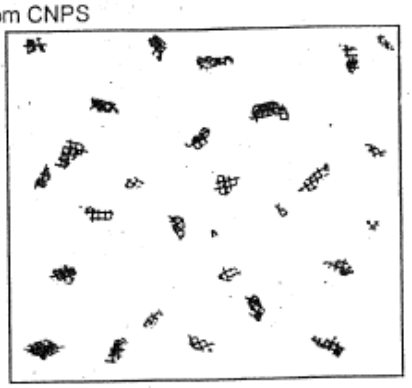
6 = Disturbance occurs 50% to <75% of area within maximum extent.

7 = Disturbance occurs ≥75% of area within maximum extent.

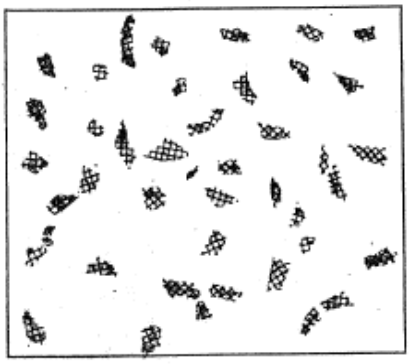
Cover Diagrams from CNPS



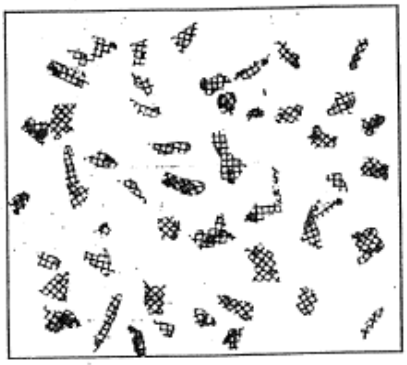
1%



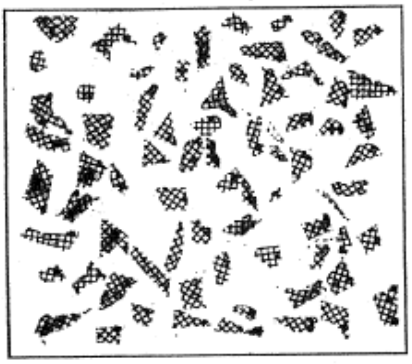
5%



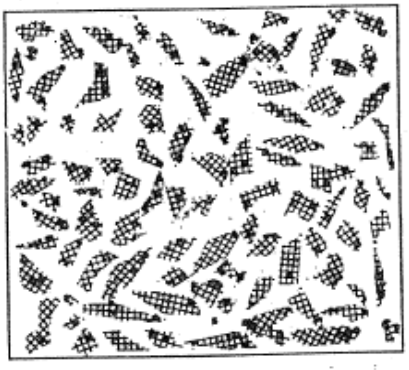
10%



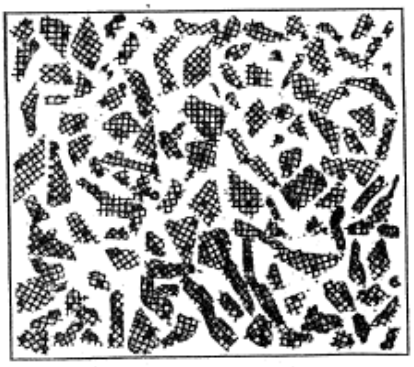
15%



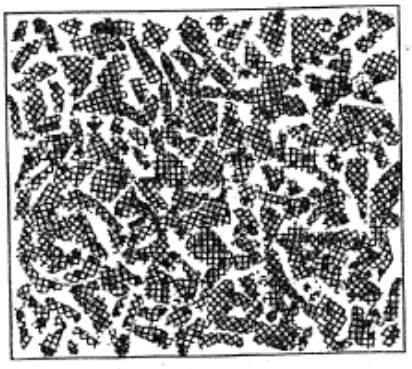
25%



35%



50%



75%

APPENDIX B

MONITORING STRATEGIC PLAN (MSP)
RARE PLANT OCCURRENCES MONITORED IN 2016

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_3BOME003	1	Bonita Meadows - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501590	3613887	Bonita Meadows	3	Caltrans	Caltrans	AECOM	AECOM/CBI
ACIL_3WRFI018	1	Wright's Field (north & south) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	521942	3631522	Wright's Field	3	Back Country Land Trust	Back Country Land Trust	AECOM	AECOM/CBI
ACIL_4SASP024	1	Saber Springs (east) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	493723	3643827	South Poway Cornerstone	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
ACPR_7BALA020	1	Batiquitos Lagoon - ACPR	Acmispon prostratus	Nuttall's acmispon	470993	3660868	Batiquitos Lagoon Ecological Preserve	7	California Department of Fish and Wildlife	California Department of Fish and Wildlife	AECOM	AECOM/CBI
ACPR_7CSPA018	1	San Elijo Lagoon - ACPR	Acmispon prostratus	Nuttall's acmispon	474055	3651952	San Elijo Lagoon Ecological Reserve	7	California Department of Fish and Wildlife	San Elijo Lagoon Conservancy	AECOM	AECOM/CBI
ACPR_7TPSR019	1	Torrey Pines State Reserve South - ACPR	Acmispon prostratus	Nuttall's acmispon	475719	3643431	Torrey Pines State Natural Reserve	7	California Department of Parks and Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
ACPR_7TPSR019	2	Torrey Pines State Reserve South - ACPR	Acmispon prostratus	Nuttall's acmispon	475774	3643465	Torrey Pines State Natural Reserve	7	California Department of Parks and Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
ACPR_7TPSR023	1	Torrey Pines State Reserve North - ACPR	Acmispon prostratus	Nuttall's acmispon	475794	3644056	Torrey Pines State Natural Reserve	7	County of San Diego DPR	California Department of Parks and Recreation	AECOM	AECOM/CBI
AGSH_1BFSP001	1	Border Field State Park - AGSH	Agave shawii var shawii	Shaw's agave	488948	3599814	Border Field State Park	1	California Department Of Parks And Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
AGSH_7GFTR004	1	Guy Fleming Trail - AGSH	Agave shawii var shawii	Shaw's agave	475825	3642848	Torrey Pines State Natural Reserve	6	California Department Of Parks And Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
AGSH_7GFTR004	2	Guy Fleming Trail - AGSH	Agave shawii var shawii	Shaw's agave	475923	3642782	Torrey Pines State Natural Reserve	6	California Department Of Parks And Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
AGSH_7SCSB006	1	South Carlsbad State Beach - AGSH	Agave shawii var shawii	Shaw's agave	469264	3665080	South Carlsbad State Beach	7	California Department of Parks and Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
AMPU_3ILTS002	1	Interpretive Loop Translocation - AMPU	Ambrosia pumila	San Diego ambrosia	505534	3621344	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3ILTS002	2	Interpretive Loop Translocation - AMPU	Ambrosia pumila	San Diego ambrosia	505500	3621309	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3ILTS002	3	Interpretive Loop Translocation - AMPU	Ambrosia pumila	San Diego ambrosia	505446	3621238	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
AMPU_3ILTS002	4	Interpretive Loop Translocation - AMPU	Ambrosia pumila	San Diego ambrosia	505249	3621080	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3PAR4001	3	Par 4 - AMPU	Ambrosia pumila	San Diego ambrosia	506924	3622362	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3PAR4001	1	Par 4 - AMPU	Ambrosia pumila	San Diego ambrosia	507550	3622326	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3PAR4001	2	Par 4 - AMPU	Ambrosia pumila	San Diego ambrosia	506731	3622385	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_3SCBR003	1	near Steele Canyon Bridge (Obs. #1--near horse trail) - AMPU	Ambrosia pumila	San Diego ambrosia	505665	3621627	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
AMPU_8JERA012	1	Jeffreys Ranch - AMPU	Ambrosia pumila	San Diego ambrosia	476877	3679298	Jeffries Ranch	8	Caltrans	Caltrans	AECOM	AECOM/CBI
AMPU_8JERA012	2	Jeffreys Ranch - AMPU	Ambrosia pumila	San Diego ambrosia	476898	3679337	Jeffries Ranch	8	Caltrans	Caltrans	AECOM	AECOM/CBI
AMPU_8JERA012	3	Jeffreys Ranch - AMPU	Ambrosia pumila	San Diego ambrosia	476934	3679387	Jeffries Ranch	8	Caltrans	Caltrans	AECOM	AECOM/CBI
AMPU_8SLRR011	1	San Luis Rey River Valley - South Side of Olive Hill Road and West of Mission Road - AMPU	Ambrosia pumila	San Diego ambrosia	478943	3683306	Groves Open Space	8	Caltrans	Caltrans	AECOM	AECOM/CBI
BAVA3_4IRMT002	1	Iron Mountain (South) - BAVA3	Baccharis vanessae	Encinitas baccharis	504242	3648603	Iron Mountain	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
BAVA3_4MTWO003	1	Mount Woodson (North) - BAVA3	Baccharis vanessae	Encinitas baccharis	502158	3652764	Mount Woodson	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
BAVA3_4MTWO009	2	Mount Woodson (South) - BAVA3	Baccharis vanessae	Encinitas baccharis	502699	3652297	Mount Woodson	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
BAVA3_4MTWO009	3	Mount Woodson (South) - BAVA3	Baccharis vanessae	Encinitas baccharis	502731	3652269	Mount Woodson	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
BAVA3_4MTWO009	1	Mount Woodson (South) - BAVA3	Baccharis vanessae	Encinitas baccharis	502282	3652266	Mount Woodson	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
DECO13_3BOME009	1	Bonita Meadows - DECO13	Deinandra conjugens	Otay tarplant	500044	3615232	Bonita Meadows	3	Caltrans	Caltrans	AECOM	AECOM/CBI
DECO13_3TRIM008	2	Trimark/Gobbler's Knob/Horseshoe Bend - DECO13	Deinandra conjugens	Otay tarplant	501113	3614153	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
DECO13_3TRIM008	1	Trimark/Gobbler's Knob/Horseshoe Bend - DECO13	Deinandra conjugens	Otay tarplant	500900	3614106	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
DECO13_3TRIM008	3	Trimark/Gobbler's Knob/Horseshoe Bend - DECO13	Deinandra conjugens	Otay tarplant	501232	3614065	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	AECOM	AECOM/CBI
DUBLB_3BFSP001	1	Border Field State Park - DUBLB	Dudleya blochmaniae	Blochman’s dudleya	490114	3599963	Border Field State Park	1	California Department Of Parks And Recreation	California Department of Parks and Recreation	AECOM	AECOM/CBI
DUVA_4SOPO018	1	South Poway Cornerstone - DUVA	Dudleya variegata	Variegated dudleya	494849	3645221	South Poway Cornerstone	4	City Of Poway	City of Poway	AECOM	AECOM/CBI
PAGA5_3BAMT005	1	Barber Mountain West - PAGA5	Packera ganderi	Gander’s ragwort	526449	3617160	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3BAMT006	1	Barber Mountain East - PAGA5	Packera ganderi	Gander’s ragwort	527047	3617330	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3BAMT006	2	Barber Mountain East - PAGA5	Packera ganderi	Gander’s ragwort	526963	3617426	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3BAMT006	3	Barber Mountain East - PAGA5	Packera ganderi	Gander’s ragwort	527036	3617313	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3LAPE007	2	Lawson Peak - PAGA5	Packera ganderi	Gander’s ragwort	526451	3620322	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3LAPE007	3	Lawson Peak - PAGA5	Packera ganderi	Gander’s ragwort	527366	3619818	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
PAGA5_3LAPE007	1	Lawson Peak - PAGA5	Packera ganderi	Gander’s ragwort	526705	3620261	Cleveland National Forest	11	U.S. Forest Service	U.S. Forest Service	AECOM	AECOM/CBI
ACIL_3CERE004	1	Thornmint Hill - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512228	3633411	Crestridge Ecological Reserve	3	California Department of Fish and Wildlife	Endangered Habitats Conservancy	CBI	AECOM/CBI
ACIL_3MGMT008	1	McGinty Mountain - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512430	3623732	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
ACIL_3MGMT010	1	McGinty Mountain (summit and ridgeline) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	513060	3624215	San Diego National Wildlife Refuge	3	U.S. Fish and Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
ACIL_3MGMT010	2	McGinty Mountain (summit and ridgeline) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	513093	3623963	San Diego National Wildlife Refuge	3	U.S. Fish and Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
ACIL_3OTLA011	1	Lower Otay Reservoir - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	508763	3609849	Otay Mountain Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_3PMA1013	1	PMA1- Rice Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	498413	3611821	City of Chula Vista Central City Preserve	3	City of Chula Vista	City of Chula Vista	CBI	AECOM/CBI
ACIL_3RJER015	1	Rancho Jamul Ecological Reserve - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	513878	3613843	Rancho Jamul Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
ACIL_3SOCR016	1	Skeleton Flats/Suncrest - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512528	3627787	South Crest	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
ACIL_3SOCR016	2	Skeleton Flats/Suncrest - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512536	3627783	South Crest	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
ACIL_4CSVI020	1	Canada San Vicente--Monte Vista (Long's Gulch) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512336	3647816	Canada De San Vicente	4	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
ACIL_4CSVI020	2	Canada San Vicente--Monte Vista (Long's Gulch) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512258	3647807	Canada De San Vicente	4	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
ACIL_4SIPR026	1	Simon Preserve - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	516451	3654129	Simon Preserve	4	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
ACIL_4VIMT0028	1	Viejas Mountain (northwest slope) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	524587	3636436	Cleveland National Forest	4	U.S. Forest Service	U.S. Forest Service	CBI	AECOM/CBI
ACIL_4VIMT0030	1	Viejas Mountain (west-southwest flank) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	523966	3635412	Cleveland National Forest	4	U.S. Forest Service	U.S. Forest Service	CBI	AECOM/CBI
ACIL_6EMPO037	1	Emerald Pointe - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	472073	3664747	Emerald Pointe Open Space	6	San Diego Habitat Conservancy	San Diego Habitat Conservancy	CBI	AECOM/CBI
ACIL_6PARO043	1	Palomar Airport Road - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	475225	3665873	Carlsbad Oaks North Habitat Conservation Area	6	County Of San Diego, Public Works	Center for Natural Lands Management	CBI	AECOM/CBI
ACPR_7CSPA018	2	San Elijo Lagoon - ACPR	Acmispon prostratus	Nuttall's acmispon	474060	3651923	Cardiff State Beach	7	California Department of Parks and Recreation	California Department of Parks and Recreation	CBI	AECOM/CBI
ACPR_7SLRR017	1	San Luis Rey River - ACPR	Acmispon prostratus	Nuttall's acmispon	464056	3674091	San Luis Rey River	7	City of Oceanside	City of Oceanside	CBI	AECOM/CBI
AGSH_1CNMO002	3	Cabrillo National Monument - AGSH	Agave shawii var shawii	Shaw's agave	477742	3615072	Cabrillo National Monument	1	National Park Service	National Park Service	CBI	AECOM/CBI
AGSH_1CNMO002	1	Cabrillo National Monument - AGSH	Agave shawii var shawii	Shaw's agave	477035	3614918	Cabrillo National Monument	1	National Park Service	National Park Service	CBI	AECOM/CBI
AGSH_1CNMO002	2	Cabrillo National Monument - AGSH	Agave shawii var shawii	Shaw's agave	477381	3614842	Cabrillo National Monument	1	National Park Service	National Park Service	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
AGSH_1TISL003	1	Tijuana Slough National Wildlife Area - Near Visitor Center - AGSH	Agave shawii var shawii	Shaw's agave	488197	3604232	Tijuana Slough National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
AGSH_7SELA005	1	San Elijo Lagoon - AGSH	Agave shawii var shawii	Shaw's agave	475713	3651775	San Elijo Lagoon Ecological Reserve	7	County of San Diego DPR	County of San Diego DPR	CBI	AECOM/CBI
AMPU_6VIVA015	1	Emerald Isle - West of S El Camino Real - AMPU	Ambrosia pumila	San Diego ambrosia	468861	3675182	Vista De La Valle Preserve	6	City Of Oceanside	City of Oceanside	CBI	AECOM/CBI
BAVA3_3GIHI010	1	Gibson Highlands - BAVA3	Baccharis vanessae	Encinitas baccharis	515330	3633194	Crestridge Ecological Reserve-Gibson	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
BAVA3_3OTMT001	1	Otay Mountain south side & east of Otay Mountain Truck Trail - BAVA3	Baccharis vanessae	Encinitas baccharis	514327	3604667	Otay Mountain Wilderness Area	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
BAVA3_6ECPR006	1	Escondido Creek Preserve - BAVA3	Baccharis vanessae	Encinitas baccharis	483776	3658293	Escondido Creek Preserve	6	Escondido Creek Conservancy	Escondido Creek Conservancy	CBI	AECOM/CBI
BAVA3_6EFRR005	2	Elfin Forest Recreational Reserve - BAVA3	Baccharis vanessae	Encinitas baccharis	488065	3659477	Elfin Forest Recreational Reserve	6	San Diego County Water Authority	Olivenhain MWD	CBI	AECOM/CBI
BAVA3_6EFRR005	1	Elfin Forest Recreational Reserve - BAVA3	Baccharis vanessae	Encinitas baccharis	488018	3660042	Elfin Forest Recreational Reserve	6	San Diego County Water Authority	Olivenhain MWD	CBI	AECOM/CBI
BAVA3_6OAPA008	1	Oakcrest Park - BAVA3	Baccharis vanessae	Encinitas baccharis	475221	3656404	Oakcrest Park	6	City Of Encinitas	City of Encinitas	CBI	AECOM/CBI
BLCL_3CERE001	1	CER-Bullard - BLCL	Bloomeria clevelandii	San Diego goldenstar	516394	3634805	Crestridge Ecological Reserve	3	California Department of Fish and Wildlife	Endangered Habitats Conservancy	CBI	AECOM/CBI
BLCL_3OMER011	1	Otay Mountain Ecological Reserve - BLCL	Bloomeria clevelandii	San Diego goldenstar	510143	3608196	Otay Mountain Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BLCL_4LSCP015	1	Louis A Stelzer County Park - BLCL	Bloomeria clevelandii	San Diego goldenstar	509316	3638056	Louis A. Stelzer County Park	4	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
BLCL_4SVHI016	1	San Vicente Highlands - BLCL	Bloomeria clevelandii	San Diego goldenstar	505984	3646133	San Vicente Highlands Open Space Preserve	4	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BLCL_6DMME019	1	Del Mar Mesa - BLCL	Bloomeria clevelandii	San Diego goldenstar	484522	3645168	Del Mar Mesa - Lopez Ridge Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
BLCL_6DMME019	2	Del Mar Mesa - BLCL	Bloomeria clevelandii	San Diego goldenstar	484473	3645201	Del Mar Mesa - Lopez Ridge Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BLCL_6ECPR020	1	Escondido Creek Preserve - BLCL	Bloomeria clevelandii	San Diego goldenstar	482540	3659095	Escondido Creek Preserve	6	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
BRFI_6BVCR004	1	Buena Vista Creek Ecological Reserve - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	470686	3670747	Buena Vista Creek Ecological Reserve	6	California Department Of Fish And Wildlife	Center for Natural Lands Management	CBI	AECOM/CBI
BRFI_6LACA008	1	Lake Calavera - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	474438	3670917	Lake Calavera Municipal Mitigation Parcel	6	City Of Carlsbad	Center for Natural Lands Management	CBI	AECOM/CBI
BRFI_6LACA021	1	Carlsbad Highlands Ecological Reserve - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	473429	3669402	Carlsbad Highlands Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BRFI_6LECA012	1	Letterbox Canyon-Newton Business Center - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	473368	3666978	Carlsbad Highlands Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BROR_3COCA025	1	Copper Canyon - BROR	Brodiaea orcuttii	Orcutt's brodiaea	515939	3604205	Otay Mountain Wilderness Area	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
BROR_3OTMT007	1	Otay Mountain West - BROR	Brodiaea orcuttii	Orcutt's brodiaea	510121	3608030	Otay Mountain Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BROR_3OTMT026	1	Otay Mountain East- BROR	Brodiaea orcuttii	Orcutt's brodiaea	511424	3607646	Bureau Of Land Management	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
BROR_4BOPR009	1	Boulder Oaks Preserve - BROR	Brodiaea orcuttii	Orcutt's brodiaea	505565	3647059	Boulder Oaks Preserve	4	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
BROR_4SIPR013	1	Simon Preserve - BROR	Brodiaea orcuttii	Orcutt's brodiaea	515657	3653219	Simon Preserve	4	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
BROR_4USIU014	1	USIU - BROR	Brodiaea orcuttii	Orcutt's brodiaea	491149	3639476	United States International University	4	Regents of the University of California	Regents of the University of California	CBI	AECOM/CBI
BROR_6DARA016	1	Daley Ranch - BROR	Brodiaea orcuttii	Orcutt's brodiaea	496304	3671723	Daley Ranch Open Space Preserve	6	City Of Escondido	City of Escondido	CBI	AECOM/CBI
BROR_6DMME017	2	Del Mar Mesa - BROR	Brodiaea orcuttii	Orcutt's brodiaea	485565	3645476	Del Mar Mesa - Lopez Ridge Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
BROR_6DMME017	1	Del Mar Mesa - BROR	Brodiaea orcuttii	Orcutt's brodiaea	485573	3645468	Del Mar Mesa - Lopez Ridge Ecological Reserve	6	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
BROR_6ECPR024	1	Escondido Creek Preserve - BROR	Brodiaea orcuttii	Orcutt's brodiaea	482540	3659095	Escondido Creek Preserve	6	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
BROR_8MTOL023	1	Mount Olympus - BROR	Brodiaea orcuttii	Orcutt's brodiaea	490977	3696553	Mount Olympus Preserve	8	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
CLCH5_3MGMT004	1	McGinty Mountain - CLCH5	Clinopodium chandleri	San Miguel savory	513195	3624108	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
CLCH5_3OTMT005	1	Otay Mountain south side & east of Otay Mountain Truck Trail - CLCH5	Clinopodium chandleri	San Miguel savory	514326	3604666	Otay Mountain Wilderness Area	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
COMAM3_1SDBA004	1	San Diego Bay, Naval Radar Receiving Facility, Naval Base Coronado - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	488385	3607337	San Diego Bay, Naval Radar Receiving Facility, Naval Base Coronado	1	Us Navy	U.S. FISH AND WILDLIFE SERVICE	CBI	AECOM/CBI
COMAM3_1SWMA005	1	Sweetwater Marsh - West Side of I-5 and North of Sweetwater River - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	490244	3612438	San Diego Bay National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
COMAM3_1SWMA006	1	Sweetwater Marsh - West Side of I-5 and South of Sweetwater River - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	490271	3611744	San Diego Bay National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
COMAM3_1TIES002	1	Tijuana Estuary Area - Between mouth of Tijuana River and Coronado Ave, Imperial Beach - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	488106	3603636	Tijuana Slough National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
COMAM3_1TIES002	2	Tijuana Estuary Area - Between mouth of Tijuana River and Coronado Ave, Imperial Beach - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	488399	3603536	Tijuana Slough National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
COMAM3_1TIES003	1	Tijuana Estuary Area - Near the Mouth of the Tijuana River and the North Part of Border Field State Park - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	488356	3601700	Tijuana Slough National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
COMAM3_1TIES009	1	Tijuana Slough - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	487992	3604136	Tijuana Slough National Wildlife Refuge	1	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	CBI	AECOM/CBI
COOR7_1TIRI008	1	Border Field State Park - COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	489929	3600416	Border Field State Park	1	California Department Of Parks And Recreation	California Department of Parks and Recreation	CBI	AECOM/CBI
COOR7_1TIRI009	1	Tijuana River Valley-COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	490644	3600318	Tijuana River Valley Regional Park	1	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
COOR7_3PMA1002	1	PMA1- Rice Canyon - COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	497476	3611810	City of Chula Vista Central City Preserve	3	City of Chula Vista	City of Chula Vista	CBI	AECOM/CBI
DECO13_3LOST027	1	Lonestar - DECO13	Deinandra conjugens	Otay tarplant	504564	3604603	Lonestar	3	San Diego Habitat Conservancy	San Diego Habitat Conservancy	CBI	AECOM/CBI
DECO13_3OMEA026	1	Furby North - DECO13	Deinandra conjugens	Otay tarplant	496809	3602882	Furby-North Property (Otay Mesa East)	3	County Of San Diego Dpr	County of San Diego DPR	CBI	AECOM/CBI
DECO13_3PMA2003	1	PMA2 - DECO13	Deinandra conjugens	Otay tarplant	499044	3609860	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	CBI	AECOM/CBI
DECO13_3PMA2003	2	PMA2 - DECO13	Deinandra conjugens	Otay tarplant	498429	3609632	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	CBI	AECOM/CBI
DECO13_3PMA4005	1	PMA4- DECO13	Deinandra conjugens	Otay tarplant	498946	3614050	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	CBI	AECOM/CBI
DECO13_3RJER015	1	Rancho Jamul Ecological Reserve Subpop #1-DECO13	Deinandra conjugens	Otay tarplant	512904	3613536	Rancho Jamul Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
DUBLB2_7SKCA002	1	Skeleton Canyon - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	477045	3636793	Skeleton Canyon	7	U.C. San Diego	U.C. San Diego	CBI	AECOM/CBI
DUBLB2_7TPEX004	1	Torrey Pines Extension - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	476667	3644915	Torrey Pines State Natural Reserve	7	California Department Of Parks And Recreation	California Department of Parks and Recreation	CBI	AECOM/CBI
DUBLB2_7TPSR005	2	Torrey Pines State Reserve - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	476801	3642053	Torrey Pines State Natural Reserve	6	California Department Of Parks And Recreation	California Department of Parks and Recreation	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
DUBLB2_7TPSR005	1	Torrey Pines State Reserve - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	476386	3641997	Torrey Pines State Natural Reserve	6	California Department Of Parks And Recreation	California Department of Parks and Recreation	CBI	AECOM/CBI
DUVA_3RJER033	1	Rancho Jamul - DUVA	Dudleya variegata	Variegated dudleya	513715	3613581	Rancho Jamul Ecological Reserve	3	The Department of Fish and Wildlife	The Department of Fish and Wildlife	CBI	AECOM/CBI
DUVA_3SKFL009	1	Skeleton Flats - DUVA	Dudleya variegata	Variegated dudleya	512039	3627900	South Crest	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
DUVA_3SKFL009	2	Skeleton Flats - DUVA	Dudleya variegata	Variegated dudleya	512528	3627707	South Crest	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
DUVA_3SKFL009	3	Skeleton Flats - DUVA	Dudleya variegata	Variegated dudleya	512041	3627916	South Crest	3	Endangered Habitats Conservancy	Endangered Habitats Conservancy	CBI	AECOM/CBI
DUVA_3SYCA027	1	Sycamore Canyon - DUVA	Dudleya variegata	Variegated dudleya	517114	3613062	Sycamore Canyon	3	Bureau of Land Management	Bureau of Land Management	CBI	AECOM/CBI
DUVA_3SYCA035	1	Sycamore Canyon SW - Otay Truck Trail- DUVA	Dudleya variegata	Variegated dudleya	516753	3612560	Sycamore Canyon	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
DUVI2_6ESCR004	2	Escondido Creek west of 2nd Aqueduct - DUVI2	Dudleya viscida	Sticky dudleya	484011	3658603	Greenlands Llc	6	Greenlands Llc	Escondido Creek Conservancy	CBI	AECOM/CBI
DUVI2_6ESCR004	1	Escondido Creek west of 2nd Aqueduct - DUVI2	Dudleya viscida	Sticky dudleya	484119	3658682	Cielo Del Norte	6	Escondido Creek Conservancy	Escondido Creek Conservancy	CBI	AECOM/CBI
DUVI2_6SLRR003	1	Bluffs south of San Luis Rey River in Oceanside - DUVI2	Dudleya viscida	Sticky dudleya	464951	3674748	San Luis Rey River Park	6	City Of Oceanside	City of Oceanside	CBI	AECOM/CBI
HAOR3_7SELA005	1	San Elijo Lagoon Translocated Occurrence - HAOR3	Hazardia orcuttii	Orcutt's hazardia	476709	3652857	San Elijo Lagoon Ecological Reserve	7	County Of San Diego	California Department of Fish and Wildlife	CBI	AECOM/CBI
MOLIV_4SYCA002	1	Sycamore Canyon at Sycamore Cyn Rd - MOLIV	Monardella viminea	Willowy monardella	501082	3642506	Sycamore Canyon And Goodan Ranch Preserves	4	California Department Of Fish And Wildlife	County of San Diego DPR	CBI	AECOM/CBI
MOLIV_4SYCA006	1	Sycamore Canyon East- MOLIV	Monardella viminea	Willowy monardella	502412	3642218	Sycamore Canyon and Goodan Ranch Preserves	4	County of San Diego DPR	County of San Diego DPR	CBI	AECOM/CBI
MOST_3COCA001	1	Copper Canyon - MOST	Monardella stoneana	Jennifer’s monardella	515939	3604205	Otay Mountain Wilderness Area	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
MOST_3OTMT006	1	Otay Mountain #1 - MOST	Monardella stoneana	Jennifer’s monardella	510121	3608030	Otay Mountain Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
MOST_3OTMT007	1	Otay Mountain #2 - MOST	Monardella stoneana	Jennifer's monardella	511424	3607646	Bureau Of Land Management	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
MOST_3OTMT007	2	Otay Mountain #2 - MOST	Monardella stoneana	Jennifer's monardella	511291	3607675	Bureau Of Land Management	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
MOST_3TEPE008	1	Near Tecate Peak #1 - MOST	Monardella stoneana	Jennifer's monardella	525548	3603925	Marron Valley	3	California Department Of Forestry And Fire Protection	California Department of Forestry and Fire Protection	CBI	AECOM/CBI
MOST_3TEPE009	1	Near Tecate Peak #2 - MOST	Monardella stoneana	Jennifer's monardella	527655	3604758	Marron Valley	3	California Department Of Forestry And Fire Protection	California Department of Forestry and Fire Protection	CBI	AECOM/CBI
MOST_3WBDR010	1	Wild Bill's Draw - MOST	Monardella stoneana	Jennifer's monardella	513689	3602455	Otay Mountain Wilderness Area	3	Bureau Of Land Management	Bureau of Land Management	CBI	AECOM/CBI
NOCI_5HCPR001	1	Hellhole Canyon Preserve - NOCI	Nolina cismontana	Chaparral nolina	507708	3677349	Hellhole Canyon Preserve	5	Bureau Of Land Management	County of San Diego DPR	CBI	AECOM/CBI
PAGA5_3MGMT001	1	McGinty Mountain - PAGA5	Packera ganderi	Gander's ragwort	513069	3623657	McGinty Mountain Preserve	3	The Nature Conservancy	The Nature Conservancy	CBI	AECOM/CBI
PAGA5_3SYPE002	3	Sycuan Peak - PAGA5	Packera ganderi	Gander's ragwort	517700	3624171	Sycuan Peak Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
PAGA5_3SYPE002	2	Sycuan Peak - PAGA5	Packera ganderi	Gander's ragwort	518217	3624212	Sycuan Peak Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
PAGA5_3SYPE002	1	Sycuan Peak - PAGA5	Packera ganderi	Gander's ragwort	518829	3623783	Sycuan Peak Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CBI	AECOM/CBI
ACIL_3HCWA006	2	Hollenbeck Wildlife Area - ACIL	Acanthomintha ilicifolia	San Diego thornmint	517435	3617838	Hollenbeck Canyon Wildlife Area	3	California Department of Fish and Wildlife	California Department of Fish and Wildlife	CDFW	Land Manager
ACIL_3HCWA006	1	Hollenbeck Wildlife Area - ACIL	Acanthomintha ilicifolia	San Diego thornmint	517494	3618030	Hollenbeck Canyon Wildlife Area	3	California Department of Fish and Wildlife	California Department of Fish and Wildlife	CDFW	Land Manager
ACPR_7BALA020	1	Batiquitos Lagoon - ACPR	Acmispon prostratus	Nuttal's acmispon	470993	3660868	Batiquitos Lagoon Ecological Preserve	7	California Department of Fish and Wildlife	California Department of Fish and Wildlife	CDFW	Land Manager
BLCL_3RJER007	1	Rancho Jamul Ecological Reserve - BLCL	Bloomeria clevelandii	San Diego goldenstar	515030	3613207	Rancho Jamul Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CDFW	Land Manager
DECO13_3RJER015	2	Rancho Jamul Ecological Reserve Subpop #1-DECO13	Deinandra conjugens	Otay tarplant	513258	3613851	Rancho Jamul Ecological Reserve	3	California Department Of Fish And Wildlife	California Department of Fish and Wildlife	CDFW	Land Manager
ACIL_3DREA005	1	Dennery Ranch East - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	497765	3605145	Dennery Ranch	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_3OTLA012	1	Otay Lakes - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	507964	3609626	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PRD	CitySD	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_4MTRP021	1	Mission Trails - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	493100	3631939	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_4SASP025	2	Sabre Springs - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	491379	3644859	Sabre Springs	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_4SASP025	3	Sabre Springs - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	491346	3644836	Sabre Springs	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_4SASP025	1	Sabre Springs - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	491410	3644838	Sabre Springs	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_6BLMO032	1	Black Mountain - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	485657	3651851	Black Mountain Ranch	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_6LPCA039	3	Los Penasquitos Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	483193	3643263	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_6LPCA039	2	Los Penasquitos Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	483244	3643247	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_6LPCA039	1	Los Penasquitos Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	483231	3643281	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1DUTR005	1	Dune Triangle - ACPR	Acmispon prostratus	Nuttall's acmispon	480326	3624991	Mission Bay Park	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1HOPO002	2	Mission Bay - Hospitality Point - ACPR	Acmispon prostratus	Nuttall's acmispon	477393	3624642	Mission Bay Park	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1MAPO004	4	Mission Bay - Mariner's Point - ACPR	Acmispon prostratus	Nuttall's acmispon	476985	3625276	Mission Bay Park	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1NMLA001	1	Mission Bay - No Man's Land - ACPR	Acmispon prostratus	Nuttall's acmispon	480670	3625350	Mission Bay Park	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1RRSO003	3	Mission Bay - Rip Rap - ACPR	Acmispon prostratus	Nuttall's acmispon	477981	3624575	Flood Control Channel Southern Wildlife Preserve	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACPR_1SOSH006	6	Mission Bay - East of South Shores - ACPR	Acmispon prostratus	Nuttall's acmispon	480408	3625246	Mission Bay Park	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
AMPU_4KULA005	1	Kumeyaay Lake - AMPU	Ambrosia pumila	San Diego ambrosia	496996	3633460	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_3MAVA005	3	Marron Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	523580	3603641	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
BLCL_3MAVA005	1	Marron Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	523214	3603790	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
BLCL_3MAVA005	2	Marron Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	523346	3603754	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
BLCL_3MAVA005	4	Marron Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	523387	3603726	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
BLCL_3OTLA006	1	Otay Lakes - BLCL	Bloomeria clevelandii	San Diego goldenstar	508065	3609608	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
BLCL_3OTLA006	2	Otay Lakes - BLCL	Bloomeria clevelandii	San Diego goldenstar	507825	3609610	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
BLCL_4EAEL014	1	East Elliott - BLCL	Bloomeria clevelandii	San Diego goldenstar	496320	3635142	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_4EAEL014	2	East Elliott - BLCL	Bloomeria clevelandii	San Diego goldenstar	495743	3636056	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_4EAEL014	3	East Elliott - BLCL	Bloomeria clevelandii	San Diego goldenstar	495604	3636475	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_4EAEL014	5	East Elliott - BLCL	Bloomeria clevelandii	San Diego goldenstar	495356	3635908	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_4MTRP023	1	Mission Trails - BLCL	Bloomeria clevelandii	San Diego goldenstar	492755	3633951	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BLCL_6LORI021	1	Lopez Ridge - BLCL	Bloomeria clevelandii	San Diego goldenstar	483771	3642355	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
BRFI_6BMRA002	1	Black Mountain - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	489186	3647874	Black Mountain Ranch	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
BROR_2NODR002	1	Nobel Drive -BROR	Brodiaea orcuttii	Orcutt's brodiaea	481637	3636488	Rose Canyon Open Space	2	City of San Diego	City San Diego PRD	CitySD	Land Manager
BROR_4OACR012	1	Mission Trails - Oak Creek - BROR	Brodiaea orcuttii	Orcutt's brodiaea	495437	3634107	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
BROR_6CACA015	1	Carroll Canyon Vernal Pools - BROR	Brodiaea orcuttii	Orcutt's brodiaea	485066	3639961	Carroll Canyon Vernal Pool Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
BROR_6LORI018	1	Lopez Ridge - BROR	Brodiaea orcuttii	Orcutt's brodiaea	483771	3642355	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
COMAM3_1DOBE007	1	Dog Beach - COMAM3	Chloropyron maritimum ssp. maritimum	Salt marsh bird's-beak	476697	3624184	Flood Control Channel Southern Wildlife Preserve	1	City of San Diego	City San Diego PRD	CitySD	Land Manager
COOR7_3DREA007	1	Dennery Ranch East-COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	497743	3605119	Dennery Ranch	3	City Of San Diego	City of San Diego Park and Recreation Department	CitySD	Land Manager
COOR7_3ORVA001	1	Otay River Valley - COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	495818	3605510	Otay Valley Regional Park	3	City of San Diego	City San Diego PRD	CitySD	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
CYCA_2BPGC001	1	Balboa Park Golf Course - CYCA	Cylindropuntia californica var. californica	Snake cholla	486890	3620936	Florida Canyon	2	City of San Diego	City San Diego PRD	CitySD	Land Manager
CYCA_3GOME003	1	Spring Canyon - CYCA	Cylindropuntia californica var. californica	Snake cholla	499851	3601572	Spring Canyon Open Space	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
DECO13_3DERA020	1	Dennery Ranch - DECO13	Deinandra conjugens	Otay tarplant	497202	3604695	Dennery Ranch	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
DECO13_3DREA021	1	Dennery Ranch East - DECO13	Deinandra conjugens	Otay tarplant	497718	3605044	Dennery Ranch	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
DECO13_3PRVA013	1	Proctor Valley - DECO13	Deinandra conjugens	Otay tarplant	506812	3615039	Otay Lakes Cornerstone Lands- Proctor Valley	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
DUBLB2_6CMPR001	3	Carmel Mountain - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	479884	3643912	Carmel Mountain Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUBLB2_6CMPR001	2	Carmel Mountain - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	479936	3643803	Carmel Mountain Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUBLB2_6CMPR001	1	Carmel Mountain - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	479428	3643875	Carmel Mountain Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUBLB2_7CRCA003	2	Crest Canyon - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	476330	3646198	Crest Canyon Preserve	7	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUBLB2_7CRCA003	1	Crest Canyon - DUBLB2	Dudleya brevifolia	Short-leaved dudleya	476309	3645984	Crest Canyon Preserve	7	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_3GOME003	1	Goat Mesa/Spring Canyon - DUVA	Dudleya variegata	Variegated dudleya	500079	3601862	Spring Canyon Open Space	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
DUVA_3MAVA004	1	Marron Valley - DUVA	Dudleya variegata	Variegated dudleya	523319	3603771	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
DUVA_3OTLA005	1	Otay Lakes - DUVA	Dudleya variegata	Variegated dudleya	507818	3609505	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
DUVA_4EAEL012	2	East Elliott - DUVA	Dudleya variegata	Variegated dudleya	495429	3636825	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_4EAEL012	1	East Elliott - DUVA	Dudleya variegata	Variegated dudleya	495393	3636997	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_4MERO014	1	Mercy Road	Dudleya variegata	Variegated dudleya	488701	3645106	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_4MTRP015	2	Mission Trails - DUVA	Dudleya variegata	Variegated dudleya	493288	3631639	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
DUVA_4MTRP015	1	Mission Trails - DUVA	Dudleya variegata	Variegated dudleya	493410	3631511	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_4MTRP015	3	Mission Trails - DUVA	Dudleya variegata	Variegated dudleya	493394	3631731	Mission Trails Regional Park	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_4NAVA016	1	Navajo/Mission Gorge - DUVA	Dudleya variegata	Variegated dudleya	494474	3629664	Rancho Mission Park	2	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_6BMRA020	1	Black Mountain Ranch - DUVA	Dudleya variegata	Variegated dudleya	487906	3649732	Black Mountain Ranch	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
DUVA_6SALU024	1	Santa Luz - DUVA	Dudleya variegata	Variegated dudleya	487217	3649927	Black Mountain Ranch	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ERAM4_6DEMA001	1	Overlook Park - Gully/East Del Mar - ERAM4	Erysimum ammophilum	Coast wallflower	477818	3647270	Overlook Park	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
ERAM4_6GOCA003	1	Gonzalez Canyon - ERAM4	Erysimum ammophilum	Coast wallflower	479077	3647585	Gonzalez Canyon Open Space Preserve	6	City Of San Diego	City of San Diego Park and Recreation Department	CitySD	Land Manager
ERAM4_7CRCA002	1	Crest Canyon - ERAM4	Erysimum ammophilum	Coast wallflower	476220	3647386	San Dieguito Lagoon Preserve	7	City of San Diego	City San Diego PRD	CitySD	Land Manager
ERARP_3GOME001	2	Goat Mesa/Spring Canyon - ERARP	Eryngium aristulatum var. parishii	San Diego button-celery	499800	3601746	Spring Canyon Open Space	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
ERARP_3GOME001	1	Goat Mesa/Spring Canyon - ERARP	Eryngium aristulatum var. parishii	San Diego button-celery	499985	3601607	Spring Canyon Open Space	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
ERARP_3OTLA002	1	Otay Lakes - ERARP	Eryngium aristulatum var. parishii	San Diego button-celery	507933	3609579	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
MOLIV_4SYCA001	1	Sycamore Canyon - MOLIV	Monardella viminea	Willowy monardella	500844	3642806	Sycamore Canyon	4	City of San Diego	City San Diego PRD	CitySD	Land Manager
MOLIV_6FLCA007	1	Flanders Canyon - MOLI	Monardella viminea	Willowy monardella	483919	3640201	Mira Mesa Open Space	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
MOLIV_6LOCA004	1	Lopez Canyon - MOLIV	Monardella viminea	Willowy monardella	483009	3641648	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
MOLIV_6LOCA004	2	Lopez Canyon - MOLIV	Monardella viminea	Willowy monardella	483787	3641810	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
MOLIV_6LOCA004	3	Lopez Canyon - MOLIV	Monardella viminea	Willowy monardella	484186	3642089	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
MOST_3MAVA002	1	Marron Valley - MOST	Monardella stoneana	Jennifer's monardella	524003	3604434	Marron Valley Mitigation Bank	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
MOST_3OTLA005	1	Otay Lakes - MOST	Monardella stoneana	Jennifer's monardella	508229	3609134	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
NAFO_2NOBD003	1	Nobel Drive -NAFO	Navarretia fossalis	Spreading navarretia	481637	3636488	Rose Canyon Open Space	2	City of San Diego	City San Diego PRD	CitySD	Land Manager
NAFO_3GOME002	1	Goat Mesa/Spring Canyon - NAFO	Navarretia fossalis	Spreading navarretia	499985	3601607	Spring Canyon Open Space	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
NAFO_3OTLA004	1	Otay Lakes - NAFO	Navarretia fossalis	Spreading navarretia	507547	3609467	Otay Lakes Cornerstone Lands	3	City of San Diego	City San Diego PUD	CitySD	Land Manager
NAFO_3RORI005	1	Robinhood Ridge - NAFO	Navarretia fossalis	Spreading navarretia	499641	3604523	Robinhood Ridge	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
NAFO_6CACA001	1	Carroll Canyon Vernal Pools - NAFO	Navarretia fossalis	Spreading navarretia	485198	3639904	Carroll Canyon Vernal Pool Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
POAB2_6CACA001	1	Carroll Canyon Vernal Pools - POAB2	Pogogyne abramsii	San Diego mesa mint	485194	3639872	Carroll Canyon Vernal Pool Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
POAB2_6LORI002	1	Lopez Ridge - POAB2	Pogogyne abramsii	San Diego mesa mint	483771	3642355	Los Penasquitos Canyon Preserve	6	City of San Diego	City San Diego PRD	CitySD	Land Manager
PONU_3RORI001	1	Robinhood Ridge - PONU	Navarretia fossalis	Otay mesa mint	499641	3604523	Robinhood Ridge	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
ROMI80_3DENC001	1	Dennery Ranch - ROMI80	Rosa minutifolia	Small-leaved rose	497202	3604695	Dennery Ranch	3	City of San Diego	City San Diego PRD	CitySD	Land Manager
ACIL_6LCGR038	1	La Costa Greens - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	475272	3664421	Rancho La Costa Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
ACIL_6MAMI041	1	Lux Canyon (east), Manchester Avenue Mitigation Bank - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	476741	3654717	Manchester Mitigation Bank	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
ACIL_6PARO043	1	Palomar Airport Road - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	475448	3666506	Carlsbad Oaks North Habitat Conservation Area	6	County Of San Diego, Public Works	Center for Natural Lands Management	CNLM	Land Manager
BLCL_4RAMO024	1	East Mesa - BLCL	Bloomeria clevelandii	San Diego goldenstar	499313	3631799	Rattlesnake Mountain Preserve	4	Center for Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
BRFI_6CONO007	1	Carlsbad Oaks North Habitat Conservation Area - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	476094	3666470	Carlsbad Oaks North Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
BRFI_6RLCO018	1	Rancho La Costa South - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	475769	3662977	Rancho La Costa Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
BRFI_6RLCO019	1	Rancho La Costa North - BRFI	Brodiaea filifolia	Thread-leaved brodiaea	475807	3663489	Rancho La Costa Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
BROR_6RLCO020	1	Rancho La Costa Site #4 - BROR	Brodiaea orcuttii	Orcutt's brodiaea	480376	3661740	Rancho La Costa Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
DUBLB_6MPOS002	1	McClellan - Palomar Open Space - DUBLB	Dudleya blochmaniae	Blochman's dudleya	475118	3666075	Carlsbad Oaks North Habitat Conservation Area	6	County Of San Diego, Public Works	Center for Natural Lands Management	CNLM	Land Manager
HAOR3_6KRHC004	1	Kelly Ranch Translocated Occurrence - HAOR3	Hazardia orcuttii	Orcutt's hazardia	471586	3667242	Kelly Ranch Habitat Conservation Area	6	Kelly Land Co.	Center for Natural Lands Management	CNLM	Land Manager
HAOR3_6MAMI001	1	Manchester Mitigation Bank - Natural Occurrence - HAOR3	Hazardia orcuttii	Orcutt's hazardia	476645	3654726	Manchester Mitigation Bank	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
HAOR3_6RLCO003	1	Rancho La Costa Transplanted Occurrence - HAOR3	Hazardia orcuttii	Orcutt's hazardia	475271	3664420	Rancho La Costa Habitat Conservation Area	6	Center For Natural Lands Management	Center for Natural Lands Management	CNLM	Land Manager
FRME3_3LCCA002	1	Woodwardia Canyon - FRME2	Fremontodendron mexicanum	Mexican flannelbush	512905	3608736	Otay Mountain	3	Bureau of Land Management	Bureau of Land Management	CNPS	Land Manager
BLCL_3SMHA025	1	San Miguel Habitat Management Area - BLCL	Bloomeria clevelandii	San Diego goldenstar	503577	3615057	San Miguel Habitat Management Area	3	Otay Municipal Water District	Otay Municipal Water District	HELIX	Land Manager
DECO13_3SMHA024	1	San Miguel Habitat Management Area West - DECO13	Deinandra conjugens	Otay tarplant	503870	3615372	San Miguel Habitat Management Area	3	Otay Municipal Water District	Otay Municipal Water District	HELIX	Land Manager
DECO13_3SMHA025	1	San Miguel Habitat Management Area East - DECO13	Deinandra conjugens	Otay tarplant	504486	3614775	San Miguel Habitat Management Area	3	Otay Municipal Water District	Otay Municipal Water District	HELIX	Land Manager
DUVA_3SMHA034	1	San Miguel Habitat Management Area - DUVA	Dudleya variegata	Variegated dudleya	503572	3615068	San Miguel Habitat Management Area	3	Otay Municipal Water District	Otay Municipal Water District	HELIX	Land Manager
MOLIV_4SPCA008	1	Spring Canyon - MOLIV	Monardella viminea	Willowy monardella	496553	3636230	Sycamore Canyon Landfill	4	County of San Diego DPR	County of San Diego DPR	HELIX	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_4SYCA027	4	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	502552	3643692	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	3	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501546	3644380	Sycamore Canyon And Goodan Ranch Preserves	4	California Department Of Fish And Wildlife	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	6	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	502252	3644068	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	7	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	502375	3644068	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	8	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	502267	3644249	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	5	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	502915	3643523	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	1	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501592	3644272	Sycamore Canyon And Goodan Ranch Preserves	4	California Department Of Fish And Wildlife	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	9	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501751	3644400	Sycamore Canyon And Goodan Ranch Preserves	4	California Department Of Fish And Wildlife	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	10	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501909	3644372	Sycamore Canyon And Goodan Ranch Preserves	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_4SYCA027	2	Sycamore Canyon - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	501522	3644277	Sycamore Canyon And Goodan Ranch Preserves	4	California Department Of Fish And Wildlife	County of San Diego DPR	ICF	Land Manager
CLCH5_4BOPR002	1	Boulder Oaks Preserve - CLCH5	Clinopodium chandleri	San Miguel savory	505067	3646951	Boulder Oaks Preserve	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
CLCH5_4BOPR002	2	Boulder Oaks Preserve - CLCH5	Clinopodium chandleri	San Miguel savory	505422	3647075	Boulder Oaks Preserve	4	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
DUVA_6LUCR023	1	Lusardi Creek - DUVA	Dudleya variegata	Variegated dudleya	484873	3652555	Lusardi Creek Preserve	6	County Of San Diego Dpr	County of San Diego DPR	ICF	Land Manager
ACIL_3LONC007	1	Long Canyon (PMA 4-2b) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	500143	3612792	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_3WHRI017	1	Bonita, Wheeler Ridge (Long Canyon PMA 4-1cW) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	499098	3613391	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
BLCL_3CECA031	1	Cedar Canyon - BLCL	Bloomeria clevelandii	San Diego goldenstar	514880	3611605	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3DUPA002	2	Dulzura Parcel - BLCL	Bloomeria clevelandii	San Diego goldenstar	505845	3608045	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
BLCL_3DUPA002	1	Dulzura Parcel - BLCL	Bloomeria clevelandii	San Diego goldenstar	513501	3611150	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3LCCP003	1	Little Cedar Canyon Parcel - BLCL	Bloomeria clevelandii	San Diego goldenstar	512876	3609389	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3LCCP003	3	Little Cedar Canyon Parcel - BLCL	Bloomeria clevelandii	San Diego goldenstar	505335	3608261	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
BLCL_3ORVA026	1	Otay River Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	506521	3606746	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
BLCL_3OTMT030	1	Otay Mountain East - BLCL	Bloomeria clevelandii	San Diego goldenstar	511206	3608410	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3PRVA027	2	Proctor Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	507640	3613849	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3PRVA027	1	Proctor Valley - BLCL	Bloomeria clevelandii	San Diego goldenstar	507476	3613836	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3SYPA010	1	San Ysidro Parcel - BLCL	Bloomeria clevelandii	San Diego goldenstar	507538	3608029	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3SYPA028	1	San Ysidro Parcel South - BLCL	Bloomeria clevelandii	San Diego goldenstar	508627	3607512	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BLCL_3SYPA029	1	San Ysidro Parcel North - BLCL	Bloomeria clevelandii	San Diego goldenstar	508646	3608171	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
BROR_3SYPA008	1	San Ysidro Parcel (Otay Lakes South) - BROR	Brodiaea orcuttii	Orcutt's brodiaea	509028	3608412	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
COOR7_3PMA3003	1	PMA3- COOR7	Dicranostegia orcuttiana	Orcutt's bird's-beak	498126	3607814	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DECO13_3PMA1002	1	PMA1 (Rice Canyon & Other Canyons) - DECO13	Deinandra conjugens	Otay tarplant	498690	3611804	City Of Chula Vista Central City Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DECO13_3RHRA012	1	Rolling Hills Ranch - DECO13	Deinandra conjugens	Otay tarplant	505309	3615042	Rolling Hills Ranch	3	Mcmillin Rolling Hills Ranch L L C	City of Chula Vista	RECON	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
DECO13_3RHRA012	2	Rolling Hills Ranch - DECO13	Deinandra conjugens	Otay tarplant	505298	3615204	Rolling Hills Ranch	3	Mcmillin Rolling Hills Ranch L L C	City of Chula Vista	RECON	Land Manager
DUVA_3ORVA036	2	Otay River Valley - DUVA	Dudleya variegata	Variegated dudleya	506076	3606596	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3ORVA036	1	Otay River Valley - DUVA	Dudleya variegata	Variegated dudleya	506356	3606822	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3OTMT006	1	Otay Mountain - DUVA	Dudleya variegata	Variegated dudleya	509935	3608204	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
DUVA_3PRVA037	1	Proctor Valley East - DUVA	Dudleya variegata	Variegated dudleya	507552	3613861	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
DUVA_3PRVA038	1	Proctor Valley West - DUVA	Dudleya variegata	Variegated dudleya	506978	3613499	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
DUVA_3RHRA007	1	Rolling Hills Ranch - DUVA	Dudleya variegata	Variegated dudleya	504768	3614856	Rolling Hills Ranch	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3RHRA007	2	Rolling Hills Ranch - DUVA	Dudleya variegata	Variegated dudleya	504758	3615027	Rolling Hills Ranch	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3SCPA008	2	Salt Creek North - DUVA	Dudleya variegata	Variegated dudleya	512585	3609413	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
DUVA_3SCPA008	2	Salt Creek North - DUVA	Dudleya variegata	Variegated dudleya	514057	3611856	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
DUVA_3SCPA008	1	Salt Creek North - DUVA	Dudleya variegata	Variegated dudleya	505352	3608110	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3SCPA032	2	Salt Creek South - DUVA	Dudleya variegata	Variegated dudleya	506130	3607250	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3SCPA032	1	Salt Creek South - DUVA	Dudleya variegata	Variegated dudleya	505447	3607325	Otay Ranch Preserve	3	City Of Chula Vista	City of Chula Vista	RECON	Land Manager
DUVA_3SYPA011	1	San Ysidro - DUVA	Dudleya variegata	Variegated dudleya	508103	3607922	Otay Ranch Preserve	3	Otay Ranch Pom	Otay Ranch POM	RECON	Land Manager
MOST_3NSYP004	1	San Ysidro Parcel - North - MOST	Monardella stoneana	Jennifer's monardella	509640	3607892	Otay Ranch Preserve	3	City of Chula Vista	Otay POM	RECON	Land Manager
ACPR_1MAPO004	1	Mission Bay - Mariner's Point - ACPR	Acmispon prostratus	Nuttall's acmispon	476963	3625207	Mariner'S Point	1	City Of San Diego	City of San Diego Park and Recreation Department	SD Audubon	Land Manager
AMPU_6HROS009	1	Hodges Reservoir Open Space - AMPU	Ambrosia pumila	San Diego ambrosia	493347	3658719	Hodges Reservoir Open Space	6	City Of San Diego Public Utilities Department	City of San Diego Public Utilities Department	SDRVC	Land Manager

Appendix B
Monitoring Strategic Plan (MSP) Rare Plant Occurrences Monitored in 2016

MSP Occurrence ID	Number of Samples	OccurrenceName	Scientific Name	Common Name	Coordinates Easting (UTM)	Coordinates Northing (UTM)	Preserve Name	Management Unit	Land Owner	Land Manager	Data Submitter	Surveyor
ACIL_3MGMT009	2	McGinty Mountain (southwest slope) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512465	3622290	Flying Dolphin Trust	3	The Nature Conservancy	The Nature Conservancy	TNC	Land Manager
ACIL_3MGMT009	1	McGinty Mountain (southwest slope) - ACIL	Acanthomintha ilicifolia	San Diego thorn-mint	512429	3622167	Flying Dolphin Trust	3	The Nature Conservancy	The Nature Conservancy	TNC	Land Manager
PAGA5_3MGMT001	2	McGinty Mountain - PAGA5	Packera ganderi	Gander's ragwort	513065	3623567	Mcginty Mountain Preserve	3	The Nature Conservancy	The Nature Conservancy	TNC	Land Manager
BLCL_3STCA009	1	South of Steele Canyon - BLCL	Bloomeria clevelandii	San Diego goldenstar	505763	3619799	San Diego National Wildlife Refuge	3	U.S. Fish and Wildlife Service	U.S. Fish and Wildlife Service	USFWS	Land Manager
BLCL_3SWRE008	1	Sweetwater Reservoir - BLCL	Bloomeria clevelandii	San Diego goldenstar	504443	3618452	San Diego National Wildlife Refuge	3	U.S. Fish and Wildlife Service	U.S. Fish and Wildlife Service	USFWS	Land Manager
DECO13_3JAHI006	1	Jamacha Hills - DECO13	Deinandra conjugens	Otay tarplant	503537	3620558	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	USFWS	Land Manager
FRME2_3MOMI005	1	Mother Miguel Saddle - FRME2	Fremontodendron mexicanum	Mexican flannelbush	504161	3617055	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	USFWS	Land Manager
FRME2_3WIMC004	1	Wild Man Canyon - FRME2	Fremontodendron mexicanum	Mexican flannelbush	502735	3615194	San Diego National Wildlife Refuge	3	U.S. Fish And Wildlife Service	U.S. Fish and Wildlife Service	USFWS	Land Manager