



Vegetation Monitoring in the Santa Monica Mountains and Simi Hills Region *2014–2020 Annual Report*

Natural Resource Report NPS/MEDN/NRR–2023/2598



ON THE COVER

Surveying vegetation in the Santa Monica Mountains and Simi Hills region
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Vegetation Monitoring in the Santa Monica Mountains and Simi Hills Region

2014–2020 Annual Report

Natural Resource Report NPS/MEDN/NRR–2023/2598

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November 2023

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

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Please cite this publication as:

Mendelsohn, M, J. Tiszler, and T. Sagar. 2023. Vegetation monitoring in the Santa Monica Mountains and Simi Hills region: 2014–2020 annual report. Natural Resource Report NPS/MEDN/NRR–2023/2598. National Park Service, Fort Collins, Colorado.
<https://doi.org/10.369672300992>

Contents

	Page
Figures.....	iv
Tables	v
Abstract.....	vi
Acknowledgments.....	vii
Introduction.....	8
Methods.....	9
Sampling Design	9
Plot Establishment.....	11
Field Data Collection.....	11
Participating Personnel.....	14
Data Management.....	14
Data Analysis.....	15
Results.....	16
Discussion.....	23
Literature Cited	24
Appendix A. Status of monitoring plots	25
Appendix B. Comprehensive list of species found at SAMO vegetation monitoring plots.	36

Figures

	Page
Figure 1. The study area for long-term monitoring of vegetation in the Santa Monica Mountains and Simi Hills region.	8
Figure 2. Schematic representation of the basic vegetation monitoring sampling plot.	13
Figure 3. Schematic representation of the post-fire vegetation monitoring sampling plot.	14
Figure 4. Box plots of mean absolute cover for all plots across the entire study area in years 2014–2020.	17
Figure 5. Rainfall data for an example point in the Santa Monica Mountains. Source: Climate Analyzer (http://www.climateanalyzer.us/raws/malibu_canyon).	21
Figure 6. Observations of the two most common mustards, detected at plots in years 2014–2020.	22

Tables

	Page
Table 1. Serially alternating panel design showing the number of plots to be monitored and new plots to be installed each year in the Santa Monica Mountains and Simi Hills region.	10
Table 2. Overall species richness and percent native richness summarized across all plots in the entire study area.	10
Table 3. Summary of vegetation measures and techniques employed to obtain them at the Santa Monica Mountains and Simi Hills region.	11
Table 4. Absolute cover summary statistics by vegetation type and year for the entire study area.	18
Table 5. Shrub density by year and age class summarized across all plots in the entire study area.	19
Table A-1. All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.	25
Table B-1. List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020.	36

Abstract

Our Inventory & Monitoring team surveyed over 200 Terrestrial Native Vegetation Monitoring Plots in the Santa Monica Mountains and Simi Hills (SAMO) region over the first seven years of this program's history, 2014–2020. During this period, the park experienced a large wildfire in 2013 followed by historic drought, and then in 2018 the largest wildfire in the region's recorded history, succeeded by well-timed rainfall. The goal of this monitoring program is to detect and understand the nature of vegetation change, for example in drought or post-fire environments, providing a knowledge base for developing effective management strategies. Our metrics include vegetation cover, species richness, shrub/tree abundance, survival, and recruitment. In general, SAMO experienced widescale native shrub dieback during the extended drought. Dry shrublands that subsequently burned to the ground in 2018 converted into a rich and widespread green-up with the substantial rains received in 2019, producing a very diverse assemblage of wildflowers (including many fire followers not seen in many years) and a strong recruitment of our native shrubs via resprouting and seedlings into 2020 across most of the park's more pristine areas. We documented post-fire expansions in several populations of the federally endangered Branton's milkvetch. Non-native herbaceous species such as mustards dominated previously disturbed lands and expanded their coverage following the 2018 wildfire. The data we collected will be available for advancing the science of fire ecology, and informing future park management and interpretation programs.

Acknowledgments

First and foremost, we pay tribute to the Chumash, Tongva (Gabrieleño), and Micqanaqa'n peoples, who were the original caretakers of this land on which we have the privilege to work. We sincerely thank Lena Lee for data management and digital data collection tools, Marti Witter for her expertise in fire ecology and methodology, and appreciate the hard work that Luis Aguilar, Crystal Anderson, Tony Valois, Brendan Clarke, Jake Alcaraz and numerous dedicated interns contributed to monitor the beautiful lands of SAMO. We appreciate editing provided by Stacey Ostermann-Kelm and copyediting and formatting provided by Jeri Stoller.

Introduction

In 2014, the National Park Service's (NPS) Mediterranean Coast Network of the Inventory and Monitoring Program, in collaboration with the Santa Monica Mountains National Recreation Area, began implementing a long-term vegetation monitoring program for public lands in Santa Monica Mountains National Recreation Area and the adjacent Simi Hills region (SAMO; Figure 1). The complexity of future ecological threats creates uncertainty for land managers. We believe that adverse vegetation changes that may arise from these threats can be best managed through early and coordinated actions informed by field data. The goal of this program is to detect and understand the nature of vegetation change, providing a knowledge base for developing effective management strategies. Our overall monitoring objective is to determine the status (current condition) and trends in vegetation cover, species richness, and shrub/tree abundance, survival, and recruitment within the terrestrial vegetation of MEDN parks, including post-fire changes in vegetation.

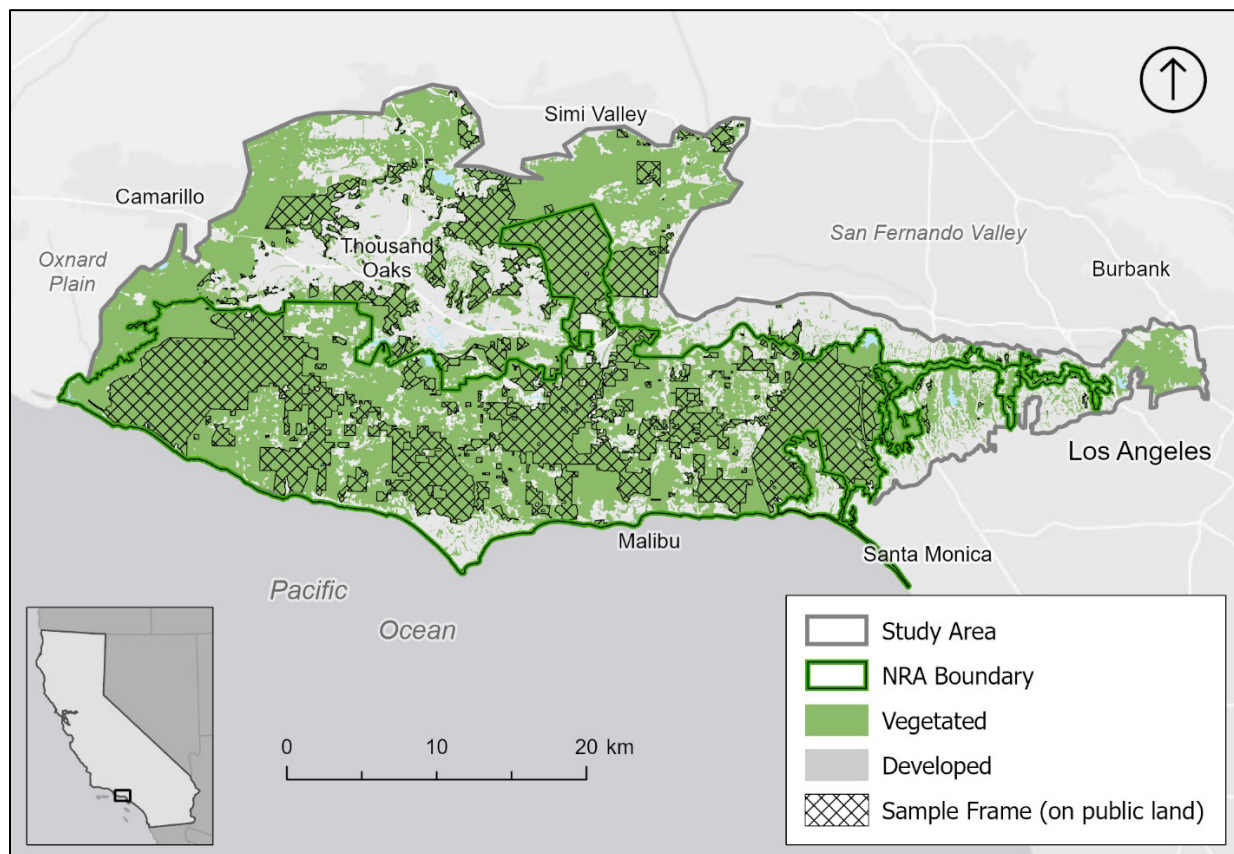


Figure 1. The study area for long-term monitoring of vegetation in the Santa Monica Mountains and Simi Hills region. This includes a sample frame composed of public land, i.e., federal, state, and local parklands within and adjacent to the Santa Monica Mountains National Recreation Area.

Methods

Sampling Design

The target population for SAMO is all vegetation occurring on undeveloped park and other public lands within and adjacent to the administrative boundary of the national recreation area, an area encompassing approximately 41,000 ha. Details of the sampling design are provided in Tiszler et al. (2016a; 2016b). Plots were selected using a random, spatially balanced design (Generalized Random Tessellation Stratified sampling [GRTS; Olsen et al. 2012]). We excluded areas with slopes greater than 40 degrees. This was done for both crew safety and to prevent damage that might occur in attempting to monitor on a steep slope. We also screened out all areas within 5m of trails and park developments as these areas have the potential to be perpetually disturbed by human activities. Finally, we screened all areas within 40m of mapped park boundaries to prevent accidentally placing the plots on private land. Thereafter, upon visiting plots to assess the practicality of establishment, we had to reject many due to access or safety issues, such as private property, poison-oak, or steep slopes that were at a finer scale than the computer slope screening process could pick up.

We employ a serially alternating panel design (Table 1) whereby each of the 300 monitoring plots is assigned to one of six panels (50 locations per panel). Once we are past the first six-year monitoring cycle (when all plots have been visited at least once), each panel will be visited for two consecutive years and then rested for four years before we return to monitor that plot. See the exception described below for monitoring plots following fire. For the first six-year monitoring cycle (2014–2019), twenty-five plots from panels A and B were monitored on an annual basis. This annual monitoring was initially needed to obtain annual estimates of variation in the data for later statistical analysis. To maintain a feasible workload, all panels were reduced to 25 plots for the first monitoring cycle. Subsequently, between 2019–2024, 25 plots have been or will be added to each panel, rounding out each panel's total to 50 monitored plots. Each plot is monitored only once during a monitoring year, between late winter and early summer.

For any area burned by wildfire in the park, we visit all burned monitoring sites included in the terrestrial vegetation monitoring program, regardless of where they are positioned in the rotation cycle (Tiszler et al. 2016a; 2016b). In 2018, three fires in November—largely the Woolsey Fire (over 36,000 ha in size), but also the Hill Fire and Peak Fire—burned 40% of the natural area in the Santa Monica Mountains and 65% of natural area in the Simi Hills. Consequently, we surveyed 209 burned and unburned plots, more than twice the 100 plots surveyed in a non-fire year. Seventy of these plots had to be newly established in 2019, and the 164 burned plots required the more complex and time-consuming post-fire monitoring protocol. As the protocol prescribes two years of post-fire monitoring in most cases for all burned plots, our extra survey work continued in 2020, with 210 plots monitored. By comparison, the 2013 Springs Fire, a considerably smaller fire that occurred largely in Point Mugu State Park, necessitated the post-fire monitoring of 34 plots.

Table 1. Serially alternating panel design showing the number of plots to be monitored and new plots to be installed each year in the Santa Monica Mountains and Simi Hills region. Each panel ultimately contains 50 plots, as prescribed in Tiszler et al. (2016a). Note that the number of plots actually installed and monitored each year exceeded this proposed design, due to wildfires, as described in the text below (and Table 2 has numbers of plots actually monitored).

Panel	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
A Panel	25	25*	25*	25*	25*	50	50	–	–	–	–	50	50
B Panel	25	25	25*	25*	25*	25*	50	50	–	–	–	–	50
C Panel	–	25	25	–	–	–	–	50	50	–	–	–	–
D Panel	–	–	25	25	–	–	–	–	50	50	–	–	–
E Panel	–	–	–	25	25	–	–	–	–	50	50	–	–
F Panel	–	–	–	–	25	25	–	–	–	–	50	50	–
Total Installed	50	25	25	25	25	25	25	25	25	25	25	0	0
Total Monitored	50	75	100	100	100	100	100	100	100	100	100	100	100

*During the first 6-year cycle only, sites in panels A and B were revisited yearly, to develop an estimate of interannual variance for a power analysis.

Table 2. Overall species richness and percent native richness summarized across all plots in the entire study area. Percent native richness is defined as the number of native species recorded on plots divided by the combined number of native and non-native species recorded on plots.

Year	# Plots	# Species	% Native
2014	79	208	87
2015	96	299	81
2016	117	303	83
2017	101	324	81
2018	100	286	80
2019	209	417	80
2020	210	413	81

Plot Establishment

Appendix A, Table A-1 displays the monitoring status of all ~300 plots during our first seven years, as well as those remaining to be established, along with the vegetation community classification and panel designation for each plot, and the years of monitoring to conclude the second six-year cycle (through 2025). Not all plots proposed to be established within a given panel and year were or will be established, due to access difficulties. Additionally, some plots were established and subsequently rejected due to deteriorating access conditions; these rejections are included in Appendix Table A-1. Variations to the two-years-on-four-years-off cycle are due to post-fire monitoring requirements, following the seven fires tracked so far in our study.

Field Data Collection

At each monitoring plot, we measure canopy cover by species, overall canopy height, soil cover (litter, rock, bare soil, etc.), shrub and tree density by species, tree basal area by species, and species richness. We use these data to calculate species frequency within plots and among plots. The plot layout, types of measurements and the methodology used to acquire them are summarized in Table 3 and Figure 2.

Table 3. Summary of vegetation measures and techniques employed to obtain them at the Santa Monica Mountains and Simi Hills region.

Measure	Population of Interest	Technique Employed
Cover (foliar)	All plant species and soil surface features	30m line-point intercept transect, with 100 points (one every 30cm)
Density	All shrub & tree species	Counts of seedling, juvenile, and mature individuals (alive & dead) • Shrubs—within the 1m x 30m belt adjacent to the 30m transect, read as 6 contiguous 1m x 5m subplots. • Trees—within a 10m x 30m belt centered on the 30m transect, read as 2 adjacent 5m x 30m subplots
Basal Area	All tree species	Trunk diameter at 1.37 m (4.5 ft) height
Species Richness	All plant species	Full list of species occurring in the 1m x 30m belt adjacent to the 30m transect
Frequency	All plant species	Frequency based on 6 contiguous 1m x 5m belt plots, each including a 1m x 1m subplot
Fire Species Richness*	All plant species	Full list of species occurring in expanded 10m x 30m belt adjacent to the 30m transect, read as 3 contiguous 10m x 10m subplots
Cover (foliar)*	Plant species that have at least 1% cover in a Fire Species Richness subplot	Visual estimate of percent cover, within each 10m x 10m subplot

* Post-fire monitoring conditions only

Table 3 (continued). Summary of vegetation measures and techniques employed to obtain them at the Santa Monica Mountains and Simi Hills region.

Measure	Population of Interest	Technique Employed
Burn Severity*	All three 10m x 10m subplots (first post-fire year only)	Visual estimate of percent cover by severity classes, as outlined in the NPS Fire Monitoring Handbook (vegetation only; not substrate)
Sampling Event Metadata*	Vegetation and soil in expanded 10m x 30m plot & 5–10m buffer around plot	• Visual assessment of phenology (up to two dominant phenophases) for ○ Herbaceous plants ○ Woody plants • Visual estimate of effect of sampling (disturbance levels: low, medium, high) for ○ Vegetation ○ Soil • Plants potentially resulting from previous sampling disturbance Plants of note in the immediate vicinity

* Post-fire monitoring conditions only

Vegetation cover is measured using the line-point intercept method. A 30m measuring tape is stretched between two fixed rebar stakes. A small-diameter rod is passed vertically through the canopy at 30cm intervals along the tape, and each species touching the rod is recorded. The number of “hits” of a given species out of the 100 points sampled along the tape is its absolute cover. Shrub/tree density and species richness are determined by counting plants within 1m x 30m and 10m x 30m quadrats adjacent to or centered on the line-point intercept transect (Table 3; Figure 2). The length of these larger plots is defined by the line-point intercept tape. The width is determined by using measuring tape perpendicular to the line-point intercept tape. All plots are worked from the downslope side, except where it is necessary to measure tree basal area.

Plots that require post-fire monitoring have an expanded layout, with additional data taken (Table 3; Figure 3). The expanded post-fire plot is a 10m x 30m rectangle with the 30m line-point intercept transect as the baseline, and is split into three side-by-side 10m x 10m subplots. Measuring tapes and flags or flagging tape are used to lay out and temporarily mark the post-fire expanded plots, and are then removed at the end of the monitoring visit. Within each subplot, species richness, and estimated percent cover of all species having at least 1% cover are recorded. Burn severity is also recorded within each subplot, only in the first post-fire year. Finally, for the expanded plot, herbaceous plant and woody plant phenology, effect of sampling (i.e., disturbance level), and plants of note in the immediate vicinity or potentially resulting from previous sampling disturbance are recorded.

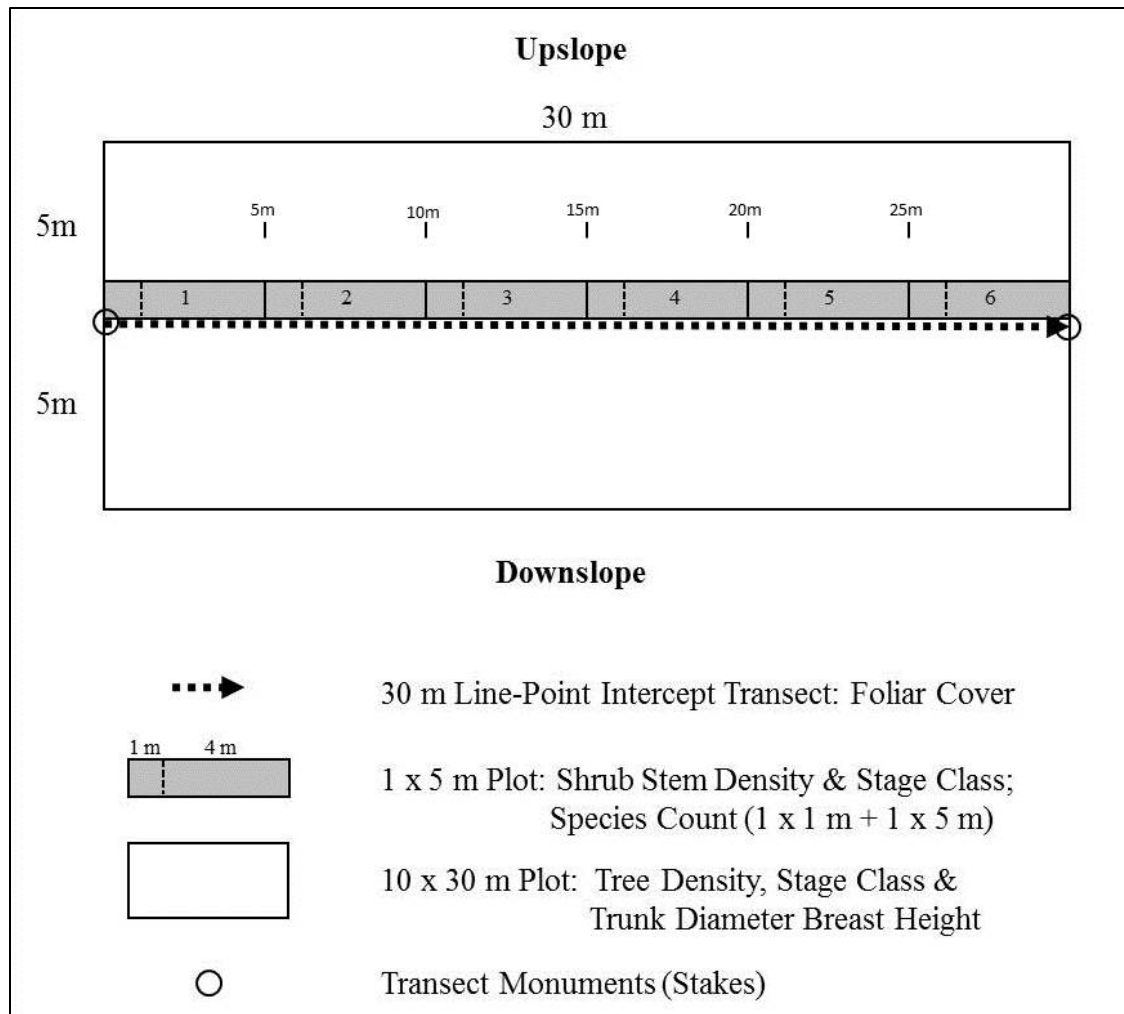


Figure 2. Schematic representation of the basic vegetation monitoring sampling plot.

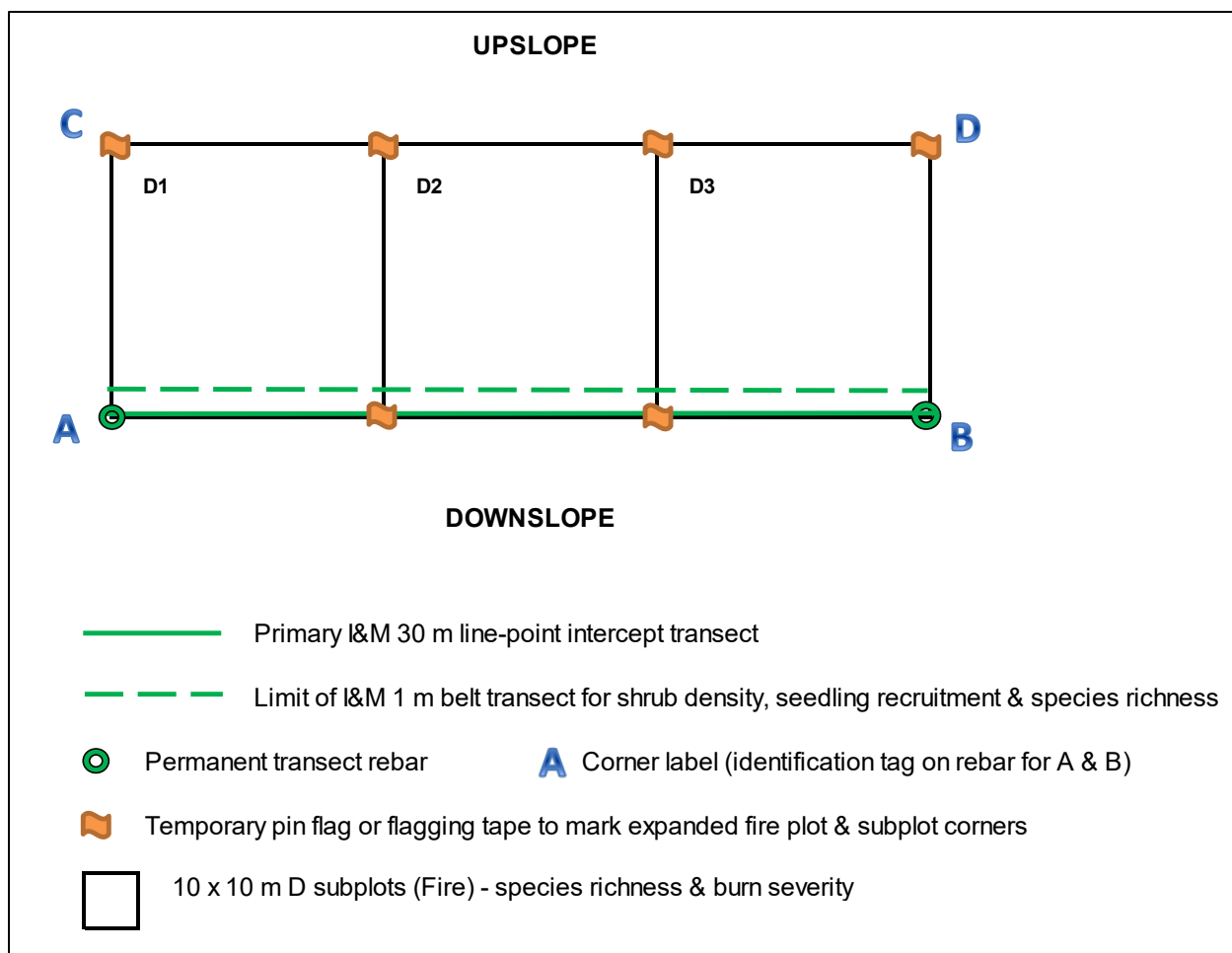


Figure 3. Schematic representation of the post-fire vegetation monitoring sampling plot.

Each monitoring plot requires the permanent installation of at least two, and up to four, 3/8" (#3) rebar stakes. Each rebar stake is either covered completely with a white PVC pipe sleeve—for visibility to returning surveyors and to prevent injury if someone should fall onto the rebar—or simply bent to form a cane handle and prevent injury. Rebar stakes—whether bent, or straight with PVC sleeve—stand up to 1m tall and are installed so that they are not generally visible from trails and developed areas. In dense shrublands, one bent rebar stake at the transect midpoint, or two bent rebar stakes at 10m intervals, may be added to aid surveyors in placing the transect tape on subsequent visits.

Participating Personnel

The program is administered and implemented by long-term NPS staff. Implementation of field work is assisted by temporary staff, partners, interns, and volunteers. The personnel comprising this latter group changes yearly. Names of personnel who collected data at each site are available upon request.

Data Management

At the end of each field day, paper datasheets and digital data forms completed that day were checked by field leads to ensure legibility, completeness, and correct use of species codes. During

and after the end of each field season, the vegetation monitoring data were entered into a customized MS Access database. This work was led by the database manager, who imported directly into the database all data that were collected digitally; staff, interns, and volunteers entered data recorded on paper into the database between the date of collection and the end of that calendar year. Secondary checking of the entered data (verification) was later conducted by staff, interns, and volunteers before the end of that calendar year. Each plot's data were reviewed at least once by the botanist. The data manager ran validation queries following data verification. All data were certified by the botanist and archived by the data manager.

Data Analysis

All summary statistics were calculated from the 30m transect and adjacent 1m x 30m belt. However, additional results (e.g., tree density, tree basal area, burn severity, species richness, etc. from the 10m x 30m rectangle about the plot) are available upon request. Additionally, the dates each plot was established and monitored, or rejected, are available upon request. In the following summaries, we present results from the monitoring plots at the entire study area level.

Results

For this multi-year report, summaries are presented per year, 2014–2020. Appendix B, Table B-1 has a list of all plant species found at monitoring plots across the entire study area, grouped together across years 2014–2020. Here we present a series of results that are the most instructive regarding understanding the status of native vegetation in the study area:

- overall species richness and percent native richness (Table 2)
- cover by vegetation community (Figure 4 and Table 4)
- shrub density (Table 5)
- annual precipitation (Figure 5)
- annual observations of two invasive mustard species (Figure 6)

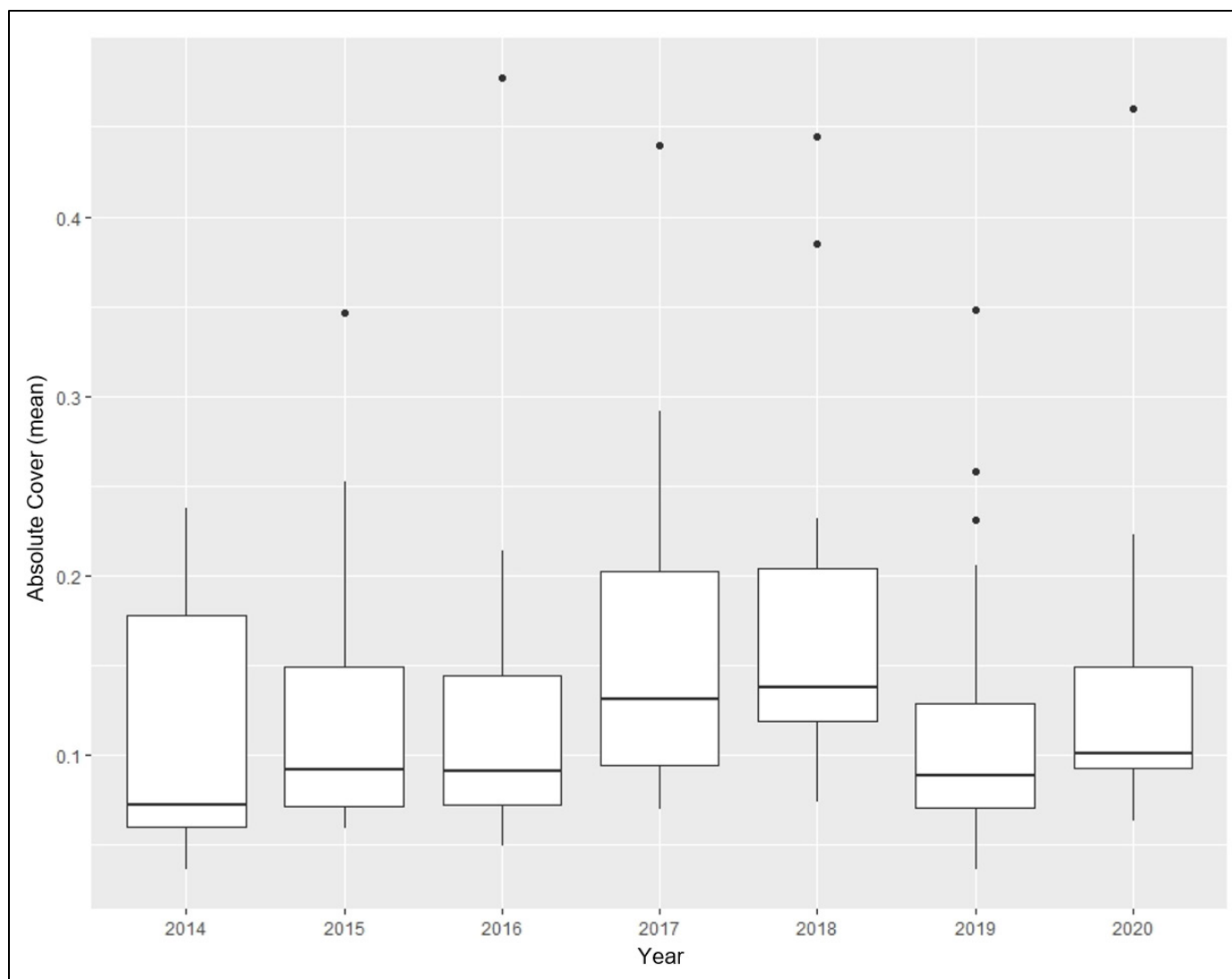


Figure 4. Box plots of mean absolute cover for all plots across the entire study area in years 2014–2020. *Absolute cover* is a statistic that represents how much live plant material covers the ground, and when evaluated at the level of a single species, takes a value between 0 and 1.0, representing the fraction of times a species is hit out of 100 opportunities along the 30m transect. However, the cover metric can exceed 1.0 when single-species cover values are summed across multiple species, as we have done here.

Table 4. Absolute cover summary statistics by vegetation type and year for the entire study area. Included are mean and standard deviation, median and range (minimum - maximum), and sample size (n = the count of species-hits across all transects within a specified vegetation community). *Absolute cover*, when evaluated at the level of a single species, takes a value between 0 and 1.0, representing the fraction of times a species is hit out of 100 opportunities along the 30m transect. However, the cover metric can exceed 1.0 when single-species cover values are summed across multiple species, as we have done here.

Vegetation Type	Absolute Cover Summary Statistics	2014	2015	2016	2017	2018	2019	2020
Chaparral	Mean $\pm$ Std Dev	0.08 $\pm$ 0.13	0.08 $\pm$ 0.13	0.09 $\pm$ 0.13	0.1 $\pm$ 0.14	0.12 $\pm$ 0.16	0.07 $\pm$ 0.11	0.1 $\pm$ 0.14
	Median (Min - Max)	0.03 (0.01 - 0.88)	0.03 (0.01 - 1.19)	0.04 (0.01 - 0.99)	0.04 (0.01 - 0.95)	0.05 (0.01 - 1.1)	0.03 (0.01 - 1.03)	0.04 (0.01 - 0.95)
	n	313	705	836	796	615	1550	1652
Coastal Sage Scrub	Mean $\pm$ Std Dev	0.05 $\pm$ 0.07	0.07 $\pm$ 0.09	0.07 $\pm$ 0.09	0.1 $\pm$ 0.13	0.11 $\pm$ 0.15	0.09 $\pm$ 0.13	0.09 $\pm$ 0.14
	Median (Min - Max)	0.02 (0.01 - 0.4)	0.03 (0.01 - 0.57)	0.04 (0.01 - 0.74)	0.04 (0.01 - 0.72)	0.05 (0.01 - 0.85)	0.04 (0.01 - 0.93)	0.04 (0.01 - 0.97)
	n	155	318	302	296	240	687	729
Grassland	Mean $\pm$ Std Dev	0.1 $\pm$ 0.17	0.13 $\pm$ 0.25	0.17 $\pm$ 0.27	0.13 $\pm$ 0.22	0.16 $\pm$ 0.26	0.18 $\pm$ 0.27	0.18 $\pm$ 0.26
	Median (Min - Max)	0.02 (0.01 - 0.67)	0.02 (0.01 - 0.99)	0.04 (0.01 - 0.96)	0.03 (0.01 - 1)	0.06 (0.01 - 1)	0.05 (0.01 - 1)	0.06 (0.01 - 1.26)
	n	16	42	58	136	271	322	277
Riparian Woodland	Mean $\pm$ Std Dev	0.06 $\pm$ 0.07	0.13 $\pm$ 0.18	0.07 $\pm$ 0.1	0.09 $\pm$ 0.11	0.15 $\pm$ 0.19	0.08 $\pm$ 0.12	0.11 $\pm$ 0.15
	Median (Min - Max)	0.03 (0.01 - 0.26)	0.05 (0.01 - 0.66)	0.04 (0.01 - 0.59)	0.05 (0.01 - 0.61)	0.06 (0.01 - 0.75)	0.03 (0.01 - 0.55)	0.05 (0.01 - 0.79)
	n	23	40	65	53	22	82	97
Upland Woodland	Mean $\pm$ Std Dev	0.16 $\pm$ 0.2	0.15 $\pm$ 0.23	0.12 $\pm$ 0.17	0.17 $\pm$ 0.23	0.16 $\pm$ 0.27	0.1 $\pm$ 0.16	0.12 $\pm$ 0.17
	Median (Min - Max)	0.09 (0.01 - 0.98)	0.07 (0.01 - 0.91)	0.06 (0.01 - 0.95)	0.09 (0.01 - 0.97)	0.05 (0.01 - 0.99)	0.03 (0.01 - 0.83)	0.05 (0.01 - 0.78)
	n	28	20	54	42	30	165	190

Table 5. Shrub density by year and age class summarized across all plots in the entire study area. Included are mean and standard deviation, median and range (minimum - maximum), and sample size (n = the count of species-on-transect observed, e.g., if *Ceanothus megacarpus* and *Salvia mellifera* are observed on a single transect, that species-on-transect count = 2). Therefore, the means and medians estimate the number of individuals of a single shrub species in the listed age class on a single plot.

Age Class	Shrub Density	2014	2015	2016	2017	2018	2019	2020
Adult	Mean $\pm$ Std Dev	5.46 $\pm$ 9.62	4.39 $\pm$ 6.03	3.96 $\pm$ 5.01	4.15 $\pm$ 5.29	5.02 $\pm$ 6.66	4.04 $\pm$ 4.77	12.35 $\pm$ 32.21
	Median (Min - Max)	2 (1 - 70)	2 (1 - 35)	2 (1 - 33)	2 (1 - 40)	3 (1 - 43)	2 (1 - 29)	3 (1 - 243)
	n	166	198	132	240	170	170	220
Juvenile	Mean $\pm$ Std Dev	3.04 $\pm$ 4.62	2.45 $\pm$ 3.07	9.32 $\pm$ 21.1	4.92 $\pm$ 9.71	4.91 $\pm$ 7.11	7.07 $\pm$ 14.32	22.97 $\pm$ 61.15
	Median (Min - Max)	1 (1 - 23)	1 (1 - 18)	2 (1 - 161)	2 (1 - 105)	2 (1 - 35)	2 (1 - 91)	4 (1 - 675)
	n	49	44	107	166	79	72	412
Resprout	Mean $\pm$ Std Dev	5.56 $\pm$ 7.64	4.9 $\pm$ 6.29	4.66 $\pm$ 6.52	3.83 $\pm$ 9.66	2.67 $\pm$ 2.81	4.14 $\pm$ 6.21	3.87 $\pm$ 6.54
	Median (Min - Max)	2 (1 - 38)	2.5 (1 - 42)	2 (1 - 34)	1 (1 - 53)	1.5 (1 - 9)	2 (1 - 66)	2 (1 - 71)
	n	103	108	100	29	12	273	228
Seedling–New	Mean $\pm$ Std Dev	24.71 $\pm$ 37.58	23.25 $\pm$ 77.12	8.7 $\pm$ 24.23	12.14 $\pm$ 42.4	12.07 $\pm$ 34.69	65.58 $\pm$ 192.96	23.51 $\pm$ 88.04
	Median (Min - Max)	6 (1 - 177)	4 (1 - 860)	2 (1 - 207)	2 (1 - 335)	2 (1 - 198)	8 (1 - 2835)	2 (1 - 860)
	n	77	154	93	69	43	587	245
Seedling–Year 2	Mean $\pm$ Std Dev	–	12.16 $\pm$ 26.61	8.59 $\pm$ 16.09	–	5.54 $\pm$ 12.08	9 $\pm$ 12.38	15.7 $\pm$ 45
	Median (Min - Max)	–	4 (1 - 165)	3 (1 - 114)	–	1 (1 - 45)	2 (1 - 39)	3 (1 - 454)
	n	–	62	73	–	13	20	347
Dead Adult	Mean $\pm$ Std Dev	4.46 $\pm$ 4.86	3.51 $\pm$ 6.12	3.24 $\pm$ 3.48	3.53 $\pm$ 5.35	3.41 $\pm$ 5.93	2.49 $\pm$ 2.57	3.45 $\pm$ 3.27
	Median (Min - Max)	2 (1 - 30)	2 (1 - 46)	2 (1 - 14)	2 (1 - 45)	2 (1 - 40)	1 (1 - 15)	2 (1 - 16)
	n	142	76	41	103	51	127	73
Dead Juvenile	Mean $\pm$ Std Dev	4 $\pm$ 4.2	2.5 $\pm$ 2.12	–	–	–	–	2 $\pm$ 1.41
	Median (Min - Max)	3 (1 - 14)	2.5 (1 - 4)	–	–	–	–	2 (1 - 3)
	n	13	2	–	–	–	–	2
Dead Resprout	Mean $\pm$ Std Dev	only 1 value	1 $\pm$ 0	1 $\pm$ 0	–	only 1 value	only 1 value	only 1 value
	Median (Min - Max)	1 (1 - 1)	1 (1 - 1)	1 (1 - 1)	–	1 (1 - 1)	6 (6 - 6)	1 (1 - 1)
	n	1	5	8	–	1	1	1

Table 5 (continued). Shrub density by year and age class summarized across all plots in the entire study area. Included are mean and standard deviation, median and range (minimum - maximum), and sample size (*n* = the count of species-on-transect observed, e.g., if *Ceanothus megacarpus* and *Salvia mellifera* are observed on a single transect, that species-on-transect count = 2). Therefore, the means and medians estimate the number of individuals of a single shrub species in the listed age class on a single plot.

Age Class	Shrub Density	2014	2015	2016	2017	2018	2019	2020
Dead Seedling	Mean ± Std Dev	3 ± 4.58	8 ± 11.27	4.14 ± 6.72	only 1 value	3 ± 3.06	6.79 ± 12.44	3.23 ± 4.19
	Median (Min - Max)	1 (1 - 15)	2 (1 - 21)	1 (1 - 26)	1 (1 - 1)	2 (1 - 10)	1.5 (1 - 36)	2 (1 - 14)
	<i>n</i>	9	3	14	1	10	14	13

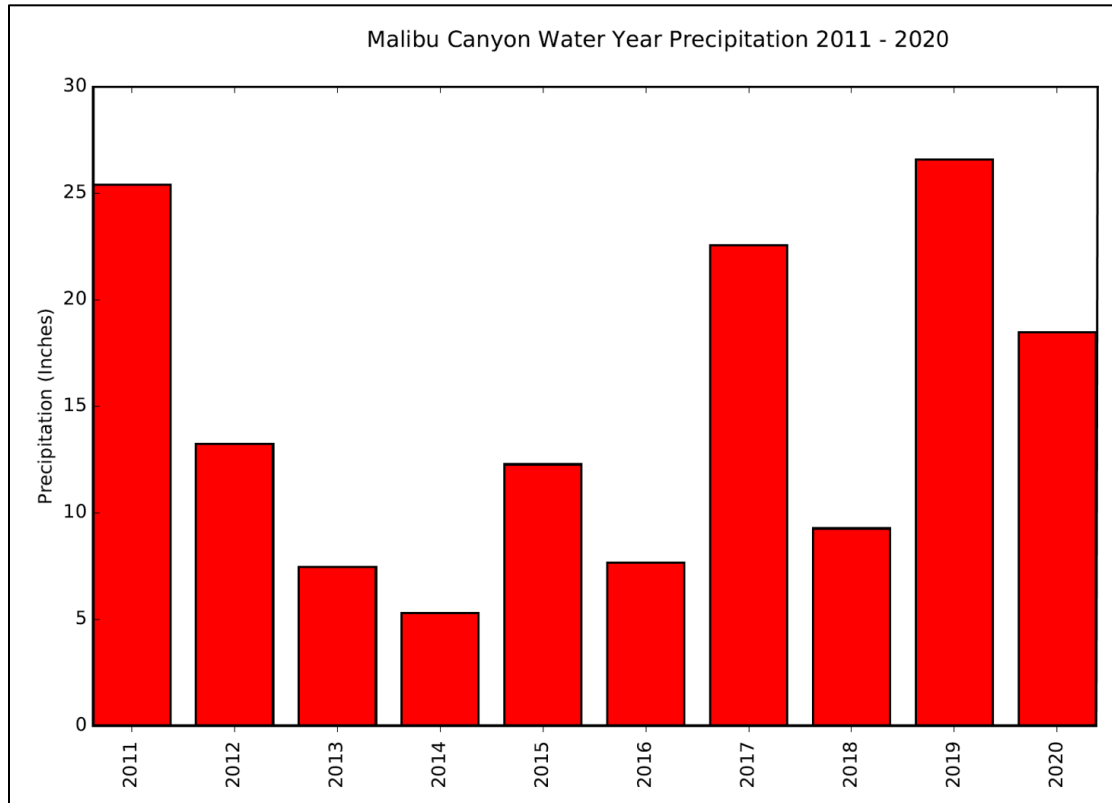


Figure 5. Rainfall data for an example point in the Santa Monica Mountains. Source: Climate Analyzer (http://www.climateanalyzer.us/raws/malibu_canyon).

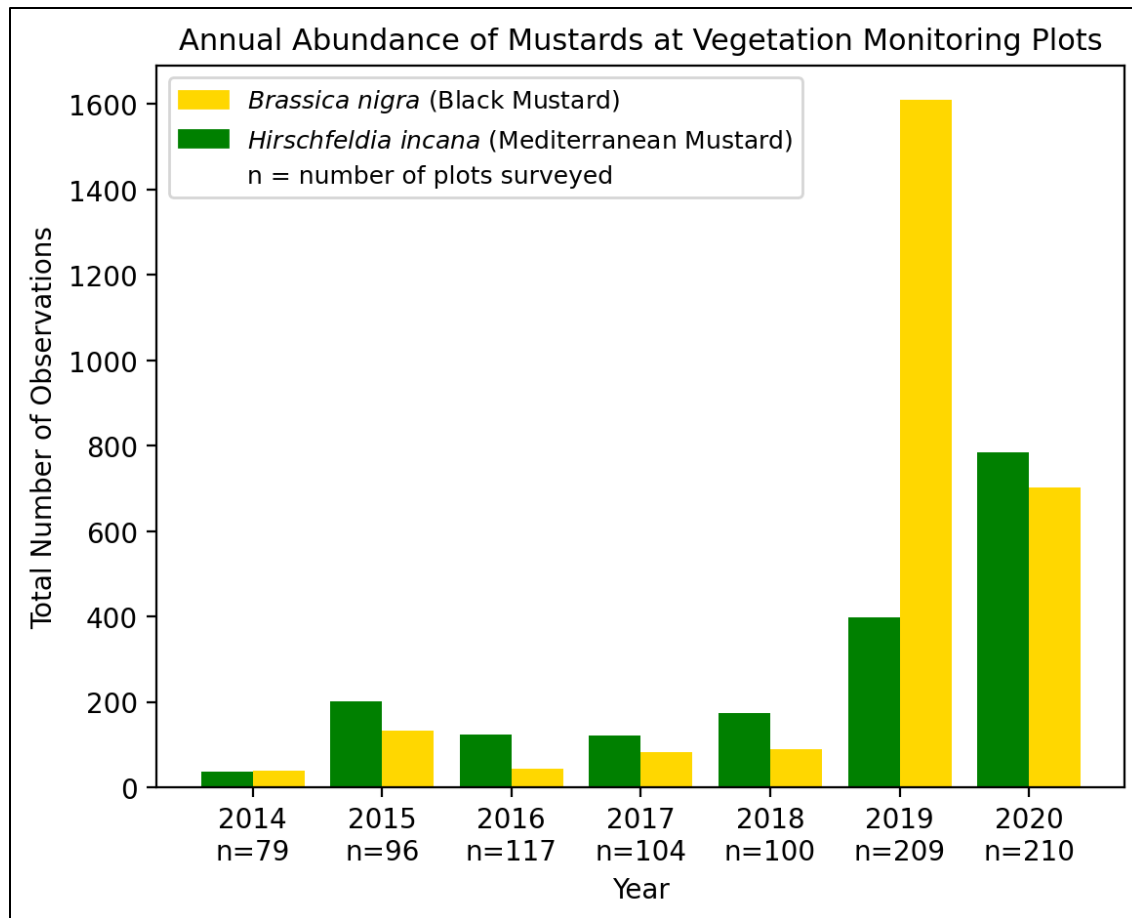


Figure 6. Observations of the two most common mustards, detected at plots in years 2014–2020. Note that plots burned in the Woolsey, Hill, and Peak Fires in November 2018, following the 2018 and preceding the 2019 survey data shown above.

Discussion

Our first monitoring year of 2014 fell on the heels of the May 2013 Springs Fire of almost 10,000 ha, and in the middle of a historic drought for southern California (Figure 5). This gave us the opportunity to study the recovery of vegetation following an early-season wildfire amidst a drought. Then, in November 2018, three fires ranged in size from small (~80 ha, Peak Fire), medium (~1,800 ha, Hill Fire), to over 36,000 ha for the Woolsey Fire, all in the course of one week. The Woolsey Fire was the largest fire to date recorded in SAMO. Studying our dataset, which includes pre- and post-fire as well as mid- and post-drought data, has enabled us to follow the status of the vegetation communities over this eventful first seven years of the program.

Our results suggest that cover averaged across all vegetation plots was lowest in the middle of the historic drought, slowly increased as rainfall increased into 2018, and was reduced by the extensive 2018 fires. However, cover increased in 2020 and approached nearly post-drought, pre-fire levels.

In general, the region experienced a rich and widespread green-up in 2019 with the substantial rains received (Figure 5), producing a very diverse assemblage of wildflowers (including many fire followers not seen in many years), and a strong recruitment of our native shrubs via resprouting and seedlings. This is in fairly stark contrast to the reduced or at least delayed vegetation recovery following the Springs Fire and concurrent drought (SAMO unpublished data). In 2019, we documented several populations of the federally endangered Braunton's milkvetch (*Astragalus brauntonii*), one of the rare Blochman's dudleya (*Dudleya blochmaniae*) and a range expansion into the region of Veatch's blazing star (*Mentzelia veatchiana*). We continued extensive post-fire monitoring in 2020, during which the region received almost average precipitation levels. The 2020 rains seemed to be enough to fuel continued high levels of shrub seedling and resprout growth and species richness levels.

Two invasive, non-native mustards—*Brassica nigra* (black mustard) and *Hirschfeldia incana* (Mediterranean mustard)—are the most common species of mustards, and among the most common forbs in general, in the Santa Monica Mountains and Simi Hills. Following the 2018 Woolsey Fire in particular, the presence of black and Mediterranean mustards skyrocketed to the point of being some of the most noticeable, and often bothersome, features on the landscape. Year 2019 experienced a large increase in black mustard, while 2020 saw Mediterranean mustard become dominant even while black mustard remained on the landscape in higher than pre-fire abundance levels (Figure 6). All data collected are available for advancing the science of fire ecology, and informing future park management and interpretation programs, and have been used in numerous regional to national media reports.

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Appendix A. Status of monitoring plots

Table A-1. All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
4	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
13	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
15	A	Y	COSCA	Coastal Sage Scrub	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
18	A	Y	NPS	Grassland	M	M	M	M	M	M	M	W19	P	–	–	–	P
19	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
23	A	Y	SP	Coastal Sage Scrub	M	M	M	M	M	M	M	–	–	–	–	–	P
27	A	Y	MRCA	Chaparral	M	M	M	M	M	M	M	–	–	–	–	–	P
29	A	Y	SP	Grassland	M	M	M	M	M	M	M	S13	–	–	–	–	P
30	A	Y	MRCA	Coastal Sage Scrub	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
40	A	Y	MRCA	Chaparral	M	M	M	M	M	M	M	–	–	–	–	–	P
41	A	Y	COSCA	Coastal Sage Scrub	M	M	M	M	M	M	M	–	–	–	–	–	P
45	rejected ^{PO}	Y	SP	Riparian Woodland	M	M	M	–	–	–	–	–	–	–	–	–	–
46	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
53	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
55	A	Y	MRCA	Chaparral	M	M	M	M	M	M	M	–	–	–	–	–	P
57	A	Y	COSCA	Chaparral	M	M	M	M	M	M	M	–	–	–	–	–	P
60	A	Y	MRCA	Grassland	M	M	M	M	M	M	M	W18	–	–	–	–	P
61	A	Y	SP	Chaparral	M	M	M	M	M	M	M	S13	–	–	–	–	P
66	A	Y	NPS	Coastal Sage Scrub	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
68	A	Y	NPS	Coastal Sage Scrub	M	M	M	M	M	M	M	W18	P-add	–	–	–	P
71	A	Y	MRCA	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
76	A	Y	SP	Upland Woodland	M	M	M	M	M	M	M	–	–	–	–	–	P
78	A	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
79	A	Y	COSCA	Chaparral	M	M	M	M	M	M	M	W18	–	–	–	–	P
82	A	Y	SP	Coastal Sage Scrub	M	M	M	M	M	M	M	S13	–	–	–	–	P
93	A	Y	SP	Chaparral	M	M	M	M	M	M	M	S13	–	–	–	–	P
94	A-GAP	Y	NPS	Riparian Woodland	–	–	–	–	–	M	M	–	–	–	–	–	P
96	A-GAP	Y	RSRPD	Coastal Sage Scrub	–	–	–	–	–	M	M	P18	P-add	–	–	–	P

¹ PO=plot monitored initially, but then dropped from the study (rejected) due to copious poison-oak, D@=delayed due to danger; visited in this year, but couldn't be monitored safely, ET=plot monitored initially, but then dropped from the study (rejected) due to extreme terrain, PA=plot monitored initially, but then dropped from the study (rejected) due to property access restrictions, P?=this plot may or may not be monitored this year, depending on how many plots ahead of it can be established, which will dictate which Panel it ends up in, P-add=this plot was surveyed an extra year to focus on a subset for a continued look at vegetation recovery following the Woolsey Fire, in collaboration with J. Alcaraz (Vegetation Bio-technician on this project, and California State University Northridge M.S. student).

² Owner codes: Malibu=City of Malibu, COSCA=Conejo Open Space Conservation Agency, LVMWD=Las Virgenes Municipal Water District, MRCA= Mountains Recreation and Conservation Authority, MRT=Mountains Restoration Trust, NPS=National Park Service, RSRPD= Rancho Simi Recreation and Park District, SP=California State Parks.

³ Recent Fire codes: S13=Springs2013, W18=Woolsey2018, H18=Hill2018, P18=Peak2018, W19=Wendy2019, E19=Easy2019, R20=RockPool2020.

⁴ Fire Extra–these 3 plots were added beyond the panel design to enable additional Coastal Sage Scrub post-fire monitoring following the Springs Fire.

Table A-1 (continued). All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
99	A-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
100	A-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	–	–	–	–	–	P
101	A-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	–	P
110	A-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	–	P
115	A-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
124	A-GAP	Y	RSRPD	Grassland	–	–	–	–	–	M	M	–	–	–	–	–	P
131	A-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	–	P
132	A-GAP	Y	NPS	Grassland	M	–	–	–	–	M	M	W18	–	–	–	–	P
133	A-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
135	A-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
139	A-GAP	Y	MRT	Chaparral	–	–	–	–	–	M	M	–	–	–	–	–	P
141	A-GAP	Y	SP	Coastal Sage Scrub	M	M	M	–	–	M	M	S13	–	–	–	–	P
143	B-GAP	Y	COSCA	Grassland	–	–	–	–	–		M	W18	P	–	–	–	–
146	A-GAP	Y	COSCA	Chaparral	M	M	M	–	–	M	M	S13	–	–	–	–	P
147	A-GAP	Y	MRCA	Upland Woodland	–	–	–	–	–	M	M	W18	–	–	–	–	P
148	A-GAP	Y	SP	Upland Woodland	–	–	–	–	–	M	M	–	–	–	–	–	P
151	A-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	–	–	–	–	–	P
152	A-GAP	Y	MRCA	Chaparral	–	–	–	–	–	M	M	–	–	–	–	–	P
158	A-GAP	Y	SP	Upland Woodland	–	–	–	–	–	M	M	W18	–	–	–	–	P
163	A-GAP	Y	LVMWD	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
164	B-GAP	Y	SP	Chaparral	–	–	–	–	–	–	M	–	P	–	–	–	–
165	A-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	–	P
173	A-GAP	Y	SP	Coastal Sage Scrub	M	M	M	–	–	M	M	S13	–	–	–	–	P
174	A-GAP	Y	SP	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	P-add	–	–	–	P
175	A-GAP	Y	NPS	Grassland	–	–	–	–	–	M	M	W18	–	–	–	–	P
177	B	Y	SP	Chaparral	M	M	M	M	M	M	M	W18	P	–	–	–	–
191	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	W18	P	–	–	–	–
205	B	Y	SP	Chaparral	M	M	M	M	M	M	M	S13	P	–	–	–	–
206	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	W18	P	–	–	–	–
211	B	Y	NPS	Grassland	M	M	M	M	M	M	M	W18	P	–	–	–	–

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Table A-1 (continued). All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
212	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M		P	—	—	—	—
215	B	Y	SP	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
217	B	Y	COSCA	Coastal Sage Scrub	M	M	M	M	M	M	M	—	P	—	—	—	—
222	B	Y	SP	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
223	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
225	B	Y	SP	Coastal Sage Scrub	M	M	M	M	M	M	M	W18	P	—	—	—	—
231	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	—	P	—	—	—	—
237	B	Y	SP	Chaparral	M	M	M	M	M	M	M	S13	P	—	—	—	—
238	B	Y	SP	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
250	B	Y	SP	Upland Woodland	M	M	M	M	M	M	D@	W18	P	—	—	—	—
253	rejected ^{PO}	Y	SP	Chaparral	1	M	M	—	—	—	—	S13	—	—	—	—	—
255	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	—	P	—	—	—	—
258	B	Y	MRCA	Chaparral	M	M	M	M	M	M	M	S13	P	—	—	—	—
260	B	Y	NPS	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
270	rejected ^{ET}	Y	SP	Chaparral	M	M	—	—	—	—	—	—	—	—	—	—	—
271	B	Y	COSCA	Chaparral	M	M	M	M	M	M	M	W18	P	—	—	—	—
274	B	Y	NPS	Riparian Woodland	M	M	M	M	M	M	M	—	P	—	—	—	—
285	B	Y	SP	Coastal Sage Scrub	M	M	M	M	M	M	M	S13	P	—	—	—	—
286	B	Y	NPS	Chaparral	M	M	M	M	M	M	M	—	P	—	—	—	—
287	B	Y	COSCA	Riparian Woodland	M	M	M	M	M	M	M	—	P	—	—	—	—
289	rejected ^{PA}	Y	NPS	Chaparral	—	M	—	—	—	—	—	—	—	—	—	—	—
291	B	Y	MRCA	Grassland	—	—	M	M	M	M	M	W18	P	—	—	—	—
293	B	Y	NPS	Chaparral	—	—	M	M	M	M	M	W18	P	—	—	—	—
297	B-GAP	Y	COSCA	Coastal Sage Scrub	—	—	—	—	—	—	M	—	P	—	—	—	—
301	rejected ^{PO}	Y	SP	Riparian Woodland	M	—	—	—	—	—	—	S13	—	—	—	—	—
303	B-GAP	Y	MRCA	Chaparral	—	—	—	—	—	M	M	W18	P	—	—	—	—
304	B-GAP	Y	SP	Chaparral	—	—	—	—	—	—	M	—	P	—	—	—	—
313	B-GAP	Y	COSCA	Coastal Sage Scrub	—	—	—	—	—	—	M	—	P	—	—	—	—
316	B-GAP	Y	MRCA	Grassland	—	—	—	—	—	M	M	W18	P	—	—	—	—
317	B-GAP	Y	SP	Chaparral	M	M	M	—	—		M	S13	P	—	—	—	—

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Table A-1 (continued). All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

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318	B-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
322	B-GAP	Y	SP	Chaparral	–	–	–	–	–		M	S13	P	–	–	–	–
323	B-GAP	Y	NPS	Riparian Woodland	–	–	–	–	–	M	M	W18	P	–	–	–	–
324	B-GAP	Y	NPS	Grassland	–	–	–	–	–	M	M	W18	P	–	–	–	–
329	B-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
335	B-GAP	Y	COSCA	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
338	B-GAP	Y	SP	Chaparral	M	M	M	–	–	–	M	S13	P	–	–	–	–
340	B-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	–	M	–	P	–	–	–	–
349	B-GAP	Y	SP	Grassland	–	–	–	–	–	–	M	S13	P	–	–	–	–
356	B-GAP	Y	SP	Chaparral	–	–	–	–	–	–	M	–	P	–	–	–	–
357	B-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
358	B-GAP	Y	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	M	–	P	–	–	–	–
360	C-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	P	P	–	–	–
361	C-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	P	P	–	–	–
365	B-GAP	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	M	S13	P	–	–	–	–
367	B-GAP	Y	MRCA	Upland Woodland	–	–	–	–	–	M	M	W18	P	–	–	–	–
369	B-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
371	B-GAP	Y	MRCA	Upland Woodland	–	–	–	–	–	M	M	W18	P	–	–	–	–
379	B-GAP	Y	LVMWD	Chaparral	–	–	–	–	–	M	M	W18	P	–	–	–	–
383	C	Y	RSRPD	Chaparral	–	M	M	–	–	M	M	W18	P	P	–	–	–
385	C	Y	SP	Chaparral	M	M	M	M	–	–	–	S13	P	P	–	–	–
386	C	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
390	C	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	P	P	–	–	–
393	C	Y	COSCA	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
397	C	Y	SP	Chaparral	–	M	M	–	–	–	–	P	P	–	–	–	–
403	C	Y	MRCA	Coastal Sage Scrub	–	M	M	–	–	M	M	W18	P	P	–	–	–
404	C	Y	MRCA	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
408	C	Y	MRCA	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
409	C	Y	COSCA	Coastal Sage Scrub	–	M	M	–	–	M	M	H18	P	P	–	–	–
413	C	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–

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Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
420	C	Y	SP	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
429	C	Y	NPS	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
430	C	Y	SP	Coastal Sage Scrub	–	M	M	–	–	M	M	W18	P	P	–	–	–
435	C	Y	MRCA	Grassland	–	M	M	–	–	M	M	W18	P	P	–	–	–
436	C	Y	MRCA	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
445	C	Y	NPS	Chaparral	–	M	M	–	–	M	M	W18	P	P	–	–	–
447	C	Y	MRCA	Chaparral	–	M	M	–	–	M	M	W18	P	P	–	–	–
450	C	Y	NPS	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
452	C	Y	RSRPD	Chaparral	–	M	M	–	–	M	M	W18	P	P	–	–	–
454	C	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	P	P	–	–	–
455	C	Y	MRCA	Upland Woodland	–	M	M	–	–	M	M	W18	P	P	–	–	–
458	C	Y	MRCA	Chaparral	–	M	M	–	–	–	–	–	P	P	–	–	–
461	C	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
463	C	Y	COSCA	Coastal Sage Scrub	–	M	M	–	–	M	M	W18	P	P	–	–	–
465	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
467	C-GAP	Y	MRCA	Riparian Woodland	–	–	–	–	–	M	M	W18	P	P	–	–	–
477	C-GAP	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
478	C-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
481	C-GAP	Y	SP	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	P	P	–	–	–
484	C-GAP	Y	SP	Grassland	–	–	–	–	–	–	–	–	P	P	–	–	–
486	C-GAP	Y	COSCA	Upland Woodland	–	–	–	–	–	–	–	–	P	P	–	–	–
487	C-GAP	Y	MRCA	Chaparral	–	–	–	–	–	–	–	–	P	P	–	–	–
493	C-GAP	Y	SP	Upland Woodland	–	–	–	–	–	–	–	S13	P	P	–	–	–
495	C-GAP	Y	RSRPD	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	P	P	–	–	–
507	C-GAP	Y	COSCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	P	P	–	–	–
509	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
512	D-GAP	N	MRCA	Chaparral	–	–	–	–	–	–	–	–	–	P	P	–	–
521	C-GAP	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
526	C-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
527	C-GAP	Y	COSCA	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–

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543	D-GAP	N	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	P	P	–	–
545	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
547	C-GAP	Y	MRCA	Upland Woodland	–	–	–	–	–	M	M	W18	P	P	–	–	–
552	D-GAP	N	MRCA	Chaparral	–	–	–	–	–	–	–	–	–	P	P	–	–
553	D-GAP	N	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	P	P	–	–
561	C-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
568	D-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	P	P	–	–
569	D-GAP	N	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	P	P	–	–
572	C-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	P	P	–	–	–
579	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
580	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
594	C-GAP	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	P	P	–	–	–
597	C-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	P	P	–	–	–
605	D	Y	SP	Coastal Sage Scrub	M	M	M	M	–	–	–	S13	–	P	P	–	–
613	D	Y	NPS	Chaparral	–	–	M	M	–	M	D@	W18	–	P	P	–	–
621	D	Y	SP	Coastal Sage Scrub	M	M	M	M	–	–	–	S13	–	P	P	–	–
623	D	Y	NPS	Upland Woodland	–	–	M	M	–	M	M	W18	–	P	P	–	–
627	D	Y	MRCA	Chaparral	–	–	M	M	–	M	M	W18	–	P	P	–	–
631	D	Y	NPS	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
632	D	Y	SP	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
635	D	Y	SP	Grassland	–	–	M	M	–	M	M	W18, R20	P	P	P	–	–
638	D	Y	MRCA	Upland Woodland	–	–	M	M	–	M	M	W18	P-add	P	P	–	–
642	D	Y	SP	Chaparral	–	–	M	M	–	–	–	S13	–	P	P	–	–
643	D	Y	NPS	Chaparral	–	–	M	M	–	M	M	W18	–	P	P	–	–
646	D	Y	SP	Chaparral	M	M	M	M	–	–	–	S13	–	P	P	–	–
647	D	Y	MRCA	Grassland	–	–	M	M	–	M	M	W18	–	P	P	–	–
649	D	Y	COSCA	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
653	D	Y	SP	Chaparral	–	–	M	M	–	–	–	S13	–	P	P	–	–
656	D	Y	RSRPD	Coastal Sage Scrub	–	–	M	M	–	M	M	W18	–	P	P	–	–
658	D	Y	SP	Riparian Woodland	–	–	M	M	–	–	–	S13	–	P	P	–	–

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659	D	Y	MRCA	Grassland	–	–	M	M	–	M	M	W18	–	P	P	–	–
660	D	Y	MRCA	Coastal Sage Scrub	–	–	M	M	–	–	–	–	–	P	P	–	–
664	D	Y	MRCA	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
665	D	Y	COSCA	Coastal Sage Scrub	–	–	M	M	–	M	M	H18	–	P	P	–	–
669	D	Y	SP	Coastal Sage Scrub	M	M	M	M	–	–	–	S13	–	P	P	–	–
679	D	Y	MRCA	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
680	D	Y	SP	Chaparral	–	–	M	M	–	–	–	–	–	P	P	–	–
682	D	Y	NPS	Chaparral	–	–	M	M	–	M	M	W18	–	P	P	–	–
685	D-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
686	D-GAP	Y	SP	Upland Woodland	–	–	–	–	–	M	M	W18	–	P	P	–	–
689	D-GAP	Y	SP	Riparian Woodland	–	–	–	–	–	M	M	W18	–	P	P	–	–
691	D-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	P	P	–	–
697	D-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
698	D-GAP	Y	MRCA	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
702	D-GAP	Y	NPS	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	P	P	–	–
703	D-GAP	Y	NPS	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	P	P	–	–
706	D-GAP	Y	NPS	Grassland	–	–	–	–	–	–	M	W19	P	P	P	–	–
708	D-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
710	D-GAP	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	–	P	P	–	–
711	D-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	P	P	–	–
717	D-GAP	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	–	P	P	–	–
719	D-GAP	Y	COSCA	Grassland	–	–	–	–	–	M	M	W18	–	P	P	–	–
721	D-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
727	D/E-GAP	N	SP	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	P?	P	P?	–
730	D-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
733	D-GAP	Y	SP	Chaparral	M	M	M	–	–	–	–	S13	–	P	P	–	–
742	D/E-GAP	N	COSCA	Grassland	–	–	–	–	–	–	–	–	–	P?	P	P?	–
749	D/E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	S13	–	P?	P	P?	–
750	D-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	–	P	P	–	–
763	D-GAP	Y	COSCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	P	P	–	–

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767	D/E-GAP	N	MRCA	Chaparral	–	–	–	–	–	–	–	–	–	P?	P	P?	–
770	D-GAP	Y	NPS	Coastal Sage Scrub	–	–	–	–	–	M	M	S13,W18	–	P	P	–	–
771	E	Y	NPS	Coastal Sage Scrub	–	–	–	M	M	M	M	W18	–	–	P	P	–
772	E	Y	NPS	Grassland	–	–	–	M	M	M	M	W18	–	–	P	P	–
775	E	Y	MRCA	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
777	E	Y	NPS	Grassland	–	–	–	M	M	–	–	–	–	–	P	P	–
782	E	Y	NPS	Upland Woodland	–	–	–	M	M	M	M	W18	–	–	P	P	–
783	E	Y	COSCA	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
785	E	Y	Malibu	Coastal Sage Scrub	–	–	–	M	M	M	M	W18	–	–	P	P	–
787	E	Y	MRCA	Grassland	–	–	–	M	M	M	M	W18	–	–	P	P	–
789	E	Y	NPS	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
791	E	Y	MRCA	Grassland	–	–	–	M	M	M	M	W18	–	–	P	P	–
799	E	Y	COSCA	Grassland	–	–	–	M	M	M	M	W18	–	–	P	P	–
804	E	Y	SP	Chaparral	–	–	–	M	M	–	–	–	–	–	P	P	–
809	E	Y	COSCA	Coastal Sage Scrub	–	–	–	M	M	–	–	–	–	–	P	P	–
813	E	Y	SP	Chaparral	–	–	–	M	M	–	–	S13	–	–	P	P	–
814	E	Y	NPS	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
815	E	Y	NPS	Coastal Sage Scrub	–	–	–	M	M	M	M	W18	–	–	P	P	–
816	E	Y	MRCA	Grassland	–	–	–	M	M	–	–	–	–	–	P	P	–
817	E	Y	SP	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
819	E	Y	MRCA	Coastal Sage Scrub	–	–	–	M	M	M	M	W18	–	–	P	P	–
821	E	Y	NPS	Grassland	–	–	–	M	M	M	M	W18	–	–	P	P	–
824	E	Y	SP	Chaparral	–	–	–	M	M	–	–	–	–	–	P	P	–
827	E	Y	SP	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
828	E	Y	RSRPD	Grassland	–	–	–	M	M	–	–	–	–	–	P	P	–
830	E	Y	SP	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
831	E	Y	RSRPD	Chaparral	–	–	–	M	M	M	M	W18	–	–	P	P	–
834	E-GAP	Y	SP	Chaparral	–	–	–	–	–	–	–	S13	–	–	P	P	–
835	E-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	P	P	–
836	E-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	P	P	–

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839	E-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	P	P	–
840	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
844	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
847	E-GAP	Y	COSCA	Chaparral	–	–	–	–	–	M	M	W18	–	–	P	P	–
856	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
857	E-GAP	Y	COSCA	Coastal Sage Scrub	–	–	–	–	–	M	M	H18	–	–	P	P	–
861	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	S13	–	–	P	P	–
863	E-GAP	Y	COSCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	–	P	P	–
865	E-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	D@	W18	–	–	P	P	–
868	E-GAP	N	SP	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	–	P	P	–
870	E-GAP	N	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	–	P	P	–
874	E-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	P	P	–
879	E-GAP	Y	RSRPD	Grassland	–	–	–	–	–	M	M	W18	–	–	P	P	–
883	E-GAP	Y	MRCA	Grassland	–	–	–	–	–	M	M	W18	–	–	P	P	–
885	E-GAP	N	NPS	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
888	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
889	E-GAP	N	COSCA	Grassland	–	–	–	–	–	–	–	–	–	–	P	P	–
891	E-GAP	N	MRCA	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
897	E-GAP	N	SP	Coastal Sage Scrub	–	–	–	–	–	–	–	S13	–	–	P	P	–
898	E-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	P	P	–
909	F	Y	SP	Chaparral	–	–	–	–	M	M	–	S13	–	–	–	P	P
910	F	Y	MRCA	Chaparral	–	–	–	–	M	M	M	W18	–	–	–	P	P
911	F	Y	COSCA	Chaparral	–	–	–	–	M	M	M	W18	–	–	–	P	P
913	F	Y	NPS	Chaparral	–	–	–	–	M	M	M	W18	–	–	–	P	P
915	F	Y	NPS	Coastal Sage Scrub	–	–	–	–	M	M	M	W18	–	–	–	P	P
920	F	Y	MRCA	Chaparral	–	–	–	–	M	M	–	–	–	–	–	P	P
921	F	Y	COSCA	Coastal Sage Scrub	–	–	–	–	M	M	M	H18	–	–	–	P	P
925	F	Y	SP	Coastal Sage Scrub	–	–	–	–	M	M	–	S13	–	–	–	P	P
934	F	Y	COSCA	Coastal Sage Scrub	–	–	–	–	M	M	–	–	–	–	–	P	P
937	F	Y	COSCA	Grassland	–	–	–	–	M	M	–	–	–	–	–	P	P

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⁴ Fire Extra–these 3 plots were added beyond the panel design to enable additional Coastal Sage Scrub post-fire monitoring following the Springs Fire.

Table A-1 (continued). All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
941	F	Y	SP	Coastal Sage Scrub	—	—	—	—	M	M	—	S13	—	—	—	P	P
942	F	Y	SP	Chaparral	—	—	—	—	M	M	M	W18	—	—	—	P	P
948	F	Y	MRCA	Grassland	—	—	—	—	M	M	—	—	—	—	—	P	P
955	F	Y	SP	Chaparral	—	—	—	—	M	M	M	W18	—	—	—	P	P
956	F	Y	RSRPD	Coastal Sage Scrub	—	—	—	—	M	M	M	E19	P	—	—	P	P
959	F	Y	NPS	Chaparral	—	—	—	—	M	M	M	W18	—	—	—	P	P
960	F	Y	MRCA	Chaparral	—	—	—	—	M	M	—	—	—	—	—	P	P
962	F	Y	SP	Chaparral	—	—	—	—	M	M	—	S13	—	—	—	P	P
964	F	Y	NPS	Chaparral	—	—	—	—	M	M	M	W18	—	—	—	P	P
971	F	Y	MRCA	Chaparral	—	—	—	—	M	M	—	—	—	—	—	P	P
973	F	Y	SP	Coastal Sage Scrub	—	—	—	—	M	M	—	S13	—	—	—	P	P
974	F	Y	MRCA	Coastal Sage Scrub	—	—	—	—	M	D@	M	W18	—	—	—	P	P
977	F	Y	NPS	Chaparral	—	—	—	—	M	M	M	W18	—	—	—	P	P
979	F	Y	NPS	Grassland	—	—	—	—	M	M	M	W18	—	—	—	P	P
981	F	Y	NPS	Grassland	—	—	—	—	M	M	M	W18	—	—	—	P	P
986	F-GAP	Y	NPS	Riparian Woodland	—	—	—	—	—	M	M	W18	—	—	—	P	P
989	F-GAP	N	SP	Coastal Sage Scrub	—	—	—	—	—	—	—	S13	—	—	—	P	P
990	F-GAP	Y	NPS	Coastal Sage Scrub	—	—	—	—	—	M	M	W18	—	—	—	P	P
999	F-GAP	N	NPS	Chaparral	—	—	—	—	—	—	—	—	—	—	—	P	P
1003	F-GAP	Y	SP	Grassland	—	—	—	—	—	M	M	W18	—	—	—	P	P
1004	F-GAP	Y	RSRPD	Coastal Sage Scrub	—	—	—	—	—	M	M	W18	—	—	—	P	P
1008	F-GAP	N	RSRPD	Coastal Sage Scrub	—	—	—	—	—	—	—	—	—	—	—	P	P
1009	F-GAP	Y	Malibu	Upland Woodland	—	—	—	—	—	M	M	W18	—	—	—	P	P
1012	F-GAP	N	MRCA	Chaparral	—	—	—	—	—	—	—	—	—	—	—	P	P
1016	F-GAP	N	SP	Chaparral	—	—	—	—	—	—	—	—	—	—	—	P	P
1019	F-GAP	Y	COSCA	Coastal Sage Scrub	—	—	—	—	—	M	M	W18	—	—	—	P	P
1021	F-GAP	Y	SP	Chaparral	—	—	—	—	—	M	M	W18	—	—	—	P	P
1022	F-GAP	Y	NPS	Chaparral	—	—	—	—	—	M	M	W18	—	—	—	P	P
1027	F-GAP	Y	NPS	Chaparral	—	—	—	—	—	M	M	W18	—	—	—	P	P
1028	F-GAP	Y	NPS	Chaparral	—	—	—	—	—	M	M	W18	—	—	—	P	P

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Table A-1 (continued). All monitoring plots across entire study area, along with the vegetation community, panel designation, and status—established, recent fire history, and years monitored (M) or proposed (P) for monitoring.

Plot MS-#	Panel ¹	Established?	Owner ²	Vegetation Community	2014	2015	2016	2017	2018	2019	2020 ¹	Recent Fire ³	2021 ¹	2022 ¹	2023 ¹	2024 ¹	2025 ¹
1029	F-GAP	Y	Malibu	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	–	–	P	P
1036	F-GAP	N	SP	Chaparral	–	–	–	–	–	–	–	–	–	–	–	P	P
1037	F-GAP	Y	SP	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	–	–	P	P
1038	F-GAP	Y	SP	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	P	P
1039	F-GAP	Y	COSCA	Grassland	–	–	–	–	–	M	M	W18	–	–	–	P	P
1041	F-GAP	N	SP	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	–	–	P	P
1042	F-GAP	N	NPS	Grassland	–	–	–	–	–	–	–	–	–	–	–	P	P
1044	F-GAP	N	MRCA	Upland Woodland	–	–	–	–	–	–	–	–	–	–	–	P?	P?
1045	F-GAP	Y	MRCA	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	P	P
1053	F-GAP	N	SP	Grassland	–	–	–	–	–	–	–	S13	–	–	–	P?	P?
1054	F-GAP	Y	MRCA	Coastal Sage Scrub	–	–	–	–	–	M	M	W18	–	–	–	P	P
1055	F-GAP	N	COSCA	Coastal Sage Scrub	–	–	–	–	–	–	–	–	–	–	–	P?	P?
1057	F-GAP	Y	NPS	Chaparral	–	–	–	–	–	M	M	W18	–	–	–	P	P
1058	F-GAP	N	COSCA	Grassland	–	–	–	–	–	–	–	–	–	–	–	P?	P?
1309	Fire Extra ⁴	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	–	–	–	–	–
1490	Fire Extra ⁴	Y	COSCA	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	–	–	–	–	–
1665	Fire Extra ⁴	Y	SP	Coastal Sage Scrub	M	M	M	–	–	–	–	S13	–	–	–	–	–

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Appendix B. Comprehensive list of species found at SAMO vegetation monitoring plots.

Table B-1. List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
ACHMIL	<i>Achillea millefolium</i>	Asteraceae	Herbaceous	Perennial
ACMAMEAM	<i>Acmispon americanus</i> var. <i>americanus</i>	Fabaceae	Herbaceous	Annual
ACMGLA	<i>Acmispon glaber</i>	Fabaceae	Sub-shrub	Perennial
ACMGRAGR	<i>Acmispon grandiflorus</i> var. <i>grandiflorus</i>	Fabaceae	Herbaceous	Perennial
ACMMARMA	<i>Acmispon maritimus</i> var. <i>maritimus</i>	Fabaceae	Herbaceous	Annual
ACMMIC	<i>Acmispon micranthus</i>	Fabaceae	Herbaceous	Annual
ACMSTR	<i>Acmispon strigosus</i>	Fabaceae	Herbaceous	Annual
ACMWRA	<i>Acmispon wrangelianus</i>	Fabaceae	Herbaceous	Annual
ACOMIC	<i>Acourtia microcephala</i>	Asteraceae	Herbaceous	Perennial
ADEFASFA	<i>Adenostoma fasciculatum</i> var. <i>fasciculatum</i>	Rosaceae	Shrub	Perennial
ADESPA	<i>Adenostoma sparsifolium</i>	Rosaceae	Shrub	Perennial
ADICAP	<i>Adiantum capillus-veneris</i>	Pteridaceae	Fern	Perennial
ADIJOR	<i>Adiantum jordanii</i>	Pteridaceae	Fern	Perennial
AGOGRAGR	<i>Agoseris grandiflora</i> var. <i>grandiflora</i>	Asteraceae	Herbaceous	Perennial
AGRPAL	<i>Agrostis pallens</i>	Poaceae	Grass	Perennial
ALLHAE	<i>Allium haematochiton</i>	Alliaceae	Herbaceous	Perennial
ALLPENPE	<i>Allium peninsulare</i> var. <i>peninsulare</i>	Alliaceae	Herbaceous	Perennial
ALLPRA	<i>Allium praecox</i>	Alliaceae	Herbaceous	Perennial
ALLGLU	<i>Allophyllum glutinosum</i>	Polemoniaceae	Herbaceous	Annual
ALNRHO	<i>Alnus rhombifolia</i>	Betulaceae	Tree	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
AMSINT	<i>Amsinckia intermedia</i>	Boraginaceae	Herbaceous	Annual
ANTCOT	<i>Anthemis cotula</i> *	Asteraceae	Herbaceous	Annual
ANTCAU	<i>Anthriscus caucalis</i> *	Apiaceae	Herbaceous	Annual
ANTCOU	<i>Antirrhinum coulterianum</i>	Plantaginaceae	Herbaceous	Annual
ANTKEL	<i>Antirrhinum kelloggii</i>	Plantaginaceae	Herbaceous	Annual
ANTNUT	<i>Antirrhinum nuttallianum</i>	Plantaginaceae	Herbaceous	Annual
ANTMUL	<i>Antirrhinum thompsonii</i>	Plantaginaceae	Herbaceous	Annual
APHOCC	<i>Aphanes occidentalis</i>	Rosaceae	Herbaceous	Annual
APHFAS	<i>Aphyllon fasciculatum</i>	Orobanchaceae	Herbaceous	Perennial
APHTUB	<i>Aphyllon tuberosum</i>	Orobanchaceae	Herbaceous	Perennial
APIANG	<i>Apiastrum angustifolium</i>	Apiaceae	Herbaceous	Annual
ARCGLAGL	<i>Arctostaphylos glandulosa</i> ssp. <i>glandulosa</i>	Ericaceae	Shrub	Perennial
ARCGLAUC	<i>Arctostaphylos glauca</i>	Ericaceae	Shrub	Perennial
ARGMUN	<i>Argemone munita</i>	Papaveraceae	Herbaceous	Annual
ARIADS	<i>Aristida adscensionis</i>	Poaceae	Grass	Annual
ARTCAL	<i>Artemisia californica</i>	Asteraceae	Shrub	Perennial
ARTDOU	<i>Artemisia douglasiana</i>	Asteraceae	Herbaceous	Perennial
ASCCAL	<i>Asclepias californica</i>	Apocynaceae	Herbaceous	Perennial
ASCFAS	<i>Asclepias fascicularis</i>	Apocynaceae	Herbaceous	Perennial
ASPCAL	<i>Aspidotis californica</i>	Pteridaceae	Fern	Perennial
ASTDID	<i>Astragalus didymocarpus</i> var. <i>didymocarpus</i>	Fabaceae	Herbaceous	Annual
ASTGAM	<i>Astragalus gambelianus</i>	Fabaceae	Herbaceous	Annual
ASTTRI	<i>Astragalus trichopodus</i> var. <i>lonchus</i>	Fabaceae	Herbaceous	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
ASTTRIPH	<i>Astragalus trichopodus</i> var. <i>phoxus</i>	Fabaceae	Herbaceous	Perennial
ATHPUS	<i>Athysanus pusillus</i>	Brassicaceae	Herbaceous	Annual
AVEBAR	<i>Avena barbata</i> *	Poaceae	Grass	Annual
AVEFAT	<i>Avena fatua</i> *	Poaceae	Grass	Annual
BACPILCO	<i>Baccharis pilularis</i> var. <i>consanguinea</i>	Asteraceae	Shrub	Perennial
BACPLUPL	<i>Baccharis plummerae</i> ssp. <i>plummerae</i>	Asteraceae	Shrub	Perennial
BACSAL	<i>Baccharis salicifolia</i>	Asteraceae	Shrub	Perennial
BARORT	<i>Barbarea orthoceras</i>	Brassicaceae	Herbaceous	Perennial
BLOCROCR	<i>Bloomeria crocea</i> var. <i>crocea</i>	Themidaceae	Herbaceous	Perennial
BOTBAR	<i>Bothriochloa barbinodis</i>	Poaceae	Grass	Perennial
BOWINC	<i>Bowlesia incana</i>	Apiaceae	Herbaceous	Annual
BRADIS	<i>Brachypodium distachyon</i> *	Poaceae	Grass	Annual
BRANIG	<i>Brassica nigra</i> *	Brassicaceae	Herbaceous	Annual
BRICAL	<i>Brickellia californica</i>	Asteraceae	Shrub	Perennial
BRODIA	<i>Bromus diandrus</i> *	Poaceae	Grass	Annual
BROHOR	<i>Bromus hordeaceus</i> *	Poaceae	Grass	Annual
BROMAD	<i>Bromus madritensis</i> *	Poaceae	Grass	Annual
BRORUB	<i>Bromus rubens</i> *	Poaceae	Grass	Annual
CALBRE	<i>Calandrinia breweri</i>	Montiaceae	Herbaceous	Annual
CALMEN	<i>Calandrinia menziesii</i>	Montiaceae	Herbaceous	Annual
CARMAC	<i>California macrophylla</i>	Geraniaceae	Herbaceous	Annual
CALALB	<i>Calochortus albus</i>	Liliaceae	Herbaceous	Perennial
CALCAT	<i>Calochortus catalinae</i>	Liliaceae	Herbaceous	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
CALCLAGR	<i>Calochortus clavatus</i> var. <i>gracilis</i>	Liliaceae	Herbaceous	Perennial
CALCLAPA	<i>Calochortus clavatus</i> var. <i>pallidus</i>	Liliaceae	Herbaceous	Perennial
CALMON	<i>Calyptidium monandrum</i>	Montiaceae	Herbaceous	Annual
CALMAC	<i>Calystegia macrostegia</i>	Convolvulaceae	Herbaceous	Perennial
CALPURPU	<i>Calystegia purpurata</i> ssp. <i>purpurata</i>	Convolvulaceae	Herbaceous	Perennial
CAMSTR	<i>Camissonia strigulosa</i>	Onagraceae	Herbaceous	Annual
CAMBIS2	<i>Camissoniopsis bistorta</i>	Onagraceae	Herbaceous	Annual
CAMINT2	<i>Camissoniopsis intermedia</i>	Onagraceae	Herbaceous	Annual
CAMMIC3	<i>Camissoniopsis micrantha</i>	Onagraceae	Herbaceous	Annual
CAPBUR	<i>Capsella bursa-pastoris</i> *	Brassicaceae	Herbaceous	Annual
CARCALCA	<i>Cardamine californica</i> var. <i>californica</i>	Brassicaceae	Herbaceous	Perennial
CAROLI	<i>Cardamine oligosperma</i>	Brassicaceae	Herbaceous	Annual
CARPYC	<i>Carduus pycnocephalus</i> *	Asteraceae	Herbaceous	Annual
CASAFFAF	<i>Castilleja affinis</i> ssp. <i>affinis</i>	Orobanchaceae	Herbaceous	Perennial
CASEXS	<i>Castilleja exserta</i> ssp. <i>exserta</i>	Orobanchaceae	Herbaceous	Annual
CAUHET	<i>Caulanthus heterophyllus</i>	Brassicaceae	Herbaceous	Annual
CAULAS	<i>Caulanthus lasiophyllus</i>	Brassicaceae	Herbaceous	Annual
CEACRA	<i>Ceanothus crassifolius</i>	Rhamnaceae	Shrub	Perennial
CEACUNCU	<i>Ceanothus cuneatus</i> var. <i>cuneatus</i>	Rhamnaceae	Shrub	Perennial
CEAMEGME	<i>Ceanothus megacarpus</i> var. <i>megacarpus</i>	Rhamnaceae	Shrub	Perennial
CEAOLI	<i>Ceanothus oliganthus</i>	Rhamnaceae	Shrub	Perennial
CEASPI	<i>Ceanothus spinosus</i>	Rhamnaceae	Shrub	Perennial
CENMEL	<i>Centaurea melitensis</i> *	Asteraceae	Herbaceous	Annual

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
CERGLO	<i>Cerastium glomeratum</i> *	Caryophyllaceae	Herbaceous	Annual
CERBET	<i>Cercocarpus betuloides</i>	Rosaceae	Shrub	Perennial
CHAART	<i>Chaenactis artemisiifolia</i>	Asteraceae	Herbaceous	Annual
CHAGLA	<i>Chaenactis glabriuscula</i>	Asteraceae	Herbaceous	Annual
CHECAL	<i>Chenopodium californicum</i>	Chenopodiaceae	Herbaceous	Perennial
CHEMUR	<i>Chenopodium murale</i> *	Chenopodiaceae	Herbaceous	Annual
CHLPOM	<i>Chlorogalum pomeridianum</i>	Hyacinthaceae	Herbaceous	Perennial
CHOSTA	<i>Chorizanthe staticoides</i>	Polygonaceae	Herbaceous	Annual
CIROCC	<i>Cirsium occidentale</i>	Asteraceae	Herbaceous	Perennial
CISMAR	<i>Cistanthe maritima</i>	Montiaceae	Herbaceous	Annual
CLABOT	<i>Clarkia bottae</i>	Onagraceae	Herbaceous	Annual
CLACYLCY	<i>Clarkia cylindrica</i> ssp. <i>cylindrica</i>	Onagraceae	Herbaceous	Annual
CLAEPI	<i>Clarkia epilobioides</i>	Onagraceae	Herbaceous	Annual
CLAPUR	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Onagraceae	Herbaceous	Annual
CLAUNG	<i>Clarkia unguiculata</i>	Onagraceae	Herbaceous	Annual
CLAEXI	<i>Claytonia exigua</i> ssp. <i>exigua</i>	Portulacaceae	Herbaceous	Annual
CLAPAR	<i>Claytonia parviflora</i>	Portulacaceae	Herbaceous	Annual
CLAPER	<i>Claytonia perfoliata</i>	Portulacaceae	Herbaceous	Annual
CLELAS	<i>Clematis lasiantha</i>	Ranunculaceae	Vine	Perennial
COLHET	<i>Collinsia heterophylla</i>	Plantaginaceae	Herbaceous	Annual
COMDIV	<i>Comarostaphylis diversifolia</i> ssp. <i>planifolia</i>	Ericaceae	Shrub	Perennial
CONMAC	<i>Conium maculatum</i> *	Apiaceae	Herbaceous	Perennial
CONARV	<i>Convolvulus arvensis</i> *	Convolvulaceae	Herbaceous	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
CONSIM	<i>Convolvulus simulans</i>	Convolvulaceae	Herbaceous	Annual
CORRIGRI	<i>Cordylanthus rigidus</i> ssp. <i>rigidus</i>	Orobanchaceae	Herbaceous	Annual
CORFIL	<i>Corethrogyne filaginifolia</i>	Asteraceae	Shrub	Perennial
CRACON	<i>Crassula connata</i>	Crassulaceae	Herbaceous	Annual
CROSCO	<i>Crocianthemum scoparium</i>	Cistaceae	Sub-shrub	Perennial
CROSET	<i>Croton setigerus</i>	Euphorbiaceae	Herbaceous	Annual
CRYCLE	<i>Cryptantha clevelandii</i>	Boraginaceae	Herbaceous	Annual
CRYINT	<i>Cryptantha intermedia</i>	Boraginaceae	Herbaceous	Annual
CRYMICROM	<i>Cryptantha micromeres</i>	Boraginaceae	Herbaceous	Annual
CRYMICROS	<i>Cryptantha microstachys</i>	Boraginaceae	Herbaceous	Annual
CRYMUR	<i>Cryptantha muricata</i>	Boraginaceae	Herbaceous	Annual
CUSCAL	<i>Cuscuta californica</i>	Convolvulaceae	Vine	Annual
CUSSUB	<i>Cuscuta subinclusa</i>	Convolvulaceae	Vine	Annual
CYLPRO	<i>Cylindropuntia prolifera</i>	Cactaceae	Shrub	Perennial
CYNDAC	<i>Cynodon dactylon</i> *	Poaceae	Grass	Perennial
DAUPUS	<i>Daucus pusillus</i>	Apiaceae	Herbaceous	Annual
DEIFAS	<i>Deinandra fasciculata</i>	Asteraceae	Herbaceous	Annual
DELODO	<i>Delairea odorata</i> *	Asteraceae	Vine	Perennial
DELCAR	<i>Delphinium cardinale</i>	Ranunculaceae	Herbaceous	Perennial
DELPAR	<i>Delphinium parryi</i>	Ranunculaceae	Herbaceous	Perennial
DELPAT	<i>Delphinium patens</i> ssp. <i>hepaticoides</i>	Ranunculaceae	Herbaceous	Perennial
DENRIG	<i>Dendromecon rigida</i>	Papaveraceae	Shrub	Perennial
DESPIN	<i>Descurainia pinnata</i>	Brassicaceae	Herbaceous	Annual

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
DICOCC	<i>Dichondra occidentalis</i>	Convolvulaceae	Herbaceous	Perennial
DIPBRE	<i>Diplacus brevipes</i>	Phrymaceae	Herbaceous	Annual
DIPLON	<i>Diplacus longiflorus</i>	Phrymaceae	Shrub	Perennial
DIPCAP	<i>Dipterostemon capitatus</i>	Themidaceae	Herbaceous	Perennial
DISSPI	<i>Distichlis spicata</i>	Poaceae	Grass	Perennial
DRACUNIN	<i>Draba cuneifolia</i> var. <i>integrifolia</i>	Brassicaceae	Herbaceous	Annual
DRYARG	<i>Dryopteris arguta</i>	Dryopteridaceae	Fern	Perennial
DUDLAN	<i>Dudleya lanceolata</i>	Crassulaceae	Herbaceous	Perennial
DUDPULPU	<i>Dudleya pulverulenta</i> ssp. <i>pulverulenta</i>	Crassulaceae	Herbaceous	Perennial
DYSAMB	<i>Dysphania ambrosioides</i> *	Chenopodiaceae	Herbaceous	Annual
EHROCH	<i>Ehrendorferia ochroleuca</i>	Papaveraceae	Herbaceous	Perennial
EHRERE	<i>Ehrharta erecta</i> *	Poaceae	Grass	Perennial
ELYCON	<i>Elymus condensatus</i>	Poaceae	Grass	Perennial
ELYGLAGL	<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Poaceae	Grass	Perennial
ELYTRI	<i>Elymus triticoides</i>	Poaceae	Grass	Perennial
EMMPENPE	<i>Emmenanthe penduliflora</i> var. <i>penduliflora</i>	Boraginaceae	Herbaceous	Annual
ENCCAL	<i>Encelia californica</i>	Asteraceae	Shrub	Perennial
EPICAN	<i>Epilobium canum</i>	Onagraceae	Herbaceous	Perennial
ERISAP	<i>Eriastrum sapphirinum</i>	Polemoniaceae	Herbaceous	Annual
ERIPAL	<i>Ericameria palmeri</i> var. <i>pachylepis</i>	Asteraceae	Shrub	Perennial
ERICAN	<i>Erigeron canadensis</i>	Asteraceae	Herbaceous	Annual
ERIFOLFO	<i>Erigeron foliosus</i> var. <i>foliosus</i>	Asteraceae	Herbaceous	Perennial
ERICRA	<i>Eriodictyon crassifolium</i>	Boraginaceae	Shrub	Perennial

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
ERICIN	<i>Eriogonum cinereum</i>	Polygonaceae	Shrub	Perennial
ERIELOEL	<i>Eriogonum elongatum</i> var. <i>elongatum</i>	Polygonaceae	Herbaceous	Perennial
ERIFAS	<i>Eriogonum fasciculatum</i>	Polygonaceae	Shrub	Perennial
ERICONCO	<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	Asteraceae	Herbaceous	Perennial
EROBOT	<i>Erodium botrys</i> *	Geraniaceae	Herbaceous	Annual
EROCIC	<i>Erodium cicutarium</i> *	Geraniaceae	Herbaceous	Annual
EROMOS	<i>Erodium moschatum</i> *	Geraniaceae	Herbaceous	Annual
ERYGUT	<i>Erythranthe guttata</i>	Phrymaceae	Herbaceous	Annual
ESCCAE	<i>Eschscholzia caespitosa</i>	Papaveraceae	Herbaceous	Annual
ESCCAL	<i>Eschscholzia californica</i>	Papaveraceae	Herbaceous	Annual
EUCCHR	<i>Eucrypta chrysanthemifolia</i>	Boraginaceae	Herbaceous	Annual
EULCAL	<i>Eulobus californica</i>	Onagraceae	Herbaceous	Perennial
EUPALB	<i>Euphorbia albomarginata</i>	Euphorbiaceae	Herbaceous	Perennial
EUPPEP	<i>Euphorbia peplus</i> *	Euphorbiaceae	Herbaceous	Annual
EUPPOL	<i>Euphorbia polycarpa</i>	Euphorbiaceae	Herbaceous	Perennial
EUPSPA	<i>Euphorbia spathulata</i>	Euphorbiaceae	Herbaceous	Annual
EUPTER	<i>Euphorbia terracina</i> *	Euphorbiaceae	Herbaceous	Perennial
FESBRO	<i>Festuca bromoides</i> *	Poaceae	Grass	Annual
FESMIC	<i>Festuca microstachys</i>	Poaceae	Grass	Annual
FESMUL	<i>Festuca multiflora</i>	Poaceae	Grass	Perennial
FESMYU	<i>Festuca myuros</i> *	Poaceae	Grass	Annual
FESOCT	<i>Festuca octoflora</i>	Poaceae	Grass	Annual
FESPER	<i>Festuca perennis</i> *	Poaceae	Grass	Annual

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
FOEVUL	<i>Foeniculum vulgare</i> *	Apiaceae	Herbaceous	Perennial
FRACALCA	<i>Frangula californica</i> ssp. <i>californica</i>	Rhamnaceae	Shrub	Perennial
FRIBIF	<i>Fritillaria biflora</i>	Liliaceae	Herbaceous	Perennial
GALANGAN	<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	Rubiaceae	Herbaceous	Perennial
GALAPA	<i>Galium aparine</i>	Rubiaceae	Herbaceous	Annual
GALNUTNU	<i>Galium nuttallii</i> ssp. <i>nuttallii</i>	Rubiaceae	Herbaceous	Perennial
GALPARISI	<i>Galium parisiense</i> *	Rubiaceae	Herbaceous	Annual
GARVEA	<i>Garrya veatchii</i>	Garryaceae	Shrub	Perennial
GASPHL	<i>Gastridium phleoides</i> *	Poaceae	Grass	Annual
GILANG	<i>Gilia angelensis</i>	Polemoniaceae	Herbaceous	Annual
GILCAP	<i>Gilia capitata</i> ssp. <i>abrotanifolia</i>	Polemoniaceae	Herbaceous	Annual
GILCLI	<i>Gilia clivorum</i>	Polemoniaceae	Herbaceous	Annual
GITDIFDI	<i>Githopsis diffusa</i> ssp. <i>diffusa</i>	Campanulaceae	Herbaceous	Annual
GRICAM	<i>Grindelia camporum</i>	Asteraceae	Herbaceous	Perennial
HAZSQU	<i>Hazardia squarrosa</i> var. <i>grindelioides</i>	Asteraceae	Shrub	Perennial
HEDCRE	<i>Hedypnois cretica</i> *	Asteraceae	Herbaceous	Annual
HELGRA	<i>Helianthus gracilentus</i>	Asteraceae	Herbaceous	Perennial
HELECH	<i>Helminthotheca echioides</i> *	Asteraceae	Herbaceous	Perennial
HERHIR	<i>Herniaria hirsuta</i> ssp. <i>cinerea</i> *	Caryophyllaceae	Herbaceous	Annual
HESTEN	<i>Hesperocnide tenella</i>	Urticaceae	Herbaceous	Annual
HESMIC	<i>Hesperolinon micranthum</i>	Linaceae	Herbaceous	Annual
HESWHI	<i>Hesperoyucca whipplei</i>	Agavaceae	Sub-shrub	Perennial
HETARB	<i>Heteromeles arbutifolia</i>	Rosaceae	Shrub	Perennial

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
HIRINC	<i>Hirschfeldia incana</i> *	Brassicaceae	Herbaceous	Annual
HORMUR	<i>Hordeum murinum</i> *	Poaceae	Grass	Annual
HYPGLA	<i>Hypochaeris glabra</i> *	Asteraceae	Herbaceous	Annual
ISOMEN	<i>Isocoma menziesii</i>	Asteraceae	Shrub	Perennial
JUGCALCA	<i>Juglans californica</i> var. <i>californica</i>	Juglandaceae	Shrub	Perennial
KECCOR	<i>Keckiella cordifolia</i>	Plantaginaceae	Shrub	Perennial
LACSER	<i>Lactuca serriola</i> *	Asteraceae	Herbaceous	Annual
LAMAU	<i>Lamarckia aurea</i> *	Poaceae	Grass	Annual
LAMAMP	<i>Lamium amplexicaule</i> *	Lamiaceae	Herbaceous	Annual
LASCAL	<i>Lasthenia californica</i>	Asteraceae	Herbaceous	Annual
LASGRA	<i>Lasthenia gracilis</i>	Asteraceae	Herbaceous	Annual
LATVESVE	<i>Lathyrus vestitus</i> var. <i>vestitus</i>	Fabaceae	Herbaceous	Perennial
LEPFRA	<i>Lepechinia fragrans</i>	Lamiaceae	Shrub	Perennial
LEPNITNI	<i>Lepidium nitidum</i> var. <i>nitidum</i>	Brassicaceae	Herbaceous	Annual
LEPVIRPU	<i>Lepidium virginicum</i> var. <i>pubescens</i>	Brassicaceae	Herbaceous	Annual
LEPSQU	<i>Lepidospartum squamatum</i>	Asteraceae	Shrub	Perennial
LILHUM	<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	Liliaceae	Herbaceous	Perennial
LINCAL	<i>Linanthus californicus</i>	Polemoniaceae	Shrub	Perennial
LINDIA	<i>Linanthus dianthiflorus</i>	Polemoniaceae	Herbaceous	Annual
LITAFF	<i>Lithophragma affine</i>	Saxifragaceae	Herbaceous	Annual
LITCYM	<i>Lithophragma cymbalaria</i>	Saxifragaceae	Herbaceous	Perennial
LOGFIL	<i>Logfia filaginoides</i>	Asteraceae	Herbaceous	Annual
LOGGAL	<i>Logfia gallica</i> *	Asteraceae	Herbaceous	Annual

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
LOMDASDA	<i>Lomatium dasycarpum</i> ssp. <i>dasycarpum</i>	Apiaceae	Herbaceous	Perennial
LOMLUC	<i>Lomatium lucidum</i>	Apiaceae	Herbaceous	Perennial
LONSUBDE	<i>Lonicera subspicata</i> var. <i>denudata</i>	Caprifoliaceae	Shrub	Perennial
LUPBIC	<i>Lupinus bicolor</i>	Fabaceae	Herbaceous	Annual
LUPCON	<i>Lupinus concinnus</i>	Fabaceae	Herbaceous	Annual
LUPHIR	<i>Lupinus hirsutissimus</i>	Fabaceae	Herbaceous	Annual
LUPLAT	<i>Lupinus latifolius</i>	Fabaceae	Herbaceous	Perennial
LUPLON	<i>Lupinus longifolius</i>	Fabaceae	Shrub	Perennial
LUPSPA	<i>Lupinus sparsiflorus</i>	Fabaceae	Herbaceous	Annual
LUPSUC	<i>Lupinus succulentus</i>	Fabaceae	Herbaceous	Annual
LUPTRU	<i>Lupinus truncatus</i>	Fabaceae	Herbaceous	Annual
LYSARV	<i>Lysimachia arvensis</i> *	Myrsinaceae	Herbaceous	Annual
MADGRA	<i>Madia gracilis</i>	Asteraceae	Herbaceous	Annual
MADSAT	<i>Madia sativa</i>	Asteraceae	Herbaceous	Annual
MALFAS	<i>Malacothamnus fasciculatus</i>	Malvaceae	Shrub	Perennial
MALCLE	<i>Malacothrix clevelandii</i>	Asteraceae	Herbaceous	Annual
MALSAX	<i>Malacothrix saxatilis</i> var. <i>tenuifolia</i>	Asteraceae	Herbaceous	Perennial
MALLAU	<i>Malosma laurina</i>	Anacardiaceae	Shrub	Perennial
MALPAR	<i>Malva parviflora</i> *	Malvaceae	Herbaceous	Annual
MARMACMA	<i>Marah macrocarpus</i> var. <i>macrocarpus</i>	Cucurbitaceae	Vine	Perennial
MARVUL	<i>Marrubium vulgare</i> *	Lamiaceae	Herbaceous	Perennial
MATMAT	<i>Matricaria matricarioides</i> *	Asteraceae	Herbaceous	Annual
MEDPOL	<i>Medicago polymorpha</i> *	Fabaceae	Herbaceous	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
MELCAL	<i>Melica californica</i>	Poaceae	Grass	Perennial
MELIMP	<i>Melica imperfecta</i>	Poaceae	Grass	Perennial
MELALB	<i>Melilotus albus</i> *	Fabaceae	Herbaceous	Annual
MELIND	<i>Melilotus indicus</i> *	Fabaceae	Herbaceous	Annual
MENMIC	<i>Mentzelia micrantha</i>	Loasaceae	Herbaceous	Annual
MICCALCA	<i>Micropus californicus</i> var. <i>californicus</i>	Asteraceae	Grass	Annual
MICDOU	<i>Microseris douglasii</i>	Asteraceae	Herbaceous	Annual
MIRLAE	<i>Mirabilis laevis</i> var. <i>crassifolius</i>	Nyctaginaceae	Shrub	Perennial
MUHMIC	<i>Muhlenbergia microsperma</i>	Poaceae	Grass	Annual
NEMRAM	<i>Nemacladus ramosissimus</i>	Campanulaceae	Herbaceous	Annual
NEMPED	<i>Nemophila pedunculata</i>	Boraginaceae	Herbaceous	Annual
NICGLA	<i>Nicotiana glauca</i> *	Solanaceae	Shrub	Perennial
NUTTEX	<i>Nuttallanthus texanus</i>	Plantaginaceae	Herbaceous	Annual
OPULIT	<i>Opuntia littoralis</i>	Cactaceae	Shrub	Perennial
OXACAL	<i>Oxalis californica</i>	Oxalidaceae	Herbaceous	Perennial
PAECAL	<i>Paeonia californica</i>	Paeoniaceae	Herbaceous	Perennial
PAPCAL	<i>Papaver californicum</i>	Papaveraceae	Herbaceous	Annual
PAPHET	<i>Papaver heterophyllum</i>	Papaveraceae	Herbaceous	Annual
PARHES	<i>Parietaria hespera</i>	Urticaceae	Herbaceous	Annual
PECLNSF	<i>Pectocarya linearis</i> ssp. <i>ferocula</i>	Boraginaceae	Herbaceous	Annual
PELAND	<i>Pellaea andromedifolia</i>	Pteridaceae	Fern	Perennial
PELMUC	<i>Pellaea mucronata</i> var. <i>mucronata</i>	Pteridaceae	Fern	Perennial
PENSET	<i>Pennisetum setaceum</i> *	Poaceae	Grass	Perennial

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
PENTRI	<i>Pentagramma triangularis</i> ssp. <i>triangularis</i>	Pteridaceae	Fern	Perennial
PEREMO	<i>Perityle emoryi</i>	Asteraceae	Herbaceous	Annual
PHABRA	<i>Phacelia brachyloba</i>	Boraginaceae	Herbaceous	Annual
PHACIC	<i>Phacelia cicutaria</i>	Boraginaceae	Herbaceous	Annual
PHADIS	<i>Phacelia distans</i>	Boraginaceae	Herbaceous	Annual
PHAGRA	<i>Phacelia grandiflora</i>	Boraginaceae	Herbaceous	Annual
PHAHUB	<i>Phacelia hubbyi</i>	Boraginaceae	Herbaceous	Annual
PHAIMBIM	<i>Phacelia imbricata</i> ssp. <i>imbricata</i>	Boraginaceae	Herbaceous	Perennial
PHAPARRYI	<i>Phacelia parryi</i>	Boraginaceae	Herbaceous	Annual
PHARAM	<i>Phacelia ramosissima</i>	Boraginaceae	Herbaceous	Perennial
PHAVIS	<i>Phacelia viscida</i>	Boraginaceae	Herbaceous	Annual
PHAAQU	<i>Phalaris aquatica</i> *	Poaceae	Grass	Perennial
PHOAURAU	<i>Pholistoma auritum</i> var. <i>auritum</i>	Boraginaceae	Herbaceous	Annual
PLANOT	<i>Plagiobothrys nothofulvus</i>	Boraginaceae	Herbaceous	Annual
PLAERE	<i>Plantago erecta</i>	Plantaginaceae	Herbaceous	Annual
PLARAC	<i>Platanus racemosa</i>	Platanaceae	Tree	Perennial
POAANN	<i>Poa annua</i> *	Poaceae	Grass	Annual
POASECSE	<i>Poa secunda</i> ssp. <i>secunda</i>	Poaceae	Grass	Perennial
POLDEP	<i>Polycarpon depressum</i>	Caryophyllaceae	Herbaceous	Annual
POLTETTE	<i>Polycarpon tetraphyllum</i> ssp. <i>tetraphyllum</i> *	Caryophyllaceae	Herbaceous	Annual
POLAVI	<i>Polygonum aviculare</i> *	Polygonaceae	Herbaceous	Annual
POLCAL	<i>Polypodium californicum</i>	Polypodiaceae	Fern	Perennial
POLMON	<i>Polypogon monspeliensis</i> *	Poaceae	Grass	Annual

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
POROLE	<i>Portulaca oleracea</i> *	Portulacaceae	Herbaceous	Annual
PRICLE	<i>Primula clevelandii</i>	Primulaceae	Herbaceous	Perennial
PRUILIL	<i>Prunus ilicifolia</i> ssp. <i>ilicifolia</i>	Rosaceae	Shrub	Perennial
PSEBIO	<i>Pseudognaphalium bioletti</i>	Asteraceae	Herbaceous	Perennial
PSECAL	<i>Pseudognaphalium californicum</i>	Asteraceae	Herbaceous	Perennial
PSELUT	<i>Pseudognaphalium luteoalbum</i> *	Asteraceae	Herbaceous	Annual
PSEMIC	<i>Pseudognaphalium microcephalum</i>	Asteraceae	Herbaceous	Perennial
PSESTR	<i>Pseudognaphalium stramineum</i>	Asteraceae	Herbaceous	Annual
PSITEN	<i>Psilocarphus tenellus</i> var. <i>tenellus</i>	Asteraceae	Herbaceous	Annual
PTEDRY	<i>Pterostegia drymarioides</i>	Polygonaceae	Herbaceous	Annual
QUEAGRAG	<i>Quercus agrifolia</i> var. <i>agrifolia</i>	Fagaceae	Tree	Perennial
QUEBER	<i>Quercus berberidifolia</i>	Fagaceae	Shrub	Perennial
QUELOB	<i>Quercus lobata</i>	Fagaceae	Tree	Perennial
RAFCAL	<i>Rafinesquia californica</i>	Asteraceae	Herbaceous	Annual
RANHEB	<i>Ranunculus hebecarpus</i>	Ranunculaceae	Herbaceous	Annual
RAPRAP	<i>Raphanus raphanistrum</i> *	Brassicaceae	Herbaceous	Annual
RAPSAT	<i>Raphanus sativus</i> *	Brassicaceae	Herbaceous	Annual
RHACRO	<i>Rhamnus crocea</i>	Rhamnaceae	Shrub	Perennial
RHAILI	<i>Rhamnus ilicifolia</i>	Rhamnaceae	Shrub	Perennial
RHUINT	<i>Rhus integrifolia</i>	Anacardiaceae	Shrub	Perennial
RHUOVA	<i>Rhus ovata</i>	Anacardiaceae	Shrub	Perennial
RIBCAL	<i>Ribes californicum</i> var. <i>hesperium</i>	Grossulariaceae	Shrub	Perennial
RIBMAL	<i>Ribes malvaceum</i>	Grossulariaceae	Shrub	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
RIBSPE	<i>Ribes speciosum</i>	Grossulariaceae	Shrub	Perennial
RUMCRI	<i>Rumex crispus</i> *	Polygonaceae	Herbaceous	Perennial
SAGDECOC	<i>Sagina decumbens</i> ssp. <i>occidentalis</i>	Caryophyllaceae	Herbaceous	Annual
SALLAE	<i>Salix laevigata</i>	Salicaceae	Tree	Perennial
SALLASIAN	<i>Salix lasiandra</i>	Salicaceae	Tree	Perennial
SALLASOL	<i>Salix lasiolepis</i>	Salicaceae	Shrub	Perennial
SAL AUS	<i>Salsola australis</i> *	Chenopodiaceae	Herbaceous	Annual
SALCOL	<i>Salvia columbariae</i>	Lamiaceae	Herbaceous	Annual
SALLEU	<i>Salvia leucophylla</i>	Lamiaceae	Shrub	Perennial
SALMEL	<i>Salvia mellifera</i>	Lamiaceae	Shrub	Perennial
SALSPA	<i>Salvia spathacea</i>	Lamiaceae	Herbaceous	Perennial
SAMNIG	<i>Sambucus nigra</i> ssp. <i>cerulea</i>	Caprifoliaceae	Shrub	Perennial
SANARG	<i>Sanicula arguta</i>	Apiaceae	Herbaceous	Perennial
SANCRA	<i>Sanicula crassicaulis</i>	Apiaceae	Herbaceous	Perennial
SANTUB	<i>Sanicula tuberosa</i>	Apiaceae	Herbaceous	Perennial
SAXCAL	<i>Saxifraga californica</i>	Saxifragaceae	Herbaceous	Perennial
SCHBAR	<i>Schismus barbatus</i> *	Poaceae	Grass	Annual
SCRCAL	<i>Scrophularia californica</i>	Scrophulariaceae	Herbaceous	Perennial
SCUTUB	<i>Scutellaria tuberosa</i>	Lamiaceae	Herbaceous	Perennial
SELBIG	<i>Selaginella bigelovii</i>	Selaginellaceae	Fern	Perennial
SENVUL	<i>Senecio vulgaris</i> *	Asteraceae	Herbaceous	Annual
SILANT	<i>Silene antirrhina</i>	Caryophyllaceae	Herbaceous	Annual
SILCON	<i>Silene coniflora</i>	Caryophyllaceae	Herbaceous	Annual

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
SILGAL	<i>Silene gallica</i> *	Caryophyllaceae	Herbaceous	Annual
SILLAC	<i>Silene laciniata</i> ssp. <i>major</i>	Caryophyllaceae	Herbaceous	Perennial
SILMAR	<i>Silybum marianum</i> *	Asteraceae	Herbaceous	Annual
SISIRI	<i>Sisymbrium irio</i> *	Brassicaceae	Herbaceous	Annual
SISORI	<i>Sisymbrium orientale</i> *	Brassicaceae	Herbaceous	Annual
SISBEL	<i>Sisyrinchium bellum</i>	Iridaceae	Herbaceous	Perennial
SOLAME	<i>Solanum americanum</i>	Solanaceae	Herbaceous	Annual
SOLDOU	<i>Solanum douglasii</i>	Solanaceae	Herbaceous	Perennial
SOLXAN	<i>Solanum xanti</i>	Solanaceae	Sub-shrub	Perennial
SOLCAL	<i>Solidago californica</i>	Asteraceae	Herbaceous	Perennial
SONASPAS	<i>Sonchus asper</i> ssp. <i>asper</i> *	Asteraceae	Herbaceous	Annual
SONOLE	<i>Sonchus oleraceus</i> *	Asteraceae	Herbaceous	Annual
SPEMAR	<i>Spergularia marina</i>	Caryophyllaceae	Herbaceous	Annual
STAALB	<i>Stachys albens</i>	Lamiaceae	Herbaceous	Perennial
STABUL	<i>Stachys bullata</i>	Lamiaceae	Herbaceous	Perennial
STARIG	<i>Stachys rigida</i> var. <i>quercetorum</i>	Lamiaceae	Herbaceous	Perennial
STEKET	<i>Stebbinsoseris heterocarpa</i>	Asteraceae	Herbaceous	Annual
STEMED	<i>Stellaria media</i> *	Caryophyllaceae	Herbaceous	Annual
STENIT	<i>Stellaria nitens</i>	Caryophyllaceae	Herbaceous	Annual
STEDIE	<i>Stephanomeria diegensis</i>	Asteraceae	Herbaceous	Annual
STEPHA	<i>Stephanomeria</i> sp.	Asteraceae	Herbaceous	Annual
STICOR	<i>Stipa coronata</i>	Poaceae	Grass	Perennial
STILEP	<i>Stipa lepida</i>	Poaceae	Grass	Perennial

Table B-1 (continued). List of species found at all monitoring plots across the entire study area, grouped together across years 2014–2020. Note that this list should not be considered exhaustive for all land within the study area. * Non-native species are denoted with an asterisk following their scientific name. Common names are intentionally excluded, but can be found at <https://www.smmflowers.org/>.

Species Code	Scientific Name	Family Name	Life Form	Life Cycle
STIMIL	<i>Stipa miliacea</i> *	Poaceae	Grass	Perennial
STIPUL	<i>Stipa pulchra</i>	Poaceae	Grass	Perennial
STYGNA	<i>Stylocline gnaphaloides</i>	Asteraceae	Herbaceous	Annual
SYMMOL	<i>Symphoricarpos mollis</i>	Caprifoliaceae	Shrub	Perennial
TAROFF	<i>Taraxacum officinale</i> *	Asteraceae	Herbaceous	Perennial
TAUARG	<i>Tauschia arguta</i>	Apiaceae	Herbaceous	Perennial
TAUHAR	<i>Tauschia hartwegii</i>	Apiaceae	Herbaceous	Perennial
TETCOM	<i>Tetradymia comosa</i>	Asteraceae	Shrub	Perennial
THYCUR	<i>Thysanocarpus curvipes</i>	Brassicaceae	Herbaceous	Annual
THYLAC	<i>Thysanocarpus laciniatus</i>	Brassicaceae	Herbaceous	Annual
TORARV	<i>Torilis arvensis</i> *	Apiaceae	Herbaceous	Annual
TOXDIV	<i>Toxicodendron diversilobum</i>	Anacardiaceae	Shrub	Perennial
TOXFRE	<i>Toxicoscordion fremontii</i>	Melanthiaceae	Herbaceous	Perennial
TRILANA	<i>Trichostema lanatum</i>	Lamiaceae	Shrub	Perennial
TRILANC	<i>Trichostema lanceolatum</i>	Lamiaceae	Herbaceous	Perennial
TRICIL	<i>Trifolium ciliolatum</i>	Fabaceae	Herbaceous	Annual
TRIDEPTR	<i>Trifolium depauperatum</i> var. <i>truncatum</i>	Fabaceae	Herbaceous	Annual
TRIGRA	<i>Trifolium gracilentum</i>	Fabaceae	Herbaceous	Annual
TRIMIC	<i>Trifolium microcephalum</i>	Fabaceae	Herbaceous	Annual
TRIWIL	<i>Trifolium willdenovii</i>	Fabaceae	Herbaceous	Annual
UMBCALCA	<i>Umbellularia californica</i> var. <i>californica</i>	Lauraceae	Shrub	Perennial
UROLIN	<i>Uropappus lindleyi</i>	Asteraceae	Herbaceous	Annual
UROPIC	<i>Urospermum picroides</i> *	Asteraceae	Herbaceous	Annual

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Species Code	Scientific Name	Family Name	Life Form	Life Cycle
VENCAR	<i>Venegasia carpesioides</i>	Asteraceae	Shrub	Perennial
VICLUDLU	<i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>	Fabaceae	Herbaceous	Annual
VICVIL	<i>Vicia villosa</i> *	Fabaceae	Herbaceous	Annual
VINMAJ	<i>Vinca major</i> *	Apocynaceae	Herbaceous	Perennial
YABMIC	<i>Yabea microcarpa</i>	Apiaceae	Herbaceous	Annual

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 638/191506, November 2023

National Park Service
U.S. Department of the Interior



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