



Vegetation Classification at Lake Mead National Recreation Area, Mojave National Preserve, Castle Mountains National Monument, and Death Valley National Park

Final Report (Revised with Cost Estimate)

Natural Resource Report NPS/MOJN/NRR—2020/2178





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ON THIS PAGE

From top left, clockwise: *Pinus monophylla* - (*Juniperus osteosperma*) / Shrub Understory Woodland Alliance in Death Valley National Park (DEVA), *Hymenoclea salsola* - *Bebbia juncea* Desert Wash Alliance in DEVA, *Ephedra spp.* - *Leymus salinus* - *Eriogonum corymbosum* Badlands Cold Desert Sparse Vegetation Alliance in Lake Mead National Recreation Area, and *Panicum urvilleanum* and *Pleuraphis rigida* grassland associations in Mojave National Preserve.

Photographs courtesy of Julie M. Evens.

ON THE COVER

Overview landscape of the Mojave Desert ecosystem, Mojave National Preserve.

Photograph courtesy of Julie M. Evens.

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Executive Summary

Vegetation inventory and mapping is a process to document the composition, distribution and abundance of vegetation types across the landscape. The National Park Service's (NPS) Inventory and Monitoring (I&M) program has determined vegetation inventory and mapping to be an important resource for parks; it is one of 12 baseline inventories of natural resources to be completed for all 270 national parks within the NPS I&M program. The Mojave Desert Network Inventory & Monitoring (MOJN I&M) began its process of vegetation inventory in 2009 for four park units as follows: Lake Mead National Recreation Area (LAKE), Mojave National Preserve (MOJA), Castle Mountains National Monument (CAMO), and Death Valley National Park (DEVA).

Mapping is a multi-step and multi-year process involving skills and interactions of several parties, including NPS, with a field ecology team, a classification team, and a mapping team. This process allows for compiling existing vegetation data, collecting new data to fill in gaps, and analyzing the data to develop a classification that then informs the mapping. The final products of this process include a vegetation classification, ecological descriptions and field keys of the vegetation types, and geospatial vegetation maps based on the classification. In this report, we present the narrative and results of the sampling and classification effort. In three other associated reports (Evens et al. 2020a, 2020b, 2020c) are the ecological descriptions and field keys. The resulting products of the vegetation mapping efforts are, or will be, presented in separate reports: mapping at LAKE was completed in 2016, mapping at MOJA and CAMO will be completed in 2020, and mapping at DEVA will occur in 2021.

The California Native Plant Society (CNPS) and NatureServe, the classification team, have completed the vegetation classification for these four park units, with field keys and descriptions of the vegetation types developed at the alliance level per the U.S. National Vegetation Classification (USNVC). We have compiled approximately 9,000 existing and new vegetation data records into digital databases in Microsoft Access. The resulting classification and descriptions include approximately 105 alliances and landform types, and over 240 associations. CNPS also has assisted the mapping teams during map reconnaissance visits, follow-up on interpreting vegetation patterns, and general support for the geospatial vegetation maps being produced.

A variety of alliances and associations occur in the four park units. Per park, the classification represents approximately 50 alliances at LAKE, 65 at MOJA and CAMO, and 85 at DEVA. Several riparian alliances or associations that are somewhat rare (ranked globally as G3) include shrublands of *Pluchea sericea*, meadow associations with *Distichlis spicata* and *Juncus cooperi*, and woodland associations of *Salix laevigata* and *Prosopis pubescens* along playas, streams, and springs. Other rare to somewhat rare types (G2 to G3) include shrubland stands with *Eriogonum heermannii*, *Buddleja utahensis*, *Mortonia utahensis*, and *Salvia funerea* on rocky calcareous slopes that occur sporadically in LAKE to MOJA and DEVA. Types that are globally rare (G1) include the associations of *Swallenia alexandrae* on sand dunes and *Hecastocleis shockleyi* on rocky calcareous slopes in DEVA. Two USNVC vegetation groups hold the highest number of alliances: 1) Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope Group (G541) has nine alliances, and 2) Mojave Mid-

Elevation Mixed Desert Scrub Group (G296) has thirteen alliances. These two groups contribute significantly to the diversity of vegetation along alluvial washes and mid-elevation transition zones.

Acknowledgments

The production of this vegetation inventory was motivated by the dedication and support of many people for over a decade. The authors gratefully acknowledge the commitment of all involved in the completion of this project and production of this report.

We are especially grateful to the staff at the Mojave Desert Network Inventory and Monitoring Program (MOJN I&M), in Boulder City, Nevada, of the National Park Service (NPS) who helped provide support and funding for the project. This includes Jeanne Taylor and Mindy Trask (previous Vegetation Mapping Coordinators), Nicole Hupp (Ecologist), Nita Tallent (previous Program Manager), and Mark Lehman (Data Manager) for their assistance with data acquisition, coordination with the field sampling teams, and overall coordination with the many people involved, and specifically Nicole Hupp for her technical review of the report. Additionally, we thank Tasha LaDoux from Joshua Tree National Park, and Chris Lea for assisting with technical peer review of the report.

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We appreciate the expert assistance of NatureServe staff with classification review, description writing, and data management, including Mark Hall, Gwen Kittel, Patrick McIntyre, Marion Reed, Mary Russo, Keith Schulz, and Kristin Snow. We also thank many people for sharing legacy datasets in California, including Jane Cipra and Andrew Kaiser (NPS), Steven Delfavero (NPS), Tom Dilts and Peter Weisberg (University of Nevada Reno), Julie Evens (CNPS), Tasha La Doux and Jim André (NPS and University of California Riverside), Todd Keeler-Wolf (California Department of Fish and Wildlife), Michele Slaton (formerly NPS, now U.S. Forest Service (USFS)), and Kathryn Thomas (US Geological Survey, USGS). We thank others for sharing datasets from Arizona and Nevada, including Dianne Bangle (LAKE), Chris Roberts (LAKE), and Dave Charlet and Craig Westenburg (USGS), and John Matchett (USGS). Tasha La Doux and Jim André also assisted with providing insight on the vegetation and accessible routes for reconnaissance in MOJA and CAMO.

Special recognition goes to Karl Brown and Tammy Cook with the National Park Service Vegetation Inventory Program in Fort Collins, Colorado, for prioritizing this project and providing funding. They ensured this project was successfully completed due to their financial support, contract support, and overall oversight.

Introduction

The National Park Service (NPS) Vegetation Mapping Inventory (VMI) program is an effort to classify, describe, and map baseline vegetation communities of national park units. The goal of VMI is to provide the NPS Natural Resource Inventory and Monitoring (I&M) Program, resource managers, biological researchers and the general public with useful vegetation information at the park level. This vegetation information supports a wide variety of natural resource, park management, and planning efforts. In 2009, the Mojave Desert Network Inventory & Monitoring (MOJN I&M) began its process to develop classifications and vegetation maps for Lake Mead National Recreation Area (LAKE), Death Valley National Park (DEVA), and Mojave National Preserve (MOJA). In 2016, the Castle Mountains National Monument (CAMO) study area was newly dedicated as a National Park Service unit. Due to its small size and location (directly adjacent to MOJA), the vegetation classification for CAMO was incorporated into the MOJA classification.

Mapping is a multi-step and multi-year process involving skills and interactions of several parties, including NPS staff with a field ecology team, a classification team, and a mapping team. This process begins with compiling existing vegetation data, collecting new data to fill in gaps, and analyzing the data to develop a classification that then informs the geospatial mapping. University of Nevada at Las Vegas (UNLV), the field ecology team, conducted over 1,400 vegetation field surveys at LAKE, MOJA and DEVA from 2010–2012 to fill in data gaps. The California Native Plant Society (CNPS), the classification team, has been tasked to develop the vegetation classification, associated digital vegetation databases, field keys, and ecological descriptions to the vegetation types; all of these products are being presented in this report. Partner ecologists at NatureServe and California Department of Fish and Wildlife (CDFW) have peer reviewed the classification between 2014 and 2016. The field keys and classification are being utilized by the mapping teams to develop geospatial vegetation maps at the four park units (see Figure 1). These new maps will be more detailed (e.g., alliance-level) than pre-existing maps (e.g., Lennartz et al. 2008, Thomas et al. 2004).

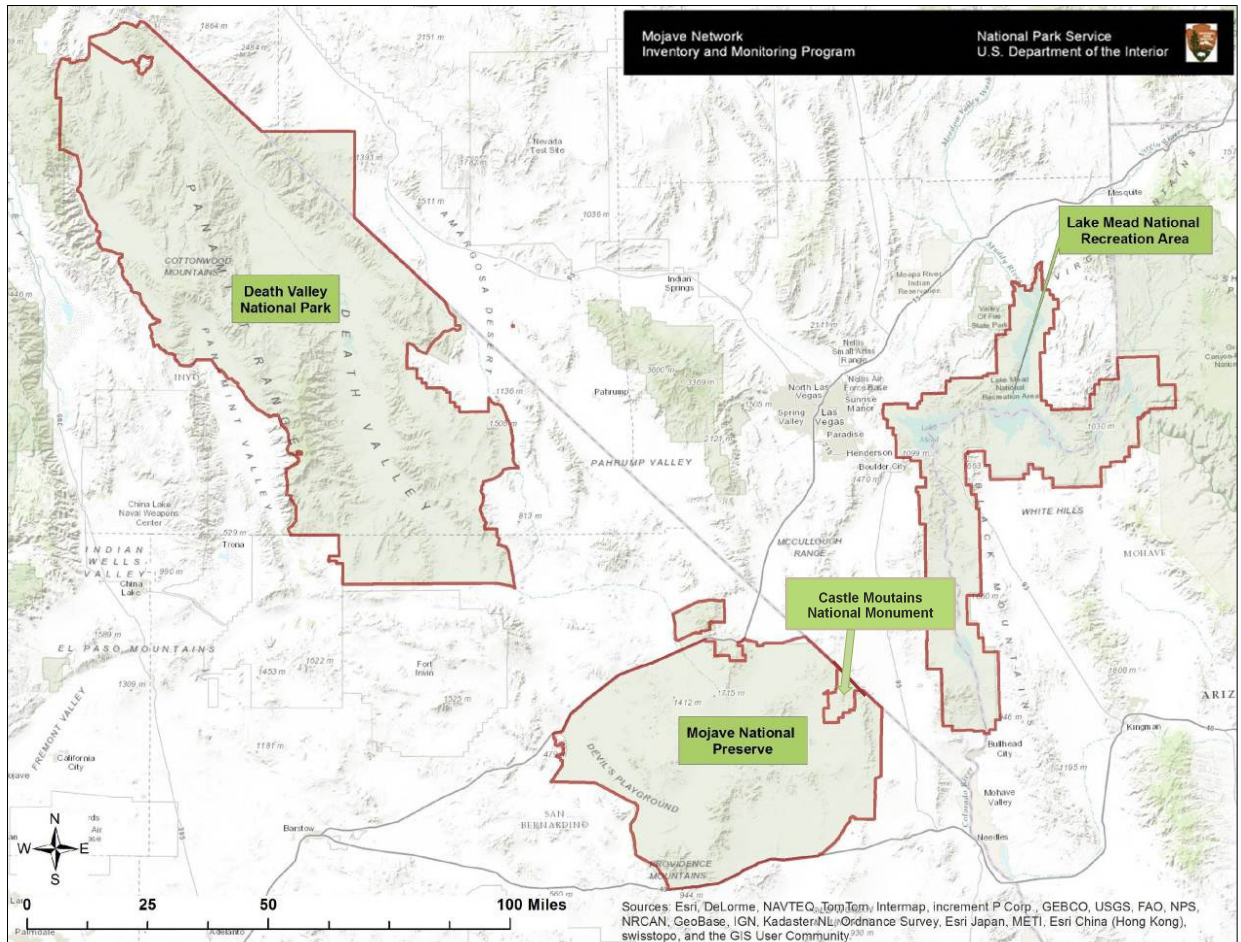


Figure 1. Boundaries (red lines) of the four national park units included in this study: Death Valley National Park, Mojave National Preserve, Castle Mountains National Monument, and Lake Mead National Recreation Area (from west to east).

Our primary project goal has been to create an integrated vegetation classification that can be applied consistently within LAKE, DEVA, MOJA, and CAMO. To achieve this, vegetation data, such as floristic composition, vegetation structure, and plant species cover, have been collected. Pooling collected data from these park areas provides a more robust sample size to define vegetation types common to all parks, as well as those unique to each park. Legacy datasets were used from many neighboring areas, including other park units within the MOJN I&M. These legacy datasets help inform current efforts and perhaps more importantly, provide additional data to refine and revise the past classifications, such as the Joshua Tree National Park classification completed in 2012. Using a multi-step analysis process, detailed below, allows vegetation types to be classified and defined, ultimately providing information for mapping at a fine-scale. Steps to achieve our primary project goal have been as follows:

1. Assemble field vegetation datasets; standardize and reconcile differences in the datasets
2. Develop preliminary and interim classifications of vegetation data

3. Train field crews on standard field sampling protocols for collecting new vegetation data
4. Develop a field key representing the interim classification of LAKE
5. Complete classification of all vegetation data, and prepare a key to the vegetation of LAKE, DEVA, MOJA, and CAMO (see below for the standard used for this classification)
6. In collaboration with the mapping team, identify the map classes that will be utilized during vegetation mapping
7. Draft vegetation descriptions for LAKE, DEVA, MOJA, CAMO, and JOTR
8. Train field staff on map accuracy assessment sampling and review accuracy assessment analysis
9. Compile a report describing vegetation classification methods and results that includes vegetation keys and descriptions

This goal of this report is to describe the methods and results, including an integrated vegetation classification, field keys, and ecological descriptions. Associated databases and electronic files are provided to MOJN I&M and VMI in support of the fine-scale vegetation mapping in these parks.

Geographic and Climatic Setting

The four park units are part of the deserts of the southwestern United States, which are characterized by lower rainfall because they are in the rain shadow of mountain ranges to the west of each desert. Biogeographically, the four park units occur primarily within the Mojave Desert Section of the American Semi-Desert and Desert Province, the Tropical/Subtropical Desert Division and Dry Domain (Figure 2). However, a portion of one park is also in Southeastern Great Basin Section of the Intermountain Semi-desert and Desert Province. While primarily within the Mojave Desert, these parks have some elements of both the Great Basin Desert (in the north) and the Sonoran Desert (in the south). The Mojave Desert is the smallest of these three North American deserts, and is intermediate between these two other deserts both spatially and floristically (Bailey 1995, 1998, Turner 1994, Johnson 1976).

The Mojave Desert and southeastern Great Basin are diverse in topography, geologic substrates, and soils, and precipitation varies both seasonally and annually across these deserts. Topographically, the mountain ranges typically run north-south with basins in-between the mountains. Topographic diversity varies and increases from west to east and from south to north in the region, wherein Death Valley is recognized as having the lowest elevation in North America, and its tallest mountain rises more than 3,000 meters as the highest elevation across the four park units. However, roughly three-fourths of this desert is between 610 and 1,220 m elevation (Johnson 1976, Keeler-Wolf 2007). Death Valley National Park (DEVA) is the largest park in the continental U.S. at 1.4 million hectares (or 3.4 million acres) with a majority of the park in California. Most of the Saline, Eureka, northern Panamint, and Greenwater valleys were added in 1994 when the former National Monument (declared in 1933) became a National Park (NPS 2015a). The Mojave National Preserve (MOJA)

consists of nearly 647,500 hectares (or 1.6 million acres) protected in 1994 (USGS 2009), and the adjacent Castle Mountains National Monument (CAMO) is nearly 8,500 hectares (or 21,000 acres) being proclaimed as a monument in 2016 (NPS 2017a). Lake Mead National Recreation Area (LAKE) consists of 607,000 hectares (or 1.5 million acres) of land and water in southern Nevada and northwestern Arizona (LAKE 2014).

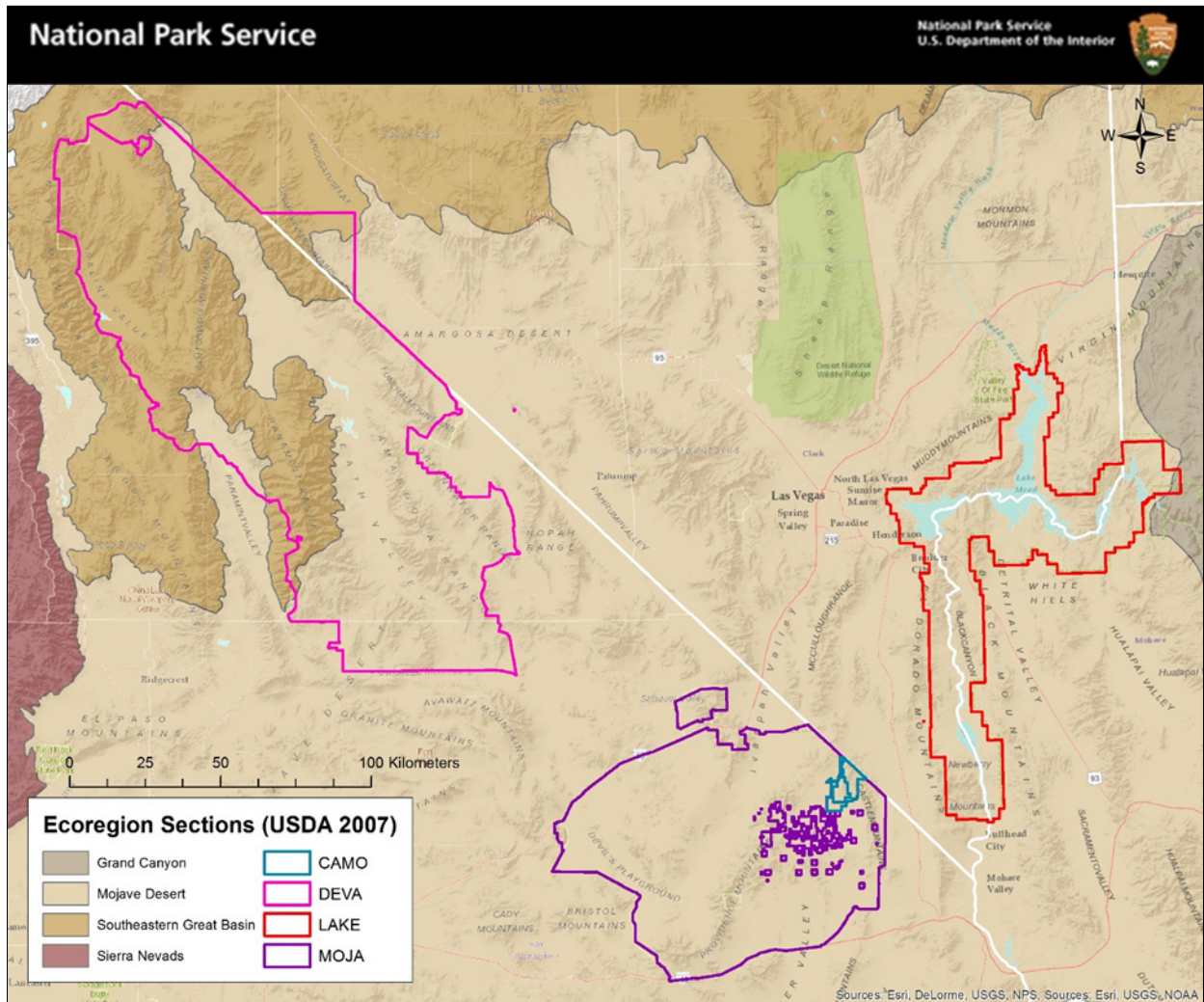


Figure 2. The biogeographical, ecological sections of the study area overlaid with the boundaries of the four national park units.

Climate and Elevation

The climate generally is characterized by very hot summers and relatively mild winters. The eastern Mojave Desert receives significant inputs of precipitation from summer monsoon thunderstorms, and summer precipitation drops towards the west and north. As with precipitation, elevation gradients influence temperature with higher-elevation mountain ranges having cooler temperatures and more precipitation (Johnson 1976).

For DEVA, Death Valley is a 250 km long north-south trending valley, which has the hottest temperatures in the park. Summers can reach 49°C (120°F) high. Winter lows in the valley average around 4°C (40°F), and temperatures drop 2 to 3°C (3 to 5°F) with every 300 m in elevation increase. Badwater Basin contains the lowest point, at 86 m below sea level. It lies in the afternoon shadow only 24 km away from the highest point in the Panamint Mountains, Telescope Peak at 3,368 m. The valley receives less than 5 cm (2 in.) in rainfall per year, while the higher elevations of the Panamint Mountains have received up to 51 cm (20 in.) in precipitation per year (NPS 2016a).

For MOJA and CAMO, temperatures vary considerably along a large range in elevation, i.e., from 268 m at Soda Lake near Baker to 2,417 m at Clark Mountain; summer temperatures average from 32.2 to 40.5°C (90 to 105°F), while winters can drop to the below -6°C (20°F). As with temperatures, elevation also influences precipitation where lower elevations average 8.6 cm (3.4 in.) annually and mountainous areas receive around 22.9 cm (9 in.) annually. At least 25 percent of precipitation falls in localized summer rainstorms, and snow often blankets the higher areas in winter (NPS 2015b).

For LAKE, temperatures range from 43.3°C (110°F) in summer to -1°C (30°F) in winter at Boulder City. The lower elevations generally receive less than 5 cm (2 in.) in rainfall per year (NPS 2017b). The lowest elevation is at Lake Mohave at 151 m, and the highest elevation is Spirit Mountain in the Newberry Mountains at 1720 m, which had received 25 cm (10 in.) average precipitation prior to and in the 1970s, and now receives 6 cm less than that because of climate change (Guida 2011). Modification of this landscape includes two massive reservoirs—Mead and Mohave. These two lakes supply municipal water, power production, and agricultural irrigation water to tens of millions of people across Nevada, Arizona, California, and Mexico (LAKE 2014). Lake Mead is the larger reservoir along the main stem of Colorado River; it is also fed by three smaller tributaries (Las Vegas Wash in the west plus Muddy and Virgin Rivers in the north, which drain into the 52.9 km long Overton Arm), and has four narrow canyons as important features. This lake surface has fluctuated in elevation over the last 30 years with an over 39 m drop to an elevation of 335 m in 2010 due to extensive drought and increasing water needs (NPS 2016b).

Geology and Soils

The region's rugged topography of isolated mountains and buttes rising up from extensive alluvial fans, along with many interior basins, flood-carved canyons, volcanic fields, sand dunes, and spring-fed oases indicate a lengthy and complex geologic history. Magma has erupted both at and below the earth's surface particularly during plate tectonic movement. Volcanic activity has occurred from over 60 million to <1 million years ago in the region. With hot magma coming up from beneath the earth's surface, volcanic eruptions have covered the landscape with ash, lava, and volcanic debris. At LAKE, the earth's crust had stretched at least 17 million years ago, creating fractures and pathways for increased magma reaching the earth's surface, and peaking about 15 million years ago. Black Canyon below Hoover Dam and the River Mountains by Boulder City are examples of this interplay of volcanic activity and fracturing (NPS 2017c). At MOJA, many periods of volcanic activity have occurred, such as at Cima volcanic field from 7.6 to <1 million years ago, where rock formation and erosion have interacted over the millennia (Dohrenwend et al. 1984).

Magma that is trapped deep below the earth's surface will cool and solidify slowly in the form of granitic plutons. With ample time for large crystals to develop, granitic rocks have coarse and grainy textures. However, many millions of years later, tectonic activity have lifted these buried rocks and exposed them, and high mountain ranges have formed. Once exposed at the earth's surface, other forces such as weathering and erosion, break down the mountains. A great example of this interplay of uplifted crystalline magma with significant weathering over time is Cima Dome in MOJA, where igneous, granitic rocks crystallized long ago from molten rock dating back to the Mesozoic Era (from 180 to 80 million years ago) and have since been weathered over time (USGS 2017).

Over parts of the region, shallow seas have formed historically in interior basins. Formations of limestone and shale formations are visible today in the uplifted mountain sediments, yet they were created when remnants of plants and animals (which lived and died along the inland seas) were incorporated with sediments eroded from older rocks. At LAKE in southern Nevada, a shallow sea covering the area over 500 million years throughout the Paleozoic Era (from 540 to 250 million years ago) has expanded and retreated several times over this long time period where Lakes Mead and Mohave now lie (NPS 2017c). At DEVA in Badwater Basin, a shallow sea also has expanded and retreated several times for over 250 million years during the Paleozoic Era. With the earth's crust being composed of inter-connected sections or plates, Death Valley lies near the boundary between two plates. Widespread rock deformation and faulting occurred through most of the Mesozoic Era (251 to 65.5 million years ago) and various mountain ranges have been uplifted (NPS 2015a).

The soils within the four park units are primarily of alluvial or colluvial nature. They are either derived from or weathered from a variety of parent material such as igneous (volcanic and plutonic), sedimentary (e.g., sandstones, shales, limestones), or metamorphic rocks. Smaller amounts of lacustrine (shallow playa lake) or aeolian (wind-blown) soils also exist. Derivatives of limestone and dolomites are scattered in LAKE, DEVA, and MOJA, such as in the Clark Mountains in MOJA and the Funeral and Panamint Mountains in DEVA (USGS 2009).

Flora

The Mojave Desert shares floristic characteristics of the other two desert regions of the southwestern U.S., yet it also is rich in its own "indicator" species. For example, a large number of Great Basin species enter the Mojave from the north (e.g., *Achnatherum hymenoides*, *Coleogyne ramosissima*, *Grayia spinosa*, *Picrothamnus desertorum*, *Pleuraphis jamesii*, *Sarcobatus vermiculatus*, and *Tetradymia canescens*). The separation along the Mojave's southern border is blurred with species from the Sonoran Desert (e.g., *Ambrosia dumosa*, *Cylindropuntia bigelovii*, *Ephedra trifurca*, *Senegalia greggii*, *Psorothamnus spinosus*, *Salazaria mexicana*, and *Simmondsia chinensis*). However, the Mojave has a large number of endemic species including both ephemeral annual plants, within the genera of *Camissonia* (sensu lato), *Chamaesyce*, *Eriogonum*, *Gilia*, *Lupinus*, *Phacelia*, etc., as well as perennial plants, such as *Acamptopappus sphaerocephalus*, *Agave utahensis*, *Echinocactus polycephalus*, *Ephedra funerea*, *Menodora spinescens*, various *Opuntia* spp., *Psorothamnus arborescens*, *P. fremontii*, *Salvia funerea*, etc. In particular, the Death Valley region with its many isolated mountain ranges is well known for its unique taxa for both genera (e.g., *Gilmania* and *Oxystylis*), and species (*Enceliopsis covilleii*, *Eriogonum rixfordii*). Specific plant

communities primarily characterize the Mojave Desert, including *Yucca brevifolia* and *Yucca schidigera*, while other communities characterize both the Mojave and Great Basin deserts include *Artemisia* spp., *Ephedra* spp., and *Coleogyne ramosissima* (Johnson 1976, Turner 1994, Keeler-Wolf 2007).

The National Vegetation Classification Standard

Following the guidelines provided by the VMI Program, MOJN I&M and CNPS have developed this vegetation classification at the alliance level, and the association level when possible. These are the finest two levels of the United States National Vegetation Classification (USNVC) hierarchy, following the National Vegetation Classification Standard (FGDC 2008) and A Manual of California Vegetation (Sawyer et al. 2009). These classification levels are floristically and environmentally defined, and are used to denote plant community types categorized by the major ecological regions of the nation. The USNVC supports the development and use of a consistent national vegetation classification to produce uniform statistics about vegetation resources across the country, based on vegetation data gathered at local, regional or national levels (FGDC 2008). The USNVC hierarchy was applied to this classification according to the most current information; however, the hierarchy is being revised iteratively based on vegetation inventory efforts such as this project, so the final product presented here will inevitably need to be revised in the future.

The United States Federal Geographic Data Committee (FGDC) promotes coordinated development, use, sharing, and dissemination of geographic data through a set of representatives from numerous federal and multi-state agencies. In 1997, FGDC Vegetation Subcommittee created a federal vegetation classification standard with supporting definitions and protocols contained in a report: FGDC-STD-005-1997 (FGDC 1997). Since then, the FGDC Vegetation Subcommittee has derived a major revision, the National Vegetation Classification (NVC) Standard, Version 2: FGDC-STD-005-2008 (FGDC 2008). The 1997 version and its revision provide documentation for a standard, synoptic view of vegetation resources in the United States and a cohesive effort among Federal agencies in their approaches to classify vegetation, thus reducing duplicative efforts among multiple agencies while promoting consistent classification of vegetation resources across regions. Version 2 replaced the original, addressed several issues known with the first version, and included a substantial reorganization of the classification's hierarchical structure. The use of a national standard aids effective resource stewardship by augmenting compatibility and widespread use of the information throughout the NPS and other Federal and State agencies.

The NVC standard classifies existing vegetation within a hierarchical structure (See Table 1). In brief, the classification is separated into two overriding categories: natural vegetation (including ruderal/semi-natural) and cultural (including ornamental/developed) vegetation. From there, each category is further divided into three main sections: (1) Upper (where physiognomy plays a predominant role), (2) Mid (where both floristics and physiognomy play a significant role), and (3) Lower (where floristics plays a predominant role). Within each section, additional levels are subset. Separate hierarchies are developed for cultural and natural vegetation types. Definitions of these various levels are detailed within Section 2 of the NVC standard (FGDC 2008); however, emphasis

by the NPS VMI Program for mapping of natural/semi-natural vegetation types is at the lower floristic levels (alliance and association) and the middle level (group).

Table 1. Summary of USNVC revised hierarchy levels and definitions for natural vegetation.

Hierarchy Level	Category	Definition
Upper: Physiognomy plays a predominant role.	L1 – Formation Class	Broad combination of dominant general growth forms adapted to basic moisture, temperature, and/or substrate or aquatic conditions.
	L2 – Formation Subclass	Combination of general dominant and diagnostic growth forms that reflect global mega- or macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate or aquatic conditions.
	L3 – Formation	Combination of dominant and diagnostic growth forms that reflect global macroclimatic conditions as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions.
Mid: Floristics and physiognomy play predominant roles	L4 – Division	Combination of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
	L5 – Macrogroup	Moderate set of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
	L6 – Group	Relatively narrow set of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology and disturbance regimes.
Lower: Floristics plays a predominant role	L7 – Alliance	Characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation. Alliances reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.
	L8 – Association	Characteristic range of species composition, diagnostic species occurrence, habitat conditions and physiognomy, usually from multiple growth forms or layers. Associations reflect subregional to topo-edaphic climate, substrates, hydrology, and disturbance regimes.

The NVC standard is available to the public and is regularly updated through NatureServe Explorer (2012; see <http://www.natureserve.org/explorer>) and the USNVC (2016; see <http://www.usnvc.org>). The online USNVC allows for access to the classification at all levels of the hierarchy, and it provides a process for peer review and updates to the classification through collaboration with federal agencies and the Ecological Society of American (ESA; see Faber-Langendoen et al. 2009, 2014).

Methods

Timeline

The compilation and analysis of data to complete vegetation classifications, geospatial maps, related databases, and ecological descriptions progress is a complex, multi-year process. A general timeline is provided below to clarify the stages of the work presented here in the overall project scheme.

2009—Initial meeting for project planning. NPS and CNPS begin compiling legacy datasets

2010—New field surveys in LAKE begin by UNLV (see Prengaman et al. 2011)

2011—New field surveys in DEVA and MOJA are completed by UNLV

2012—Interim classification analysis is completed by CNPS for LAKE mapping

2013—Mapping begins in LAKE by BOR

2014—Compiled database with full draft classification; field key and descriptions written by CNPS
Mapping begins in MOJA by Cogan Tech, Inc; Field verification of map at LAKE by NPS

2016—Mapping and Accuracy Assessment sampling is completed in LAKE (see Salas et al. 2016);
CAMO is dedicated and added into project; CNPS completes 30 field surveys

2017—Mapping begins in DEVA by Cogantech, CNPS submits draft MOJN classification report,
ecological descriptions, and databases for all four parks

2019—Accuracy Assessment sampling in MOJA begins by Chris Lea et al., MOJN classification
report completed

2020-21—Planned Completion of mapping, Accuracy Assessment analysis, and report for MOJA
and DEVA

Data Collection

Review of Existing Datasets

CNPS obtained, reviewed, and compiled/standardized legacy datasets from many sources. Jeanne Taylor, the former MOJN Vegetation Mapping Coordinator (VMC), provided some data during 2009–2012, and botanists at DEVA provided other data during 2010–2013. These recent datasets were from a variety of vegetation resource assessment and monitoring projects undertaken within and near LAKE, DEVA, and MOJA. CNPS obtained, compiled, and standardized legacy datasets from Kathryn Thomas, Todd Keeler-Wolf, and Julie Evens from the Central Mojave Vegetation Database mapping project, Joshua Tree National Park (JOTR) mapping project, the Northern and Eastern Colorado Desert mapping project, and watercourse thesis in California’s eastern Mojave Desert. CNPS reformatted other recent or new field data from NPS and USFS staff, including Steven Delfavero, Michele Slaton, Jane Cipra, and Andrew Kaiser. See Table 2 for a list of legacy datasets.

Table 2. List of legacy datasets used in the current MOJN I&M vegetation mapping project, arranged by date (newest to oldest).

Document/Study Title	Authors	Year	Spatial Data	# Samples	Classification	Mapping	Synopsis
Vegetation plot database, DEVA	Slaton, M.	2004–2010(18)	Yes	250 [+157]	X	X	Circular plots of 800 m ² for woody vegetation, rectangular plots 10 x 10 m for herbaceous vegetation.
Perennial Grass-dominated Plant Communities, MOJA	McAuliffe, J.R.	1989–2017	Yes	74+	X	X	Plots size from 1,000 to 2,500 m ² for classification of perennial plants, including data from the New York Mountains area.
Exotic Species Survey Methods, DEVA	Delfavero, S.	2008–2010	Yes	115	X	X	Rapid assessments with complete or partial plant data. Focus was for exotic species inventory yet included data on habitats where exotics do and do not occur.
Death Valley Springs Monitoring dataset, DEVA	Dilts, T. and Weisberg, P.	2010	Yes	42 (800+)	X	X	Detailed field mapping at 42 representative springs including quadrats (1m ²), transects, photo lines, and vegetation patches with over 800 polygons (minimum size 10 m ²) of the dominant vegetation.
Vegetation mapping classification data, JOTR	La Doux, T.; Babich, E.; Keeler-Wolf, T.	2009	Yes	110	X	X	Rapid assessments in plots of 10 m x 100 m in area or 50 m radius.
Vegetation mapping accuracy assessment data, JOTR	La Doux, T.; Babich, E.; Lea, C.	2009	Yes	1,313	–	X	Accuracy assessments in plot sizes of 25 m radius or 50 m radius.
Rare plant monitoring data for rare plant species in Las Vegas Valley, LAKE, and environs	Bangle, D.	2008, 2009	Yes	21 macro-plots (529 quadrats)	X	X	Long-term monitoring data for <i>Arctomecon californica</i> , found on gypsum soils in Las Vegas Valley, and near springs associated with the Colorado River. Additional rare plant data for <i>Anulocaulis leiosolenus</i> , <i>Astragalus geyeri</i> var. <i>triquetrus</i> , and <i>Eriogonum viscidulum</i> .
High resolution imagery project, LAKE	Jornada Experimental Range Station (JERS) & LAKE staff	2009	Yes	23 macro-plots (138 transects) + 32 transects	X	X	Two datasets: One at various sites/communities with 50 m x 50 m macro-plots with 6 line transects per plot; 23 macro-plots (and 138 transects). Second at springs with varying numbers of transects (32 transects). Intercept data along each transect at 0.5-meter intervals.

Table 2 (continued). List of legacy datasets used in the current MOJN I&M vegetation mapping project, arranged by date (newest to oldest).

Document/Study Title	Authors	Year	Spatial Data	# Samples	Classification	Mapping	Synopsis
High resolution imagery project, MOJA	JERS & LAKE staff	2009	Yes	4 macro-plots (24 transects)	X	X	50 m x 50 m plots with 6 line transects per plot. Four macro-plots in Joshua Tree/Blackbrush community. Point intercept data along transects at 1-meter intervals.
A floristic and vegetation analysis of the Newberry mountains, Clark County, Nevada	Abella, S. (UNLV); Roberts, C. and Holland, J.S. (LAKE)	2008, 1982	Yes	107	X	X	Study originally conducted in 1982; plots re-read in 2008. Project goal: identify the major vegetation units of the Newberry Mountains. Four major vegetation communities defined: <i>Encelia, Larrea-Ambrosia</i> , Mixed Shrub, and Mixed Shrub-Woodland.
Vegetation plot data, Red Rock Canyon National Conservation Area	Charlet, D.; Westenburg, C.	2008	Yes	300	X	X	400 m ² plots (e.g., 20 x 20 m, or rectilinear) for vegetation classification and mapping.
Vegetation classification of data from the Northern and Eastern Colorado Desert Management Planning project	Evens, J.M.; Hartman, S.	2007 (1997)	Yes	729	X	X	Relevé data of 2,100 m ² plots or helicopter surveys; reference information for the MOJN I&M classification, since majority of data is not within NPS lands.
Riparian vegetation following tamarisk removal (Sacatone Wash, Burro Spring, Meadow Springs), LAKE	Matchett, J.R.	2007	Yes	16	X	X	30-meter line transects with a 5-meter brush belt, using the point-intercept method. In areas with tamarisk plots installed, tamarisk was cut and burned. All areas have native vegetation reestablishment.
Travertine Springs complex vegetation, DEVA	Thomas, K.	2006	Yes	–	–	X	Polygon and point data of the springs complex.
Central Mojave Vegetation Database, including CAMO, DEVA, & MOJA	Thomas, K.; Keeler-Wolf, T.; Franklin, J.; and Stine, P.	2004 (1997-1998)	Yes	1,199	X	X	Relevé plots of 1,000 m ² , including 1,199 plots with plant data and 45 plots without plant data. Technical report has more information about dataset and related data used in project.
Preliminary vegetation mapping data, JOTR	AIS	2000–2001	Yes	300	X	X	Rapid assessments in plots of 1,000 m ² (20 x 50 m in area or 17.85 m radius in area).

Table 2 (continued). List of legacy datasets used in the current MOJN I&M vegetation mapping project, arranged by date (newest to oldest).

Document/Study Title	Authors	Year	Spatial Data	# Samples	Classification	Mapping	Synopsis
Watercourse vegetation in the eastern Mojave Desert, MOJA	Evens, J.M.	2000	Yes	262	X	X	Relevé plots of 1,000 m ² . Watercourse plots for master's thesis and desert riparian/wash classification.
Preliminary vegetation mapping data, JOTR	Long, J.; et.al.	1997	No	74	X	–	Relevés averaging 2,100 m ² (or 2 x 100 m ²) in representative stands.
Preliminary data from vegetation mapping of Malapai Hill quad, JOTR	Watts, J.	1996	Yes	108	X	X	100 m ² plots with average size of all shrubs estimated for cover.
Ft. Irwin	Novak, P.	1996	Yes	300	–	–	5-10 parallel 100-ft line intercepts per plot.
Preliminary data from vegetation mapping of Ft. Irwin (N of Barstow)	Watts, J.	1996	Yes	125	–	–	Abundance and cover data (cover used in analysis) in 100 m ² plots with average size of all shrubs estimated for cover.
East Mojave Scenic Area	Johnson, H.	1978	No	751	X	–	100-pace toe-point within representative pre-delineated polygons.
Ground truthing NASA-NPS Landsat Mapping, DEVA	Root, R.	1978	Yes	152	X	X	100 ft. x 100 ft. orthogonal transects from a central point.
Master's thesis within Black Mountains, DEVA	Schramm, D.	1977	No	88 (92)	–	–	Master's thesis data of Belt transects 100 x 6 yd, line intercept 2-33 m lines.

CNPS resolved various data type and transcription issues of data received. For example, the plant data from datasets contained different types of species codes and scientific names, which we resolved to merge the datasets. Upon downloading USDA Plants Database codes and names from July 2014, for Arizona, California, and Nevada (USDA-NRCS 2014), we assigned current taxonomic names to the legacy data. The plant data from the various projects also included different vegetation cover / abundance types such as cover classes, actual percent covers, relative percent covers, or numbers of hits. We resolved the cover data by storing data as specific number values (with midpoint values for cover classes and specific values for percent cover or hits). Associated plot and environmental data from each dataset were also varied, from only a few fields of information to many. More than half the datasets contained geographic UTM coordinate values while others lacked these values, and datasets contained elevation in feet or in meters. We standardized elevation to meters; if elevation was missing but UTM coordinates were present, then we derived elevation using a digital elevation model (in meters). We also derived other environmental variables (e.g., precipitation, temperature, soil characteristics) from existing GIS layers for those plots with UTM coordinates.

Collection of New Data

UNLV staff collected new classification/mapping data specifically for this NPS vegetation mapping project (Prengaman et al. 2011, Salas 2009). They collected data following the standard NPS protocols; see Appendix A for revised, second-phase field data forms used in DEVA, MOJA, and CAMO. The new data filled in data gaps across the four park areas, providing current inventory information of the parks especially in various areas where burns have occurred recently.

CNPS staff compiled existing legacy and new data from the Mojave Desert region primarily in 2013–2014. We utilized new and existing data from LAKE, DEVA, MOJA and immediate environs for a full classification analysis in 2014 and subsequently in 2017. Analysis data included approximately 4,000 surveys, as follows; Figures 3, 4, and 5 represent the locations of field survey for these parks:

- DEVA new vegetation plot and observation surveys from NPS/UNLV (2011, n=620)
- DEVA plot data from Slaton (n=233 [+157 newer surveys]) and Delfavero (n=114)
- DEVA plot data, plus plots within a 4 km buffer of DEVA from Thomas et al. (2004, n=411)
- DEVA plot data from Root (n=102)
- LAKE new vegetation plot and observation surveys from NPS/UNLV (n=439)
- LAKE fire monitoring handbook riparian/tamarisk removal transects from USGS (n=16)
- LAKE macroplots and transects from Jornada Experimental Range Station (n=55)
- LAKE/Newberry Mountains vegetation data from Roberts (n=107)
- East Mojave Scenic Area transect data subset from Johnson (1978, n=750)
- MOJA new vegetation plot and observation surveys from NPS/UNLV (n=600)
- MOJA plot data, plus plots within a 4 km buffer of MOJA from the Thomas et al. (2004, n=244)
- MOJA plot data in watercourses/washes from Evens (2000, n=264)
- MOJA transect and plot data from other sources (NRCS, Jornada Exp. Range Station; n=6)
- CAMO plot data from NPS/CNPS (2016, n=30)
- MOJA and CAMO plot data from McAuliffe (2017, n=74)

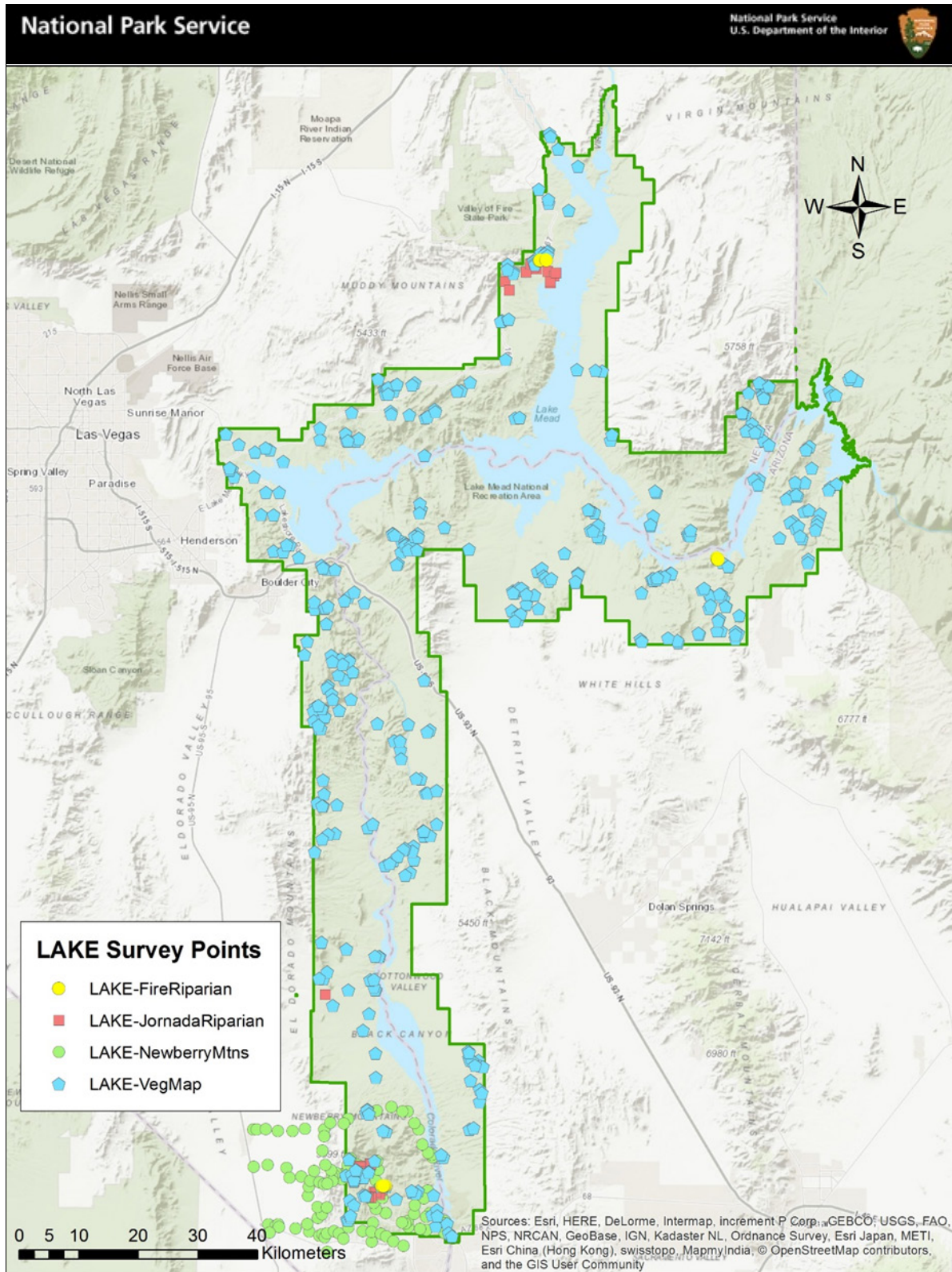


Figure 3. Location of field surveys for the vegetation classification of LAKE. Surveys from the Newberry Mountains were included in the analysis to better inform the classification of vegetation types found in the southern portion of LAKE (green circles). Map by D. Hastings and K. Sikes, CNPS, September 2017.

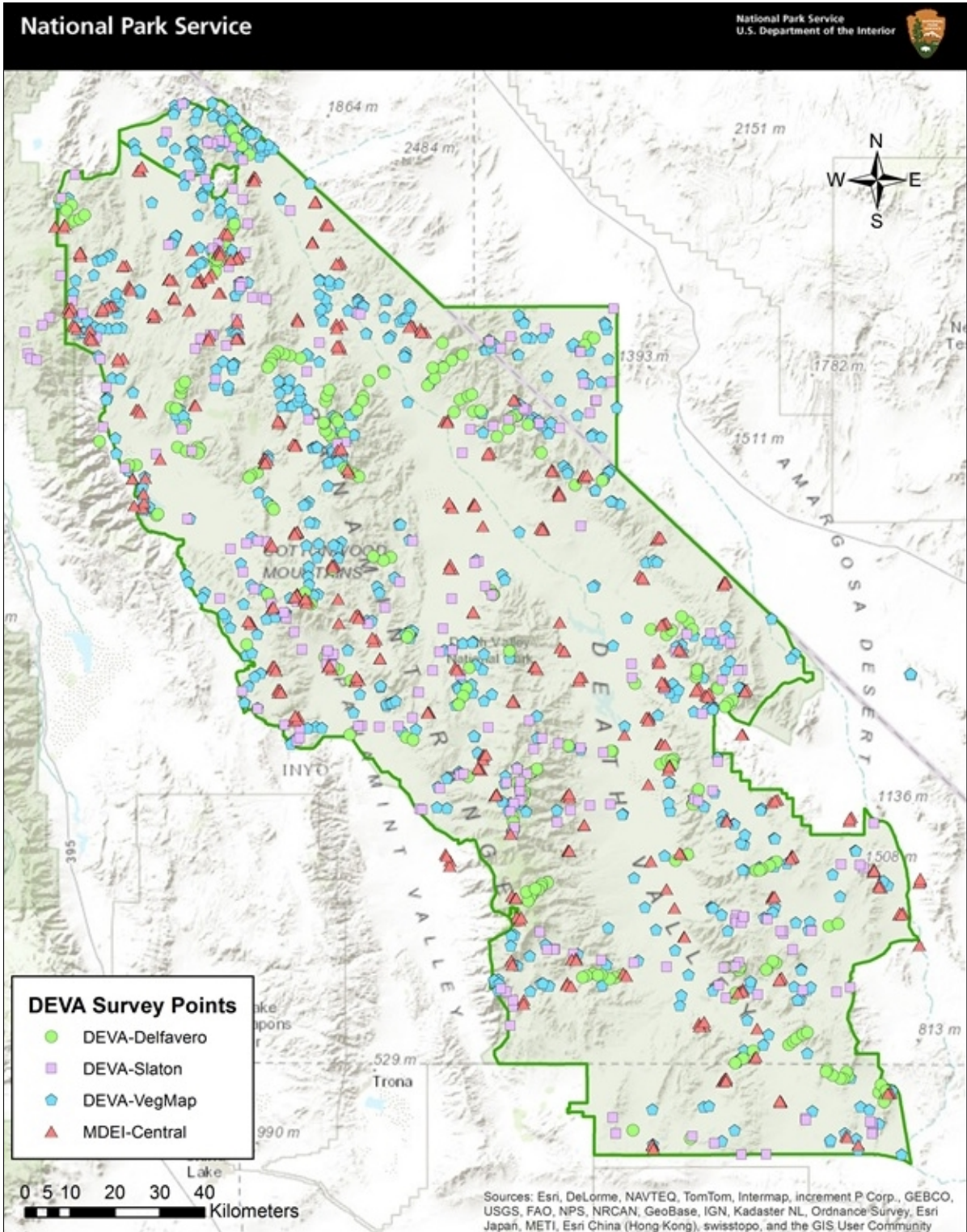


Figure 4. Location of field surveys for the vegetation classification of DEVA (outlined in green). Map by D. Hastings and K. Sikes, CNPS, February 2014.

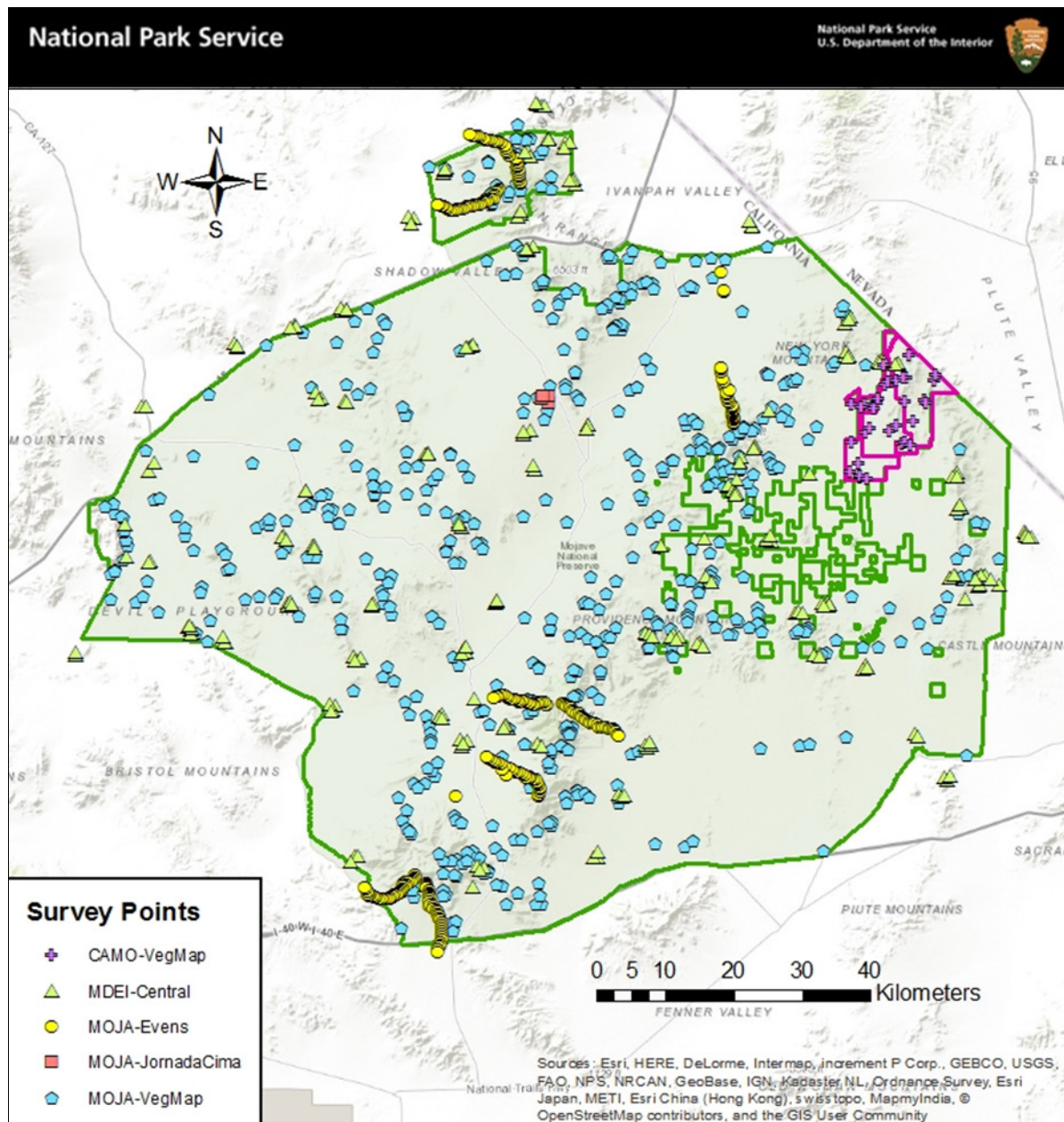


Figure 5. Location of field surveys for the vegetation classification of MOJA (outlined in green) and CAMO (outlined in magenta). Map by D. Hastings and K. Sikes, CNPS, January 2017.

We compiled the legacy and new data in a large merged database with three primary data tables of plant, plot, and site impact data (when available) along with related lookup tables. The merged dataset tables are in a Microsoft (MS) Access database format, which includes a combination of plot-based (relevé) data and stand-based (e.g., observation level, rapid assessment, and accuracy assessment) data. We merged different datasets together by placing similar, appropriate attributes into a standard set of table columns. When certain quantitative or categorical plot data values were unique a dataset, we placed those values in PlotOther fields with a description of the unique attribute.

We used the NPS Metadata Tools and Editor to create a metadata file explaining the data types and fields in the merged database, and we transferred the legacy data into the NPS PLOTS 4.0 database.

Additionally, CNPS conducted new surveys at Castle Mountains National Monument (CAMO) in 2016, using the NPS protocols after the main datasets were compiled and analyzed. Therefore, CNPS applied alliance and association names to the surveys from the existing classification. These new data from CAMO are archived within the PLOTS database along with LAKE, DEVA and MOJA surveys. More recently, we received and analyzed grasslands-focused field data from McAuliffe (2016) including MOJA and CAMO; we added this dataset to the PLOTS database and noted brief references in the written local descriptions.

Before analysis, we reviewed existing vegetation reports for current desert vegetation classifications. Primary literature included vegetation projects of the Central Mojave Desert Ecosystem Project (Keeler-Wolf and Thomas 2000, Thomas et al. 2004), Anza-Borrego Desert (Keeler-Wolf et al. 1998), Joshua Tree National Park (Keeler-Wolf et al. 2005, Evens et al. 2012), Northern and Eastern Colorado Desert (Evens and Hartman 2007), Grand Canyon and Great Basin (NatureServe 2010, Schulz and Hall 2011), Death Valley springs (Thomas 2006, Dilts and Weisberg 2010, Sada and Cooper 2012), Desert Renewable Energy Conservation Plan (VegCAMP and AIS 2013), A Manual of California Vegetation (Sawyer et al. 2009), and the NatureServe website (2012–2017).

Since data came from a variety of sources, CNPS performed a thorough quality control of the plant composition data, which resulted in various plant identification and/or taxonomic issues. Working with MOJN VMC, we made many plant data corrections or simplifications. We also developed some guidelines to resolve plant data that were assigned identifications at different taxonomic levels. For example, some taxa had been determined to the genus level and other times to the species and/or subspecies level (e.g., *Achnatherum* vs. *A. hymenoides* vs. *A. speciosum*, etc). The following decisions were made to generate a plants analysis file:

- For taxa with 2 or 3 species and the genus level determined, where the taxa generally appear as ecological equivalents (occurring in a small range of habitats), we merged all into the genus level (e.g., *Antheropeas*, *Allium*) and retained them in the analysis.
- For taxa with very few records (≤ 10) determined at both the species level and the genus level, where the species are ecologically dissimilar (ranging across many different habitats), and where a higher number of records were at genus level compared to species level, the genus records were removed for analysis (e.g., *Arabis*).
- For taxa where we have many records (>10 records) at the species level as well as at the genus level (e.g., *Camissonia*), these records were both retained and removed from the cluster analysis runs to see if there were difference results. In comparing these two runs, groupings appeared similar and not weighted by the genus level being retained, so we did not remove the genus determinations from the analysis.

Data Analysis

General Classification Standards

The alliance and association levels of the vegetation classification for this project are based upon the U.S. National Vegetation Classification (USNVC). This classification has been developed by NatureServe in partnership with federal agency partners and the State Natural Heritage Programs, including the Department of Fish and Wildlife (CDFW) and California Native Plant Society (CNPS) in California. While the first and second editions of the national classification provide thorough introductions to the classification, its structure, and the list of vegetation units known in the United States (FGDC 2008), refinements to the classification are expected to occur during its application through peer review, including during this project. Refinements and updates are served on the web at NatureServe (2014) and USNVC (2016). Taxonomy of scientific names used in vegetation types follow the NVC standard (including Kartesz 1999).

Classification Analysis Procedures

Since plant community datasets were inherently complex, and multiple environmental variables determined the heterogeneity in the patterns, we employed cluster analysis with a hierarchical agglomerative technique, typically using Sørensen distance and flexible beta group linkage method at -0.25 in PC-ORD (McCune and Mefford 2006). Though Two Way Indicator Species Analysis's (TWINSPAN's) divisive technique is sometimes employed for this type of analysis when one main underlying environmental determinant is evident in a dataset, we chose an agglomerative clustering technique with Sørensen distance instead since various environmental factors appear to influence the vegetation patterns (McCune and Grace 2002). We pooled together field surveys of both fixed-area plots (relevés) and stand-based samples (rapid assessment observations) with species abundance (cover) values, which we have converted to 7 different classes using the following modified Braun-Blanquet (1932/1951) cover categories: 1=<1%, 2=1-5%, 3=>5-15%, 4=>15-25%, 5=>25-50%, 6=>50-75%, 7=>75%. The majority of the species values in the desert fell within the first four cover classes. For data not based on percent cover, and instead as point intercept (proportion) data, we used an arc sine square root transformation on the data within PC-ORD before performing cluster analysis.

Prior to the cluster analysis runs, we performed outlier analysis on the datasets using PC-ORD to delete both outlier plots and species. We discarded plots with Sørensen distances of more than three standard deviations away from the mean (of the pairwise distances across the entire dataset). We also discarded rare species occurring in fewer than 2 or up to fewer than 6 plots from datasets in these analyses.

We displayed the cluster analysis groupings in dendrogram outputs, in which we interpreted dendrograms at 2 to 30 or more cluster group levels. After generating the cluster analysis groups, we also employed Indicator Species Analysis (ISA) to objectively decide at what number of "groups" or cut levels to explicitly interpret the cluster dendrograms (McCune and Grace 2002, Dufrière and Legendre 1997). The intent was to display and interpret the groups generated by the cluster analyses first at generic levels (to classify higher level macrogroups and alliances) and subsequently finer levels (to classify associations).

Further, we used ISA to determine which species were characteristic indicators for the different groups. With ISA producing indicator values for each species according to their group membership for all levels of groups within the dendrogram, we evaluated the statistical significance of the indicator species using a Monte Carlo test with 1000 randomizations. By repeating ISA for datasets divided into 2 groups through 30 or more groups, we evaluated all analyses to determine the total number of significant indicator species ($p\text{-value} \leq 0.5$) and the mean p -value for all species within each group level. We selected the group levels with highest numbers of significant indicators and low overall mean p -values for final evaluations of the community classification (McCune and Grace 2002).

At the most significant group level per ISA, we applied plant community names within floristic levels (i.e., alliance and association names) to each field survey. We designated alliance and association names by reviewing species composition, degree of constancy, indicator species, and species cover values. Further, we reviewed each field survey within the context of the cluster to which it had been assigned to determine association names, and we employed an ordination (e.g., Non-metric multidimensional scaling) to review the main groupings of plots.

Upon revisiting each survey, some appeared to be misclassified in earlier versions of the cluster analysis, usually because of their rarity in the dataset. We classified these surveys based on their similarity to existing associations or defined as new provisional associations. Thus, we consulted pre-existing classifications and floras to locate analogous/similar classifications or descriptions of vegetation. A summary of the above analysis process is provided in the following steps:

- Run cover category cluster analysis to display a specific arrangement of field surveys based on species presence and abundance.
- Run Indicator Species Analysis (ISA) at each of the successive group levels for each of the Cluster Analysis dendrograms from 2 groups up to the maximum number of groups (all groups with at least 2 samples).
- Settle on the representative grouping level of each Cluster Analysis in preliminary labeling.
- Preliminarily label alliance and association for all surveys, noting indicator species from the ISA.
- Review existing classifications to determine relatedness of current dataset to existing alliances and associations, and assign each association and alliance based on review of species constancy and cover on a sample-by-sample basis.
- Review ordination of the same field surveys to identify main groupings of surveys.
- Re-label final alliance names for each survey and arrange in a database table.

By 2012, CNPS coordinated with the MOJN VMC about the newer 2010–2011 data that UNLV field crews collected for use in vegetation classification analysis, and we subsequently received new data in two batches for the analysis process. We initially analyzed data in two previous (preliminary and intermediate) classification analyses, when data from within LAKE and surrounding areas were available. Our analyses proceeded from 2012–2014 upon receiving new data.

We pooled the successive data analyses together in a Microsoft (MS) Access database to review and standardize classification names. We used the resulting analyses, in addition to existing classifications and keys, as guides to assign classification names of alliances and associations. We standardized the classification names with existing USNVC and other desert classifications, and we produced MS Access and Excel summary tables of the classification for review by our partners at NatureServe and CDFW. We placed this classification within a newly revised version of the USNVC hierarchy, by nesting alliances within groups and macrogroups. At the same time, we provided expert review of the new hierarchy and placed new alliances within this hierarchy; therefore, dialog with NatureServe and CDFW has been necessary to complete the hierarchical assignments.

To further examine and display patterns of plant community composition among groups and macrogroups, we used non-metric multidimensional scaling ordination (NMDS) in PC-ORD (McCune and Mefford 2006). In this ordination, we used Sørensen (Bray & Curtis) distance measures. We removed species found in fewer than three field surveys from the analysis. We also removed outlier surveys, based on having distance measures more than two standard deviations from the mean (of each survey from every other survey). We compared 50 iterations with real data and 50 iterations with randomized data to select a dimensionality. Then we performed 200 iterations with the chosen dimensionality to find a stable solution with minimal stress (McCune and Grace 2002). To assess the variance represented by each axis, we calculated the coefficient of determination between distances in the ordination space and distances in the original space (i.e., Sørensen [Bray & Curtis] distances). We additionally combined environmental variables in a secondary matrix to determine the correlation between environmental variables and the NMDS axes. We displayed correlations, with an R-value greater than 0.16, as vectors overlain on the NMDS ordination graph indicating the direction and strength of the correlations.

Upon classifying the vegetation, we conferred with NPS staff on the type, content and format of descriptions to be written. With input from Nita Tallent, Tammy Cook, and Tom Philippi, a decision was made for CNPS to write alliance-level descriptions for the local park areas. We also received input from MOJN I&M staff, Jean Pan, and NatureServe staff, Kristin Snow and Marion Reid, on the format and content for the descriptions. We drafted sets of alliance-level vegetation descriptions, including woodland, shrub, and herbaceous vegetation types, which we merged subsequently into a complete set of descriptions organized by the USNVC hierarchy. We supplemented data compilation with information from literature searches.

Subsequently, NPS has funded association-level descriptions for those types that were new to the USNVC. CNPS staff wrote local descriptions for all associations with a sample size of at least 3 or more that resulted from the classification, while NatureServe wrote global descriptions for all associations that had a sample size of at least 10 and/or that had at least one other literature citation supporting the vegetation type. NatureServe also assigned associations with database codes as either CEG (community element global) or CEPP (community element proposed, or provisional associations) for all associations from this project.

NPS has later funded data collection and written descriptions for new classification units at CAMO once the management of that area transitioned from the Bureau of Land Management (BLM) to NPS.

This included two grassland vegetation associations. Additionally, we received another set of DEVA data from Slaton (data from 2015–2018; n=157), from a separate BLM-funded project. We co-analyzed this later dataset with other data from the Owens Valley to obtain classification names, and we subsequently archived the most recent data in the same PLOTS database as the other compiled data for MOJN. Since these datasets were collected after the main analysis and description writing, we primarily appended the plot/survey numbers at the end of the written descriptions and made minor updates to the descriptions.

Mapping Classification

Mapping at LAKE of vegetation alliances and higher-level group and macrogroups has been completed (see Salas et al. 2016); the mapping at MOJA began in 2015 and will be completed in 2020; and mapping at DEVA is occurring in subsequently by 2021. The lead mapping contractor for LAKE was David Salas at Bureau of Reclamation (BOR), and for MOJA and DEVA is Dan Cogan of Cogan Technology, Inc. CNPS staff have provided David Salas and Dan Cogan with the compiled data sets and the resulting alliance-level classification for LAKE, MOJA and DEVA, and we have addressed questions on the plot data during the LAKE mapping. This classification information also has been used to establish working map classifications at the alliance level and at higher group and macrogroup levels.

Based on the analysis of legacy and new samples at LAKE, CNPS staff has worked with BOR and with Cogan Technology, Inc.'s mapping staff to translate and simplify the classification of alliances (e.g., *Quercus turbinella* Shrubland Alliance) and landform types (e.g., playa and cultural/ornamental developed mapping units) into a coarser mapping classification. CNPS also has assisted BOR with comparing and reconciling differences in the vegetation map units at the overlapping, border area with Grand Canyon-Parashant National Monument (GRCA-PARA) and LAKE.

Results and Discussion

Using data received by MOJN I&M and various partners from 2009–2013, CNPS has compiled approximately 9,000 vegetation data records into an MS Access database. This database holds a wealth of information regarding vegetation communities, including local species presence and distribution. The data within this database will prove useful for years to come in assessing climate driven changes, shifts in dominance, and variation in species assemblages across the large area of the Mojave Desert. Already, this dataset has been used to assess the range and extent of blackbrush scrub (*Coleogyne ramosissima*) by NPS and USGS.

Of the surveys available, approximately 4,000 had adequate vegetation and/or landform information (i.e., species composition and abundance data) to inform the classification of LAKE, DEVA, MOJA, CAMO, and environs. Upon combining datasets and analyzing them using agglomerative cluster analysis, indicator species analysis, and other summary statistics using the PC-ORD suite of multivariate software tools, we found the newly compiled dataset for analysis to be large and complex in nature.

Thus, we split up the dataset into smaller subsets to perform successive cluster and indicator species analyses. The first cluster analysis run provided a separation of the field surveys into nine different groups, based on where a peak in the number of significant indicator species occurred. These nine groups included the following significant indicator taxa:

- *Artemisia tridentata*, *Pinus monophylla*, *Ephedra viridis*, *Elymus elymoides*, *Chrysothamnus viscidiflorus*, *Artemisia tridentata* spp. *vaseyana* (193 plots)
- *Atriplex confertifolia*, *Tetradymia axillaris*, *Krascheninnikovia lanata*, *Lycium andersonii*, *Picrothamnus desertorum*, *Grayia spinosa* (293 plots)
- *Yucca schidigera*, *Porophyllum gracile* and other herbs, Cryptogamic crust (721 plots)
- *Suaeda moquinii*, *Salsola*, *Pluchea sericea*, *Distichlis spicata*, *Atriplex polycarpa* (474 plots)
- *Ambrosia eriocentra*, *Chilopsis linearis*, *Acacia greggii*, *Adenophyllum cooperi*, *Hymenoclea salsola* (297 plots)
- *Plantago ovata*, *Encelia farinosa*, *Atriplex hymenelytra*, *Chorizanthe rigida* and other herbs (590 plots)
- *Gutierrezia sarothrae*, *Prunus fasciculata*, *Artemisia ludoviciana*, *Rhus trilobata*, *Yucca baccata*, *Sphaeralcea ambigua*, *Baccharis sergiloides* (535 plots)
- *Ambrosia dumosa*, *Larrea tridentata*, *Krameria erecta*, *Cylindropuntia ramosissima*, *Senna armata*, *Encelia frutescens*, *Cylindropuntia echinocarpa* (424 plots)*
- *Ericameria cooperi*, *Ephedra nevadensis*, *Pleuraphis rigida*, *Coleogyne ramosissima*, *Gutierrezia microcephala* (326 plots)*

We analyzed these nine groups separately using cluster analysis and ISA. The latter two groups (*) were from the Johnson dataset of toe-point transects, a sampling technique that is non-standard

relative to the plot- or stand-based techniques by which all other data were collected. Out of the 750 field surveys included from Johnson, 736 surveys grouped together into these latter two groups, and 14 other surveys were included in other groups above. Because most of the Johnson data grouped apart from the rest of the data, we analyzed the Johnson data separately.

The final classification has resulted in the identification of 105 alliances and landform types, and over 240 associations. These alliances and associations are nested within the upper levels of the newly revised USNVC hierarchy (see Table 3). Upon evaluating the revised USNVC hierarchy and previously described alliances, ecologists with CDFW, CNPS and NatureServe also have proposed and incorporated updates to this hierarchy, including new alliances and changes in upper-level hierarchy placements for some existing alliances. For example, temperate wetland shrubland and herbaceous groups, which had been designated in a Formation (e.g., 2.B.6. Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Formation), have been changed to nest within a separate Subclass level (i.e., 2.C. Shrub & Herb Wetland Subclass, instead of under 2.B. Temperate & Boreal Grassland & Shrubland Subclass). These recent changes are reflected in the classification, which is nested within the USNVC hierarchy, for all four park units (see Table 3).

By providing expert review and newly collected data, we are better able to represent desert ecosystems in the USNVC. Importantly, some additional revisions are a direct result of this current effort, in which we have placed new alliances within the revised hierarchy and moved others to more appropriate locations within the hierarchy. However, since the hierarchy is still undergoing peer-review, changes like this are expected to occur even after this project is completed, and future updates will be needed.

Based on the analysis of almost 640 legacy and new surveys at LAKE, 51 alliances and 108 associations from LAKE are nested within the upper levels of the newly revised USNVC hierarchy. A diagram that geographically displays the location of vegetation field surveys representing the major alliances for the LAKE classification is provided in Appendix B. This classification has been subsequently reviewed and vetted by partners at MOJN (Jeanne Taylor), NatureServe (Mark Hall and Keith Schulz) and CDFW (Todd Keeler-Wolf) in 2012.

The LAKE area has since been mapped at either the alliance or higher level units in the USNVC hierarchy (see Salas et al. 2016). For the map area, alliance-level updates or changes are reflected specifically in Table 4 for LAKE and the map buffer area with GRCA-PARA. During this classification and mapping effort, we have made a variety of recommendations and/or updates for the USNVC classification in this region. For example, *Ephedra* spp. - *Leymus salinus* - *Eriogonum corymbosum* Badlands Cold Desert Sparse Vegetation Alliance has been recently redefined by NatureServe, instead of the former *Ephedra torreyana* Sparsely Vegetated Alliance. Other recent recommendations that were accepted include an *Encelia farinosa* Desert Scrub Alliance and a mixed *Prunus fasciculata* - *Salazaria mexicana* Shrubland Alliance, instead of separate alliances for these two taxa previously described in Sawyer et al. (2009) and Evens et al. (2012). Other alliance concept changes during the course of peer-review in the USNVC include the *Fouquieria splendens* Desert Scrub alliance being merged with the *Larrea tridentata* - *Encelia farinosa* alliance. While the USNVC has recently merged these two alliances into the *Larrea tridentata* - *Encelia farinosa* -

Fouquieria splendens Upper Bajada & Rock outcrop Desert Scrub Alliance, we have kept them separated here because the two types were mapped in different mapping units at LAKE.

Table 3. List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
1. Forest to Open Woodland	1.B. Temperate & Boreal Forest	1.B.1. Warm Temperate Forest & Woodland	1.B.1.Nc. Californian Warm Temperate Forest	M009. Californian Forest & Woodland	G195. Californian Broadleaf Forest & Woodland	<i>Quercus chrysolepis</i> - <i>Quercus kelloggii</i>
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nb. Rocky Mountain Forest & Woodland	M020. Rocky Mountain Subalpine-High Montane Conifer Forest	G224. Intermountain Basins Subalpine Limber Pine - Bristlecone Pine Woodland	<i>Pinus flexilis</i>
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nb. Rocky Mountain Forest & Woodland	M020. Rocky Mountain Subalpine-High Montane Conifer Forest	G224. Intermountain Basins Subalpine Limber Pine - Bristlecone Pine Woodland	<i>Pinus longaeva</i>
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nb. Rocky Mountain Forest & Woodland	M022. Southern Rocky Mountain Lower Montane Forest	G226. Southern Rocky Mountain White Fir - Douglas-fir Dry Forest	<i>Abies concolor</i> Dry
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nc. Western North American Pinyon - Juniper Woodland & Scrub	M026. Intermountain Singleleaf Pinyon - Juniper Woodland	G246. Colorado Plateau-Great Basin Juniper Open Woodland	<i>Juniperus osteosperma</i> / Shrub Understory
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nc. Western North American Pinyon - Juniper Woodland & Scrub	M026. Intermountain Singleleaf Pinyon - Juniper Woodland	G247. Great Basin Pinyon - Juniper Woodland	<i>Pinus monophylla</i> - <i>Juniperus osteosperma</i> / Shrub Understory
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nc. Western North American Pinyon - Juniper Woodland & Scrub	M026. Intermountain Singleleaf Pinyon - Juniper Woodland	G249. Intermountain Basins Curl-leaf Mountain-mahogany Woodland & Scrub	<i>Cercocarpus ledifolius</i> / Shrub Understory
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nc. Western North American Pinyon - Juniper Woodland & Scrub	M027. Southern Rocky Mountain-Colorado Plateau Two-needle Pinyon - Juniper Woodland	G250. Colorado Plateau Pinyon - Juniper Woodland	<i>Pinus edulis</i> - <i>Juniperus osteosperma</i> / Shrub
	1.B. Temperate & Boreal Forest	1.B.2. Cool Temperate Forest & Woodland	1.B.2.Nd. Vancouverian Forest & Woodland	M025. Vancouverian Subalpine Forest	G243. Sierra-Cascade Cold-Dry Subalpine Woodland	<i>Juniperus occidentalis</i> var. <i>australis</i> - <i>Pinus albicaulis</i>
	1.B. Temperate & Boreal Forest	1.B.3. Temperate Flooded & Swamp Forest	1.B.3.Nd. Western North American Interior Flooded Forest	M036. Interior Warm & Cool Desert Riparian Forest	G797. Western Interior Riparian Forest & Woodland	<i>Populus fremontii</i> - <i>Fraxinus velutina</i> - <i>Salix gooddingii</i>
1.B. Temperate & Boreal Forest	1.B.3. Temperate Flooded & Swamp Forest	1.B.3.Nd. Western North American Interior Flooded Forest	M036. Interior Warm & Cool Desert Riparian Forest	G797. Western Interior Riparian Forest & Woodland	<i>Salix gooddingii</i> - <i>Salix laevigata</i>	

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
1. Forest to Open Woodland (continued)	1.B. Temperate & Boreal Forest	1.B.3. Temperate Flooded & Swamp Forest	1.B.3.Nd. Western North American Interior Flooded Forest	M298. Interior West Ruderal Flooded & Swamp Forest & Woodland	G510. Interior West Ruderal Riparian Forest & Scrub	<i>Rubus armeniacus</i> - <i>Sesbania punicea</i> - <i>Ficus carica</i> Ruderal
	1.B. Temperate & Boreal Forest	1.B.3. Temperate Flooded & Swamp Forest	1.B.3.Nd. Western North American Interior Flooded Forest	M298. Interior West Ruderal Flooded & Swamp Forest & Woodland	G510. Interior West Ruderal Riparian Forest & Scrub	<i>Phoenix dactylifera</i> - <i>Washingtonia filifera</i> Ruderal
	1.B. Temperate & Boreal Forest	1.B.3. Temperate Flooded & Swamp Forest	1.B.3.Nd. Western North American Interior Flooded Forest	M298. Interior West Ruderal Flooded & Swamp Forest & Woodland	G510. Interior West Ruderal Riparian Forest & Scrub	<i>Tamarix</i> spp. Ruderal
2. Shrubland & Grassland	2.B. Temperate & Boreal Grassland & Shrubland	2.B.1. Mediterranean Scrub & Grassland	2.B.1.Na. Californian Scrub & Grassland	M045. Californian Annual & Perennial Grassland	G766. Californian Annual Grassland & Forb Meadow	<i>Amsinckia menziesii</i> - <i>Amsinckia tessellata</i> - <i>Phacelia</i> spp.
	2.B. Temperate & Boreal Grassland & Shrubland	2.B.2. Temperate Grassland & Shrubland	2.B.2.Na. Western North American Grassland & Shrubland	M048. Central Rocky Mountain Montane-Foothill Grassland & Shrubland	G305. Central Rocky Mountain-North Pacific High Montane Mesic Shrubland	<i>Abies lasiocarpa</i> - <i>Populus tremuloides</i> / <i>Acer glabrum</i>
	2.B. Temperate & Boreal Grassland & Shrubland	2.B.2. Temperate Grassland & Shrubland	2.B.2.Na. Western North American Grassland & Shrubland	M049. Southern Rocky Mountain Montane Shrubland	G276. Southern Rocky Mountain Mountain-mahogany - Mixed Foothill Shrubland	<i>Amelanchier utahensis</i> - <i>Cercocarpus montanus</i> - <i>Cercocarpus intricatus</i>
	2.B. Temperate & Boreal Grassland & Shrubland	2.B.2. Temperate Grassland & Shrubland	2.B.2.Na. Western North American Grassland & Shrubland	M168. Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow	G271. Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow	<i>Poa secunda</i> - <i>Muhlenbergia richardsonis</i> - <i>Carex douglasii</i>
	2.B. Temperate & Boreal Grassland & Shrubland	2.B.2. Temperate Grassland & Shrubland	2.B.2.Nd. Western North American Interior Chaparral	M091. Warm Interior Chaparral	G281. Western Madrean Chaparral	<i>Arctostaphylos pungens</i> - <i>Arctostaphylos pringlei</i> - <i>Ceanothus greggii</i>
	2.B. Temperate & Boreal Grassland & Shrubland	2.B.2. Temperate Grassland & Shrubland	2.B.2.Nd. Western North American Interior Chaparral	M091. Warm Interior Chaparral	G281. Western Madrean Chaparral	<i>Quercus turbinella</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M075. Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland	G521. Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh	<i>Juncus balticus</i> - <i>Juncus mexicanus</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
2. Shrubland & Grassland (continued)	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M075. Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland	G526. Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland	<i>Rhus trilobata</i> - <i>Crataegus rivularis</i> - <i>Forestiera pubescens</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M075. Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland	G527. Western Montane-Subalpine Riparian & Seep Shrubland	<i>Cornus sericea</i> - <i>Dasiphora fruticosa</i> ssp. <i>floribunda</i> - <i>Ribes</i> spp.
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M888. Arid West Interior Freshwater Marsh	G531. Arid West Interior Freshwater Marsh	<i>Schoenoplectus americanus</i> - <i>Schoenoplectus acutus</i> - <i>Schoenoplectus californicus</i> Marsh
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M888. Arid West Interior Freshwater Marsh	G531. Arid West Interior Freshwater Marsh	<i>Typha domingensis</i> - <i>Typha latifolia</i> - <i>Typha angustifolia</i> Western Marsh
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland	M301. Western North American Ruderal Marsh, Wet Meadow & Shrubland	G524. Western North American Ruderal Marsh, Wet Meadow & Shrubland	<i>Phragmites australis</i> - <i>Arundo donax</i> - <i>Alopecurus pratensis</i> Ruderal Marsh
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Baccharis emoryi</i> - <i>Baccharis sergiloides</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Pluchea sericea</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Prosopis glandulosa</i> - <i>Prosopis velutina</i> - <i>Prosopis pubescens</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Salix exigua</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
2. Shrubland & Grassland (continued)	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Salix lasiolepis</i>
	2.C. Shrub & Herb Wetland	2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque	M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland	G533. North American Warm Desert Riparian Low Bosque & Shrubland	<i>Vitis arizonica - Vitis girdiana</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G537. North American Desert Alkaline-Saline Wet Scrub	<i>Allenrolfea occidentalis</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G537. North American Desert Alkaline-Saline Wet Scrub	<i>Atriplex lentiformis</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G537. North American Desert Alkaline-Saline Wet Scrub	<i>Atriplex parryi</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G537. North American Desert Alkaline-Saline Wet Scrub	<i>Sarcobatus vermiculatus</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G537. North American Desert Alkaline-Saline Wet Scrub	<i>Suaeda moquinii - Salicornia rubra - Isocoma acraden</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Cladium californicum</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Calamagrostis scopulorum - Andropogon glomeratus</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Distichlis spicata</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
2. Shrubland & Grassland (continued)	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Eleocharis palustris</i> - <i>Eleocharis rostellata</i> Alkaline-Saline
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Anemopsis californica</i> - <i>Helianthus nuttallii</i> - <i>Solidago spectabilis</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	<i>Sporobolus airoides</i> - <i>Muhlenbergia asperifolia</i> - <i>Spartina gracilis</i>
	2.C. Shrub & Herb Wetland	2.C.5. Salt Marsh	2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland	M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland	G538 North American Desert Alkaline-Saline Marsh & Playa	Alliance undetermined, refer to group level
3. Desert & Semi-Desert	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G293. Sonoran Paloverde - Mixed Cacti Desert Scrub	<i>Carnegiea gigantea</i> - <i>Parkinsonia microphylla</i> - <i>Prosopis velutina</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Ambrosia dumosa</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Cylindropuntia bigelovii</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Encelia farinosa</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Larrea tridentata</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Larrea tridentata</i> - <i>Ambrosia dumosa</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G295. Mojave-Sonoran Bajada & Valley Desert Scrub	<i>Larrea tridentata</i> - <i>Encelia farinosa</i> - <i>Fouquieria splendens</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G675. North American Warm Semi-Desert Dune & Sand Flats	<i>Dicoria canescens</i> - <i>Abronia villosa</i> - <i>Panicum urvilleanum</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M088. Mojave-Sonoran Semi-Desert Scrub	G675. North American Warm Semi-Desert Dune & Sand Flats	<i>Pleuraphis rigida</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Acacia greggii</i> - <i>Hyptis emoryi</i> - <i>Justicia californica</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Chilopsis linearis</i> - <i>Psoralea spinosa</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Encelia actonii</i> - <i>Encelia virginensis</i> - <i>Viguiera reticulata</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Ephedra californica</i> - <i>Ephedra trifurca</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Ericameria paniculata</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Fallugia paradoxa</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Hymenoclea salsola</i> - <i>Bebbia juncea</i> Includes: Desert Wash and River Bottom Sparsely Vegetated

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Prunus fasciculata</i> - <i>Salazaria mexicana</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M092. North American Warm-Desert Xeric-Riparian Scrub	G541. Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope	<i>Psorothamnus fremontii</i> - <i>Psorothamnus polydenius</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	G569. North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation	<i>Aloysia wrightii</i> - <i>Pericome caudata</i> - <i>Ephedra nevadensis</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	G569. North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation	<i>Atriplex hymenelytra</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	G569. North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation	<i>Chorizanthe rigida</i> - <i>Geraea canescens</i> Desert Pavement
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation	G569. North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation	<i>Peucephyllum schottii</i> - <i>Pleurocoronis pluriseta</i>
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M512. North American Warm Desert Ruderal Scrub & Grassland	G677. North American Warm Desert Ruderal Scrub & Grassland	<i>Bromus rubens</i> - <i>Schismus arabicus</i> - <i>Schismus barbatus</i> Ruderal
	3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland	3.A.2. Warm Desert & Semi-Desert Scrub & Grassland	3.A.2.Na. North American Warm Desert Scrub & Grassland	M512. North American Warm Desert Ruderal Scrub & Grassland	G677. North American Warm Desert Ruderal Scrub & Grassland	<i>Brassica tournefortii</i> - <i>Malcolmia africana</i> Ruderal
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M093. Great Basin Saltbush Scrub	G300. Intermountain Shadscale - Saltbush Scrub	<i>Atriplex canescens</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M093. Great Basin Saltbush Scrub	G300. Intermountain Shadscale - Saltbush Scrub	<i>Atriplex confertifolia</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M093. Great Basin Saltbush Scrub	G300. Intermountain Shadscale - Saltbush Scrub	<i>Atriplex polycarpa</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M095. Great Basin & Intermountain Xeric-Riparian Scrub	G559. Cool Semi-Desert Shrub & Herb Wash-Arroyo	<i>Ericameria nauseosa</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M118. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation	G570. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation	<i>Ephedra viridis</i> - <i>Chrysothamnus viscidiflorus</i> - <i>Rhus trilobata</i> Talus Sparse
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M118. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation	G570. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation	<i>Ephedra</i> spp. - <i>Leymus salinus</i> - <i>Eriogonum corymbosum</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M169. Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland	G302. Intermountain Mesic Tall Sagebrush Steppe & Shrubland	<i>Purshia tridentata</i> - <i>Artemisia tridentata</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M169. Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland	G303. Intermountain Dry Tall Sagebrush Steppe & Shrubland	<i>Artemisia tridentata</i> - Mixed Shrub
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M169. Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland	G304. Intermountain Mountain Big Sagebrush Steppe & Shrubland	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M170. Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland	G308. Intermountain Low & Black Sagebrush Steppe & Shrubland	<i>Artemisia arbuscula</i> ssp. <i>arbuscula</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M170. Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland	G308. Intermountain Low & Black Sagebrush Steppe & Shrubland	<i>Artemisia nova</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Amphipappus fremontii</i> - <i>Salvia funerea</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Coleogyne ramosissima</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Cylindropuntia acanthocarpa</i> / <i>Pleuraphis rigida</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Ephedra funerea</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Ephedra nevadensis</i> - <i>Lycium andersonii</i> - <i>Grayia spinosa</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Eriogonum fasciculatum</i> - <i>Viguiera parishii</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Eriogonum wrightii</i> - <i>Eriogonum heermannii</i> - <i>Buddleja utahensis</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Juniperus californica</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Menodora spinescens</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Mortonia utahensis</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Purshia stansburiana</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Yucca brevifolia</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G296. Mojave Mid-Elevation Mixed Desert Scrub	<i>Yucca schidigera</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G312. Colorado Plateau Blackbrush - Mormon-tea Shrubland	<i>Ephedra viridis</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G310. Intermountain Semi-Desert Steppe & Shrubland	<i>Chrysothamnus viscidiflorus</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G310. Intermountain Semi-Desert Steppe & Shrubland	<i>Ericameria teretifolia</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G310. Intermountain Semi-Desert Steppe & Shrubland	<i>Gutierrezia sarothrae</i> - <i>Gutierrezia microcephala</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G310. Intermountain Semi-Desert Steppe & Shrubland	<i>Krascheninnikovia lanata</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G311. Intermountain Semi-Desert Grassland	<i>Achnatherum hymenoides</i> - <i>Pseudoroegneria spicata</i> - <i>Muhlenbergia pungens</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G311. Intermountain Semi-Desert Grassland	<i>Achnatherum speciosum</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G311. Intermountain Semi-Desert Grassland	<i>Pleuraphis jamesii</i>

Table 3 (continued). List of vegetation alliances, nested within the USNVC hierarchy, found at DEVA, LAKE, MOJA, and CAMO.

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance
3. Desert & Semi-Desert (continued)	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G311. Intermountain Semi-Desert Grassland	<i>Sphaeralcea (ambigua, coccinea, parviflora)</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M171. Great Basin-Intermountain Dry Shrubland & Grassland	G311. Intermountain Semi-Desert Grassland	<i>Sporobolus cryptandrus</i> - <i>Aristida purpurea</i> var. <i>longiseta</i> - <i>Poa secunda</i>
	3.B. Cool Semi-Desert Scrub & Grassland	3.B.1. Cool Semi-Desert Scrub & Grassland	3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland	M499. Western North American Cool Semi-Desert Ruderal Scrub & Grassland	G600. Great Basin-Intermountain Ruderal Dry Shrubland & Grassland	<i>Bromus tectorum</i> - <i>Taeniatherum caput-medusae</i> Ruderal
7. Agricultural & Developed Vegetation	–	7.C.1. Lawn, Garden & Recreational and 7.C.2. Other Developed Vegetation	7.C.1.2. Horticultural Garden Vegetation 7.C.2.1 Other Developed Vegetation	CGR038, CGR040 and CGR039. Tree Garden Macrogroup, Tree Developed Vegetation Macrogroup and Shrub & Herb Developed Vegetation	CSG038. Temperate Tree Garden, CSG047 Temperate Tree Developed Vegetation and CSG045. Temperate Shrub & Herb Developed Vegetation	North American Desert Tree Garden Cultural Type (<i>Tamarix aphylla</i> Planted)
12. Natural Surface Bare Areas	–	12.A.x. Consolidated Natural Bare Areas Landform	12.A.x.x. Consolidated Natural Bare Areas Landform	U001. Consolidated Natural Bare Areas Landform	U001. Consolidated Natural Bare Areas Landform	Cliff, Scree & Pavement
	–	12.B.x. Unconsolidated Natural Bare Areas Landform	12.B.x.x. Unconsolidated Natural Bare Areas Landform	U002. Unconsolidated Natural Bare Areas Landform	U002. Unconsolidated Natural Bare Areas Landform	Desert Playa
	–	12.B.x. Unconsolidated Natural Bare Areas Landform	12.B.x.x. Unconsolidated Natural Bare Areas Landform	U002. Unconsolidated Natural Bare Areas Landform	U002. Unconsolidated Natural Bare Areas Landform	Semi-Desert Dunes & Sand Flats

Table 4. Vegetation alliances at LAKE and Newberry Mountains, including the current and former USNVC alliance names. The table is organized by life form and sorted by current USNVC alliance scientific name, and includes the alliance code (e.g., A####, or “Park Special” code) and vegetation sample size (N).

Life Form	Current Name (USNVC or other)	Alliance Code	N	Former Alliance Name	Former Code
Forest, Woodland, and Wooded Shrubland	<i>Chilopsis linearis</i> - <i>Psorothamnus spinosus</i> Desert Wash Scrub	A1044	5	<i>Chilopsis linearis</i> Woodland	A.1044
	<i>Chilopsis linearis</i> - <i>Psorothamnus spinosus</i> Desert Wash Scrub	A1044	1	<i>Psorothamnus spinosus</i> Woodland	PS.015
	<i>Juniperus californica</i> Mojave Scrub	A0502	7	<i>Juniperus californica</i> Wooded Shrubland	A.502
	<i>Phoenix dactylifera</i> - <i>Washingtonia filifera</i> Ruderal Woodland	A4161	2	<i>Washingtonia filifera</i> Woodland	A.485
	<i>Pinus monophylla</i> - <i>Juniperus osteosperma</i> / Shrub Understory Woodland	A2108	3	<i>Pinus monophylla</i> - (<i>Juniperus osteosperma</i>) Woodland	A.543
	<i>Populus fremontii</i> - <i>Fraxinus velutina</i> - <i>Salix gooddingii</i> Flooded Forest & Woodland	A3803	3	<i>Populus fremontii</i> Forest	A.313
	<i>Prosopis glandulosa</i> - <i>Prosopis velutina</i> - <i>Prosopis pubescens</i> Riparian Forest, Woodland & Shrubland	A3877	21	<i>Prosopis glandulosa</i> Woodland	A.1031
	<i>Prosopis glandulosa</i> - <i>Prosopis velutina</i> - <i>Prosopis pubescens</i> Riparian Forest, Woodland & Shrubland	A3877	15	<i>Prosopis pubescens</i> Woodland	A.1042
	<i>Salix gooddingii</i> - <i>Salix laevigata</i> Riparian Forest	A3752	2	<i>Salix gooddingii</i> Woodland	A.640
	<i>Salix gooddingii</i> - <i>Salix laevigata</i> Riparian Forest	A3752	–	<i>Salix laevigata</i> Woodland*	A.646
	<i>Tamarix</i> spp. Planted Woodland**	cf. A0842	–	<i>Tamarix</i> spp. Planted Woodland**	A.842
	<i>Yucca brevifolia</i> Wooded Shrubland	A3148	4	<i>Yucca brevifolia</i> Wooded Shrubland	A.884
Shrubland	<i>Acacia greggii</i> - <i>Hyptis emoryi</i> - <i>Justicia californica</i> Desert Wash Shrubland	A4187	18	<i>Acacia greggii</i> Shrubland	A.1036
	<i>Acacia greggii</i> - <i>Hyptis emoryi</i> - <i>Justicia californica</i> Desert Wash Shrubland	A4187	1	<i>Hyptis emoryi</i> Shrubland	A.2537
	<i>Allenrolfea occidentalis</i> Wet Shrubland**	A0866	–	<i>Allenrolfea occidentalis</i> Shrubland**	A.866
	<i>Ambrosia dumosa</i> Desert Dwarf Scrub	A3279	19	<i>Ambrosia dumosa</i> Shrubland	PS.012

* Types not sampled during the classification stage at LAKE but expected in the study area are denoted with single asterisk.

** Types either found during the map accuracy assessment field sampling or contained in the map product, including at the border with GRCA-PARA, are denoted with double asterisk.

Table 4 (continued). Vegetation alliances at LAKE and Newberry Mountains, including the current and former USNVC alliance names. The table is organized by life form and sorted by current USNVC alliance scientific name, and includes the alliance code (e.g., A####, or “Park Special” code) and vegetation sample size (N).

Life Form	Current Name (USNVC or other)	Alliance Code	N	Former Alliance Name	Former Code
Shrubland (continued)	<i>Atriplex canescens</i> Scrub	A0869	2	<i>Atriplex canescens</i> Shrubland	A.869
	<i>Atriplex confertifolia</i> Scrub	A0870	3	<i>Atriplex confertifolia</i> Shrubland	A.870
	<i>Atriplex lentiformis</i> Shrubland	A3173	2	<i>Atriplex lentiformis</i> Shrubland	PS.006
	<i>Atriplex polycarpa</i> Shrubland	A3174	1	<i>Atriplex polycarpa</i> Shrubland	A.873
	<i>Baccharis emoryi</i> - <i>Baccharis sergiloides</i> Wet Shrubland	A3874	9	<i>Baccharis sergiloides</i> Shrubland	A.2531
	<i>Carnegiea gigantea</i> - <i>Parkinsonia microphylla</i> - <i>Prosopis velutina</i> Desert Scrub	A3282	8	<i>Parkinsonia microphylla</i> Shrubland	A.883
	<i>Coleogyne ramosissima</i> Mojave Desert Scrub	A3144	11	<i>Coleogyne ramosissima</i> Shrubland	A.874
	<i>Encelia farinosa</i> Desert Scrub	A4125	30	<i>Encelia farinosa</i> Shrubland	PS.013
	<i>Ephedra fasciculata</i> Shrubland**	A3139	–	<i>Ephedra (fasciculata, nevadensis)**</i>	A.857
	<i>Ephedra viridis</i> Colorado Plateau Shrubland	A3201	2	<i>Ephedra viridis</i> Shrubland	A.858
	<i>Ericameria paniculata</i> Mojave Desert Wash Shrubland	A2509	6	<i>Ericameria paniculata</i> Shrubland	A.2509
	<i>Eriogonum fasciculatum</i> - <i>Viguiera parishii</i> Shrubland	A3150	40	<i>Eriogonum fasciculatum</i> – <i>Viguiera parishii</i> Shrubland	PS.011
	<i>Eriogonum wrightii</i> - <i>Eriogonum heermannii</i> - <i>Buddleja utahensis</i> Shrubland	A4167	1	<i>Eriogonum heermannii</i> Shrubland	PS.008
	<i>Fallugia paradoxa</i> Desert Wash Shrubland**	A3259	–	<i>Fallugia paradoxa**</i>	A.934
	<i>Fouquieria splendens</i> Desert Scrub	cf. A3278	5	<i>Fouquieria splendens</i> Shrubland	A.863
	<i>Gutierrezia sarothrae</i> - <i>Gutierrezia microcephala</i> Dwarf-shrubland**	A3203	–	<i>Gutierrezia (microcephala, sarothrae)**</i>	A.2528
<i>Hymenoclea salsola</i> - <i>Bebbia juncea</i> Mojave-Sonoran Desert Wash	A4188	35	<i>Hymenoclea salsola</i> Shrubland	A.2512	

* Types not sampled during the classification stage at LAKE but expected in the study area are denoted with single asterisk.

** Types either found during the map accuracy assessment field sampling or contained in the map product, including at the border with GRCA-PARA, are denoted with double asterisk.

Table 4 (continued). Vegetation alliances at LAKE and Newberry Mountains, including the current and former USNVC alliance names. The table is organized by life form and sorted by current USNVC alliance scientific name, and includes the alliance code (e.g., A####, or “Park Special” code) and vegetation sample size (N).

Life Form	Current Name (USNVC or other)	Alliance Code	N	Former Alliance Name	Former Code
Shrubland (continued)	<i>Krascheninnikovia lanata</i> Steppe & Dwarf-shrubland Herbaceous	A3202	1	<i>Krascheninnikovia lanata</i> Shrubland	A.1104
	<i>Larrea tridentata</i> - <i>Ambrosia dumosa</i> Bajada & Valley Desert Scrub	A3277	10	<i>Larrea tridentata</i> – <i>Ambrosia dumosa</i> Dune	PS.030
	<i>Larrea tridentata</i> - <i>Ambrosia dumosa</i> Bajada & Valley Desert Scrub	A3277	141	<i>Larrea tridentata</i> – <i>Ambrosia dumosa</i> Shrubland	A.2532
	<i>Larrea tridentata</i> - <i>Encelia farinosa</i> - <i>Fouquieria splendens</i> Upper Bajada & Rock outcrop Desert Scrub	cf. A3278	47	<i>Larrea tridentata</i> – <i>Encelia farinosa</i> Shrubland	A.2533
	<i>Larrea tridentata</i> Desert Scrub	cf. A3278	25	<i>Larrea tridentata</i> Shrubland	A.851
	<i>Lycium andersonii</i> - <i>Lycium cooperi</i> Shrubland	A3142	1	<i>Lycium (andersonii, cooperi)</i> Shrubland	na
	<i>Mortonia utahensis</i> Shrubland	A4158	5	<i>Mortonia utahensis</i> Shrubland	PS.009
	<i>Cylindropuntia acanthocarpa</i> / <i>Pleuraphis rigida</i> Shrubland	A4156	2	<i>Cylindropuntia acanthocarpa</i> Shrubland	na
	<i>Cylindropuntia bigelovii</i> Shrubland	A3146	8	<i>Cylindropuntia bigelovii</i> Shrubland	A.877
	<i>Pluchea sericea</i> Wet Shrubland	A0798	16	<i>Pluchea sericea</i> Shrubland	A.798
	<i>Prunus fasciculata</i> - <i>Salazaria mexicana</i> Northern Mojave Desert Wash	A4185	3	<i>Prunus fasciculata</i> - <i>Salazaria mexicana</i> Shrubland	A.2519
	<i>Psoralea fremontii</i> - <i>Psoralea polydenius</i> Wash	A4186	11	<i>Psoralea (arborescens, fremontii, polydenius)</i> Shrubland	PS.014
	<i>Quercus turbinella</i> Chaparral	A0793	11	<i>Quercus turbinella</i> Shrubland	A.793
	<i>Arctostaphylos pungens</i> - <i>Arctostaphylos pringlei</i> - <i>Ceanothus greggii</i> Shrubland**	A3790	–	<i>Arctostaphylos</i> - <i>Quercus turbinella</i> Shrubland Alliance**	A.789
	<i>Salix exigua</i> Warm Desert Riparian Shrubland*	A0947	–	<i>Salix exigua</i> Shrubland*	A.649
<i>Simmondsia chinensis</i> - <i>Canotia holacantha</i> - <i>Eriogonum fasciculatum</i> Desert Scrub**	A3283	–	<i>Canotia holacantha</i> Association**	CEGL 005296	

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Table 4 (continued). Vegetation alliances at LAKE and Newberry Mountains, including the current and former USNVC alliance names. The table is organized by life form and sorted by current USNVC alliance scientific name, and includes the alliance code (e.g., A####, or “Park Special” code) and vegetation sample size (N).

Life Form	Current Name (USNVC or other)	Alliance Code	N	Former Alliance Name	Former Code
Shrubland (continued)	<i>Suaeda moquinii</i> - <i>Salicornia rubra</i> - <i>Isocoma acradenia</i> Alkaline Wet Scrub	A3880	1	<i>Suaeda moquinii</i> Shrubland	A.941
	<i>Tamarix</i> spp. Ruderal Riparian Scrub	A0842	15	<i>Tamarix</i> spp. Semi-natural Shrubland	A.842
	<i>Vitis arizonica</i> - <i>Vitis girdiana</i> Shrubland	A4162	12	<i>Vitis (arizonica, girdiana)</i> Shrubland	PS.001
	<i>Yucca schidigera</i> Shrubland	A3147	7	<i>Yucca schidigera</i> Shrubland	A.881
Herbaceous	<i>Achnatherum hymenoides</i> - <i>Pseudoroegneria spicata</i> - <i>Muhlenbergia pungens</i> Grassland*	A1262	–	<i>Achnatherum hymenoides</i> Herbaceous*	A.1262
	<i>Amsinckia menziesii</i> - <i>Amsinckia tessellata</i> - <i>Phacelia</i> spp. Herbaceous	A4182	1	<i>Amsinckia (menziesii, tessellata)</i> Herbaceous	PS.002
	<i>Brassica tournefortii</i> - <i>Malcolmia africana</i> Ruderal Desert Forb	A4166	1	<i>Brassica tournefortii</i> and other mustards Semi-natural Herbaceous	PS.003
	<i>Bromus rubens</i> - <i>Schismus arabicus</i> - <i>Schismus barbatus</i> Ruderal Herbaceous	A4121	3	<i>Bromus rubens</i> – <i>Schismus (arabicus, barbatus)</i> Semi-natural Herbaceous	PS.004
	<i>Calamagrostis scopulorum</i> - <i>Andropogon glomeratus</i> Saturated Hanging Garden Herbaceous**	A2655	–	<i>Andropogon glomeratus</i> - <i>Schoenus nigricans</i> *	A.1338
	<i>Cladium californicum</i> Alkaline Seep	A4164	1	<i>Cladium californicum</i> (provisional) Herbaceous	PS.005
	<i>Distichlis spicata</i> Alkaline Wet Meadow**	A1332	–	<i>Distichlis spicata</i> Herbaceous**	A.1332
	<i>Sporobolus airoides</i> - <i>Muhlenbergia asperifolia</i> - <i>Spartina gracilis</i> Alkaline Wet Meadow**	A1334	–	<i>Sporobolus airoides</i> Herbaceous**	A.1267
	<i>Phragmites australis</i> - <i>Arundo donax</i> - <i>Alopecurus pratensis</i> Ruderal Marsh	A3847	2	<i>Phragmites australis</i> Herbaceous	A.1431
	<i>Pleuraphis rigida</i> Desert Grassland	A3170	1	<i>Pleuraphis rigida</i> Herbaceous	A.1246

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Table 4 (continued). Vegetation alliances at LAKE and Newberry Mountains, including the current and former USNVC alliance names. The table is organized by life form and sorted by current USNVC alliance scientific name, and includes the alliance code (e.g., A####, or “Park Special” code) and vegetation sample size (N).

Life Form	Current Name (USNVC or other)	Alliance Code	N	Former Alliance Name	Former Code
Sparsely Vegetated & Non-vegetated	<i>Aloysia wrightii</i> - <i>Pericome caudata</i> - <i>Ephedra nevadensis</i> Sparsely Vegetated Bedrock Cliff & Lava Field	A4025	2	Sparsely Vegetated Rock Outcrop	PS.019
	<i>Aloysia wrightii</i> - <i>Pericome caudata</i> - <i>Ephedra nevadensis</i> Sparsely Vegetated Bedrock Cliff & Lava Field	A4025	1	Sparsely Vegetated Carbonate Rock Open Scrub	na
	<i>Atriplex hymenelytra</i> Scrub	A0872	13	<i>Atriplex hymenelytra</i> Sparsely Vegetated	A.872
	<i>Chorizanthe rigida</i> - <i>Geraea canescens</i> Desert Pavement	A4024	1	<i>Chorizanthe rigida</i> - <i>Geraea canescens</i> Desert Pavement Sparsely Vegetated	PS.017
	Desert Wash and River Bottom Sparsely Vegetated**	na	–	Alluvial Wash Sparsely Vegetated**	PS.021
	<i>Dicoria canescens</i> - <i>Abronia villosa</i> - <i>Panicum urvilleanum</i> Dune	A4026	1	<i>Dicoria canescens</i> - <i>Abronia villosa</i> Sparsely Vegetated	PS.016
	<i>Ephedra</i> spp. - <i>Leymus salinus</i> - <i>Eriogonum corymbosum</i> Badlands Cold Desert Sparse Vegetation	A4052	15	<i>Ephedra torreyana</i> Sparsely Vegetated	A.2571
	<i>Ephedra</i> spp. - <i>Leymus salinus</i> - <i>Eriogonum corymbosum</i> Badlands Cold Desert Sparse Vegetation	A4052	9	<i>Psorothamnus</i> spp. Sparsely Vegetated	PS.018
	Lake Margin**	na	–	Lake Margin**	PS.025
	Montane Ravine Sparsely Vegetated**	na	–	Montane Ravine Sparsely Vegetated**	PS.020
	<i>Peucephyllum schottii</i> - - <i>Pleurocoronis plurisetata</i> Scrub	A3143	15	<i>Peucephyllum schottii</i> Sparsely Vegetated	A.2516
	Playa**	na	–	Playa Map Class**	PS.023

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Based on the map crosswalk created for the buffer area of LAKE with GRCA-PARA, the mappers included six additional alliances or associations in this region, which we added to the classification tables and keys. These types are further described in the report for GRCA-PARA (NatureServe 2010). Local descriptions for these six types in LAKE have not been included in this report since no new classification plots were not sampled. However, three of these have been sampled and classified for DEVA and MOJA; thus, brief notations are made in their vegetation alliance descriptions. Additionally, three other alliances have been discovered during the LAKE map accuracy assessment sampling (i.e., *Allenrolfea occidentalis* Shrubland, *Distichlis spicata* Alkaline Wet Meadow, and *Sporobolus airoides* - *Muhlenbergia asperifolia* - *Spartina gracilis* Alkaline Wet Meadow alliances) and thus, are added to the LAKE classification table with brief notes included in the alliance descriptions.

The classification for DEVA has resulted in 84 alliances including natural and ruderal (semi-natural) types, and 3 landform types documented from approximately 1,600 legacy and new field surveys, while the classification for MOJA and CAMO has resulted in 64 alliances and 2 landform types from approximately 1,230 legacy and new surveys. Table 5 lists these alliances (approximately 105 alliances and landform types), with the sample sizes of field surveys in DEVA, MOJA, and CAMO for this classification. In addition, Appendices C and D show graphical displays of the field surveys representing the vegetation alliances for DEVA and MOJA/CAMO, respectively. Our partners at NatureServe and CDFW reviewed this resulting classification for DEVA and MOJA during 2012–2014, and we have made updates to the classification and the alliance descriptions upon receiving their input. Additionally, we have collected field surveys at CAMO in spring 2016, which we have keyed to their respective alliances and associations since the classification analyses were already completed for the multi-park area.

Table 5. Vegetation alliances at DEVA, MOJA, and CAMO, arranged by lifeform. The number of field surveys attributed to the alliance is shown on the right (CAMO surveys are included in MOJA totals).

Lifeform	Alliance	Alliance Code	DEVA samples	MOJA samples
Forest, Woodland, and Wooded Shrubland	<i>Abies concolor</i> Dry Forest & Woodland	A3420	–	1
	<i>Chilopsis linearis</i> - <i>Psoralea argophylla</i> Desert Wash Scrub	A1044	–	87
	<i>Juniperus californica</i> Mojave Scrub	A0502	–	3
	<i>Juniperus occidentalis</i> var. <i>australis</i> - <i>Pinus albicaulis</i> Woodland **	A3622	1	–
	<i>Juniperus osteosperma</i> / Shrub Understory Woodland	A3496	2	36
	<i>Phoenix dactylifera</i> - <i>Washingtonia filifera</i> Ruderal Woodland	A4161	18	*
	<i>Pinus edulis</i> - <i>Juniperus osteosperma</i> / Shrub Understory Colorado Plateau Woodland & Scrub	A3573	–	8
	<i>Pinus flexilis</i> Intermountain Basins Forest & Woodland	A2035	5	–

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Table 5 (continued). Vegetation alliances at DEVA, MOJA, and CAMO, arranged by lifeform. The number of field surveys attributed to the alliance is shown on the right (CAMO surveys are included in MOJA totals).

Lifeform	Alliance	Alliance Code	DEVA samples	MOJA samples
Forest, Woodland, and Wooded Shrubland (continued)	<i>Pinus longaeva</i> Forest & Woodland	A0518	6	–
	<i>Pinus monophylla</i> - <i>Juniperus osteosperma</i> / Shrub Understory Woodland	A2108	68	91
	<i>Populus fremontii</i> - <i>Fraxinus velutina</i> - <i>Salix gooddingii</i> Flooded Forest & Woodland	A3803	6	3
	<i>Prosopis glandulosa</i> - <i>Prosopis velutina</i> - <i>Prosopis pubescens</i> Riparian Forest, Woodland & Shrubland	A3877	41	9
	<i>Quercus chrysolepis</i> - <i>Quercus kelloggii</i> Forest & Woodland	A3349	–	9
	<i>Salix gooddingii</i> - <i>Salix laevigata</i> Riparian Forest	A3752	6	2
	North American Desert Tree Garden Cultural Type [<i>Tamarix</i> spp. Planted]	CTY022	4	*
	<i>Yucca brevifolia</i> Wooded Shrubland	A3148	28	96
Shrubland, Dwarf Shrubland, and Scrub	<i>Abies lasiocarpa</i> - <i>Populus tremuloides</i> / <i>Acer glabrum</i> Central Rocky Mountain Avalanche Chute Shrubland	A3968	1	–
	<i>Acacia greggii</i> - <i>Hyptis emoryi</i> - <i>Justicia californica</i> Desert Wash Scrub	A4187	–	88
	<i>Allenrolfea occidentalis</i> Shrubland	A0866	26	1
	<i>Ambrosia dumosa</i> Desert Dwarf Scrub	A3279	9	3
	<i>Amelanchier utahensis</i> - <i>Cercocarpus montanus</i> - <i>Cercocarpus intricatus</i> Shrubland	A3732	5	1
	<i>Amphipappus fremontii</i> - <i>Salvia funerea</i> Shrubland	A4159	26	–
	<i>Arctostaphylos pungens</i> - <i>Arctostaphylos pringlei</i> - <i>Ceanothus greggii</i> Shrubland	A3790	2	–
	<i>Artemisia arbuscula</i> ssp. <i>arbuscula</i> Shrubland	A3219	1	–
	<i>Artemisia nova</i> Shrubland	A3222	2	–
	<i>Artemisia tridentata</i> - Mixed Shrub Dry Steppe & Shrubland	A3198	28	1
	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> - Mixed Shrubland	A3208	31	–
	<i>Atriplex canescens</i> Scrub	A0869	14	3
	<i>Atriplex confertifolia</i> Scrub	A0870	93	–
	<i>Atriplex parryi</i> Shrubland	A2507	2	–
	<i>Atriplex polycarpa</i> Shrubland	A3174	22	17
	<i>Baccharis emoryi</i> - <i>Baccharis sergiloides</i> Wet Shrubland	A3874	5	21
	<i>Celtis laevigata</i> - <i>Rhus trilobata</i> Wet Shrubland	A1033	–	1
<i>Cercocarpus ledifolius</i> / Shrub Understory Woodland **	A0586	2	–	

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Table 5 (continued). Vegetation alliances at DEVA, MOJA, and CAMO, arranged by lifeform. The number of field surveys attributed to the alliance is shown on the right (CAMO surveys are included in MOJA totals).

Lifeform	Alliance	Alliance Code	DEVA samples	MOJA samples
Shrubland, Dwarf Shrubland, and Scrub (continued)	<i>Chrysothamnus viscidiflorus</i> Shrubland & Shrub Herbaceous	A3195	3	–
	<i>Coleogyne ramosissima</i> Mojave Desert Scrub	A3144	69	36
	<i>Cornus sericea</i> - <i>Dasiphora fruticosa</i> ssp. <i>floribunda</i> - <i>Ribes</i> spp. Wet Shrubland	A3773	1	–
	<i>Cylindropuntia acanthocarpa</i> / <i>Pleuraphis rigida</i> Shrubland	A4156	–	34
	<i>Encelia actonii</i> - <i>Encelia virginensis</i> - <i>Viguiera reticulata</i> Shrubland	A4163	35	11
	<i>Encelia farinosa</i> Desert Scrub	A4215	15	6
	<i>Ephedra californica</i> - <i>Ephedra trifurca</i> Desert Wash Scrub	A2536	–	29
	<i>Ephedra funerea</i> Shrubland	A4157	18	2
	<i>Ephedra nevadensis</i> - <i>Lycium andersonii</i> - <i>Grayia spinosa</i> Scrub	A4245	55	18
	<i>Ephedra viridis</i> Colorado Plateau Shrubland	A3201	15	1
	<i>Ericameria nauseosa</i> Steppe & Shrubland	A3196	13	4
	<i>Ericameria paniculata</i> Mojave Desert Wash Scrub	A2509	27	27
	<i>Ericameria teretifolia</i> Shrubland	A2540	6	2
	<i>Eriogonum fasciculatum</i> - <i>Viguiera parishii</i> Shrubland	A3150	29	45
	<i>Eriogonum wrightii</i> - <i>Eriogonum heermannii</i> - <i>Buddleja utahensis</i> Shrubland	A4167	17	1
	<i>Fallugia paradoxa</i> Desert Wash Shrubland	A3259	1	4
	<i>Gutierrezia sarothrae</i> - <i>Gutierrezia microcephala</i> Dwarf-shrubland	A3203	1	7
	<i>Hymenoclea salsola</i> - <i>Bebbia juncea</i> Mojave-Sonoran Desert Wash	A4188	55	73
	<i>Krascheninnikovia lanata</i> Steppe & Dwarf-shrubland	A3202	16	10
	<i>Larrea tridentata</i> - <i>Ambrosia dumosa</i> Bajada & Valley Desert Scrub	A3277	268	109
	<i>Larrea tridentata</i> - <i>Encelia farinosa</i> - <i>Fouquieria splendens</i> Upper Bajada & Rock Outcrop Desert Scrub	A3278	12	14
	<i>Larrea tridentata</i> Desert Scrub	cf. A3278	100	19
	<i>Menodora spinescens</i> Dwarf-shrubland	A2515	50	–
	<i>Mortonia utahensis</i> Scrub	A4158	5	3
	<i>Pluchea sericea</i> Wet Shrubland	A0798	13	*
	<i>Prunus fasciculata</i> - <i>Salazaria mexicana</i> Northern Mojave Desert Wash	A4185	17	64
	<i>Psorothamnus fremontii</i> - <i>Psorothamnus polydenius</i> Wash	A4186	10	*
	<i>Purshia stansburiana</i> Scrub	A0833	13	10

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Table 5 (continued). Vegetation alliances at DEVA, MOJA, and CAMO, arranged by lifeform. The number of field surveys attributed to the alliance is shown on the right (CAMO surveys are included in MOJA totals).

Lifeform	Alliance	Alliance Code	DEVA samples	MOJA samples
Shrubland, Dwarf Shrubland, and Scrub (continued)	<i>Purshia tridentata</i> - <i>Artemisia tridentata</i> Mesic Steppe & Shrubland	A3179	5	4
	<i>Quercus turbinella</i> Chaparral	A0793	–	8
	<i>Rhus trilobata</i> - <i>Crataegus rivularis</i> - <i>Forestiera pubescens</i> Shrubland	A3799	1	3
	<i>Rubus armeniacus</i> - <i>Sesbania punicea</i> - <i>Ficus carica</i> Ruderal Scrub	A4160	5	–
	<i>Salix exigua</i> Warm Desert Riparian Shrubland	A0947	5	7
	<i>Salix lasiolepis</i> Warm Desert Riparian Shrubland	A3878	2	1
	<i>Sarcobatus vermiculatus</i> Intermountain Wet Shrubland	A1046	1	1
	<i>Suaeda moquinii</i> - <i>Salicornia rubra</i> - <i>Isocoma acradenia</i> Alkaline Wet Scrub	A3880	12	9
	<i>Tamarix</i> spp. Ruderal Temporarily Flooded Shrubland	A0842	2	1
	<i>Vitis arizonica</i> - <i>Vitis girdiana</i> Shrubland	A4162	6	–
	<i>Yucca schidigera</i> Shrubland	A3147	–	93
Herbaceous	<i>Achnatherum hymenoides</i> - <i>Pseudoroegneria spicata</i> - <i>Muhlenbergia pungens</i> Grassland	A1262	3	*
	<i>Achnatherum speciosum</i> Grassland	A1290	1	*
	<i>Anemopsis californica</i> - <i>Helianthus nuttallii</i> - <i>Solidago spectabilis</i> Alkaline Wet Meadow	A4247	4	*
	<i>Bromus rubens</i> - <i>Schismus arabicus</i> - <i>Schismus barbatus</i> Ruderal Herbaceous	A4121	3	1
	<i>Bromus tectorum</i> - <i>Taeniatherum caput-medusae</i> Ruderal Annual Grassland	A1814	1	–
	<i>Calamagrostis scopulorum</i> - <i>Andropogon glomeratus</i> Saturated Hanging Garden Herbaceous	A2655	6	–
	<i>Cladium californicum</i> Alkaline Seep	A4164	1	–
	<i>Distichlis spicata</i> Alkaline Wet Meadow	A1332	6	5
	<i>Eleocharis palustris</i> - <i>Eleocharis rostellata</i> Alkaline-Saline Herbaceous	A3930	2	–
	<i>Juncus balticus</i> - <i>Juncus mexicanus</i> Herbaceous	A1374	3	*
	<i>Phragmites australis</i> - <i>Arundo donax</i> - <i>Alopecurus pratensis</i> Ruderal Marsh	A3847	3	1
	<i>Pleuraphis jamesii</i> Grassland	A1287	–	29
	<i>Pleuraphis rigida</i> Desert Grassland	A3170	–	16

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Table 5 (continued). Vegetation alliances at DEVA, MOJA, and CAMO, arranged by lifeform. The number of field surveys attributed to the alliance is shown on the right (CAMO surveys are included in MOJA totals).

Lifeform	Alliance	Alliance Code	DEVA samples	MOJA samples
Herbaceous (continued)	<i>Poa secunda</i> - <i>Muhlenbergia richardsonis</i> - <i>Carex douglasii</i> Moist Meadow	A4165	2	–
	<i>Schoenoplectus americanus</i> - <i>Schoenoplectus acutus</i> - <i>Schoenoplectus californicus</i> Marsh	A3895	13	*
	<i>Sphaeralcea</i> (<i>ambigua</i> , <i>coccinea</i> , <i>parvifolia</i>) Dry Meadow	A4216	6	8
	<i>Sporobolus airoides</i> - <i>Muhlenbergia asperifolia</i> - <i>Spartina gracilis</i> Alkaline Wet Meadow	A1334	1	2
	<i>Sporobolus cryptandrus</i> - <i>Aristida purpurea</i> var. <i>longiseta</i> - <i>Poa secunda</i> Sandy Stream Terrace Grassland *	A3977	–	1
	<i>Typha domingensis</i> - <i>Typha latifolia</i> - <i>Typha angustifolia</i> Western Marsh	A3896	3	1
	Unclassified Alkali Seep & Playa	–	2	1
Sparsely Vegetated & Non-vegetated	<i>Aloysia wrightii</i> - <i>Pericome caudata</i> - <i>Ephedra nevadensis</i> Sparsely Vegetated Bedrock Cliff & Lava Field	A4025	3	*
	<i>Atriplex hymenelytra</i> Scrub	A0872	106	4
	<i>Chorizanthe rigida</i> - <i>Geraea canescens</i> Desert Pavement	A4024	12	1
	<i>Dicoria canescens</i> - <i>Abronia villosa</i> - <i>Panicum urvilleanum</i> Dune	A4026	23	17
	<i>Ephedra viridis</i> - <i>Chrysothamnus viscidiflorus</i> - <i>Rhus trilobata</i> Talus Sparse Scrub	A4050	3	1
	<i>Peucephyllum schottii</i> - <i>Pleurocoronis pluriseta</i> Scrub	A3143	11	*
	Cliff, Scree & Pavement	–	2	*
	Playa Mapping Unit	–	16	2
	Semi-Desert Dunes & Sand Flats	–	1	1
Total Number of Samples		–	1,597	1,228

* Types not sampled during the classification stage at CAMO and MOJA but expected in the study area are denoted with single asterisk.

** Types not sampled specifically in these parks, but within a 4 km buffer of them, are denoted with double asterisk.

CNPS staff have inspected the classification with ordination analysis using non-metric multidimensional scaling (NMDS). For example, we examined an ordination of the entire set of approximately 4,000 field surveys to review the USNVC Macrogroup and Group determinations. An ordination diagram of the full dataset (see Figure 6) includes the following patterns: montane and mid-elevation vegetation types on the right-hand side; riparian forest, shrubland and other wetland types on the lower left-hand side; and lower elevation creosote bush, bursage, and related scrub as well as warm semi-desert cliff, rock and pavement vegetation on the upper left-hand side. We also examined the alliance determinations for specific subsets of USNVC groups (e.g., wash groups and mid to higher elevation shrub and herb groups). An ordination diagram of selected shrubland and

herbaceous vegetation groups (see Figure 7) includes the following patterns: lower elevation creosote bush, bursage and related scrub (in G295) and warm semi-desert dune vegetation (in G675) are on the upper left-hand side of the graph, correlated with higher temperatures and lower rainfall, while the mid-elevation mixed desert scrub (G296) is on the lower right-hand side of the graph (correlated with lower temperatures and higher rainfall). While these three USNVC Groups had been placed previously in the same Macrogroup (M088), our data analysis has shown that G296 should be separate (at least at the Macrogroup level) because of its distinctly different correlations with climatic variables. We brought this issue to the attention of the USNVC peer review committee; as a result, this change has been made. Additionally, this ordination assisted our evaluation of the placement of specific alliances in the USNVC hierarchy. For example, *Pleuraphis rigida* Desert Grassland Alliance was previously placed in the Mojave Mid-elevation Mixed Desert Scrub group (G296) and has now been moved partially into the North American Warm Semi-Desert Dune & Sand Flats group (G675), as indicated by the oval drawn around the center of the alliance's plot distribution in Figure 7.

The current classification lists reflect the NVC hierarchy as of early 2019. However, other changes will continue to be made as further analyses are completed and peer-reviewed in the Southwestern U.S., such as a recent update in the summer of 2019 where the intermountain alliances of *Juniperus osteosperma* have been combined and split into various new Group designations with *Pinus monophylla* or *Pinus edulis*, and these entities have been combined into one Macrogroup instead of being in two Macrogroups. Since we completed this classification in early 2019, we are using the Group designations from that timeframe for this project, in which all of associations of *J. osteosperma* are in one alliance and in one group, instead of having them split up into at least two different alliances and groups as was done in the summer of 2019.

Based on the classification results, CNPS staff has written a set of field keys and local vegetation descriptions for the 105 alliances and landform types classified in this project. The field key for the alliances defined in the three parks of LAKE, DEVA, and MOJA, which was adapted from an initial field key for LAKE (Salas et al. 2016), is provided in a separate report (Evens et al. 2020a). This key was field tested at LAKE by NPS staff (Jeanne Taylor and Jean Pan); at DEVA by CNPS staff (Julie Evens and Deborah Stout), NPS staff (Jane Cipra and Andrew Kaiser), and NatureServe staff (M. Hall and K. Schulz); and at MOJA by CNPS staff (Scott Batiuk, J. Evens, and D. Stout). The 105 local alliance descriptions, arranged within the USNVC hierarchy for these three parks, are provided in a separate report (Evens et al. 2020b). While these alliance descriptions had already been written before the 2016 CAMO fieldwork, sample sizes for new CAMO field surveys have been added to these alliance descriptions (no new alliances unique to CAMO were found).

Of the 240 associations identified in the four parks, we have written local association descriptions for 145 new associations that have been added to the USNVC (i.e., those with a sample size of at least 3). These local descriptions of new associations found at LAKE, DEVA, MOJA and CAMO are provided in a separate report (Evens et al. 2020c). Additionally, Appendix E provides the plant species names used in the classification of field vegetation data, as well as in the supporting keys and descriptions, in which taxonomy is based on USDA-NRCS (2010–2014).

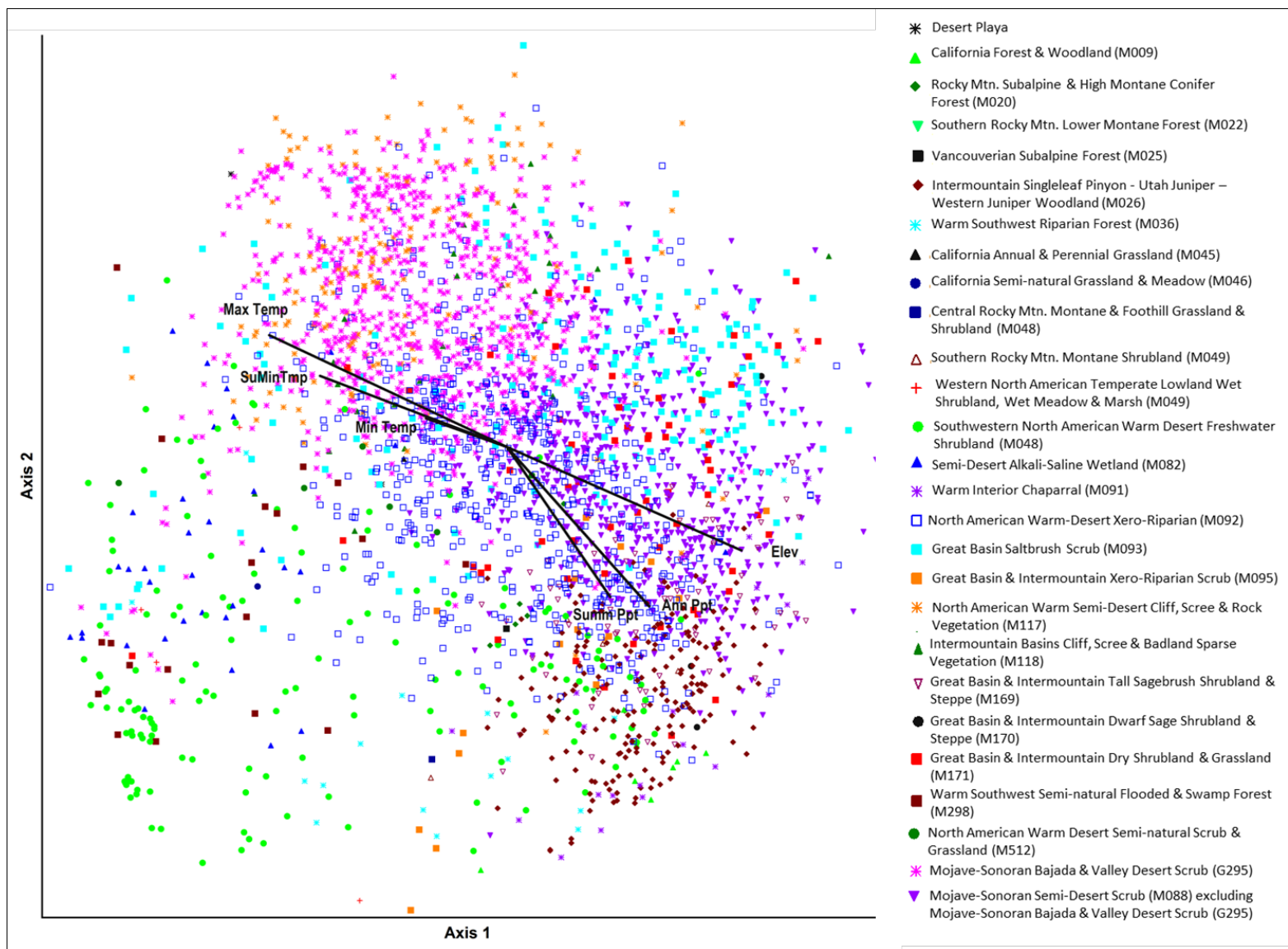


Figure 6. Ordination for the full set of classification samples, shown with USNVC Macrogroups and correlated environmental variables ($r>0.16$)

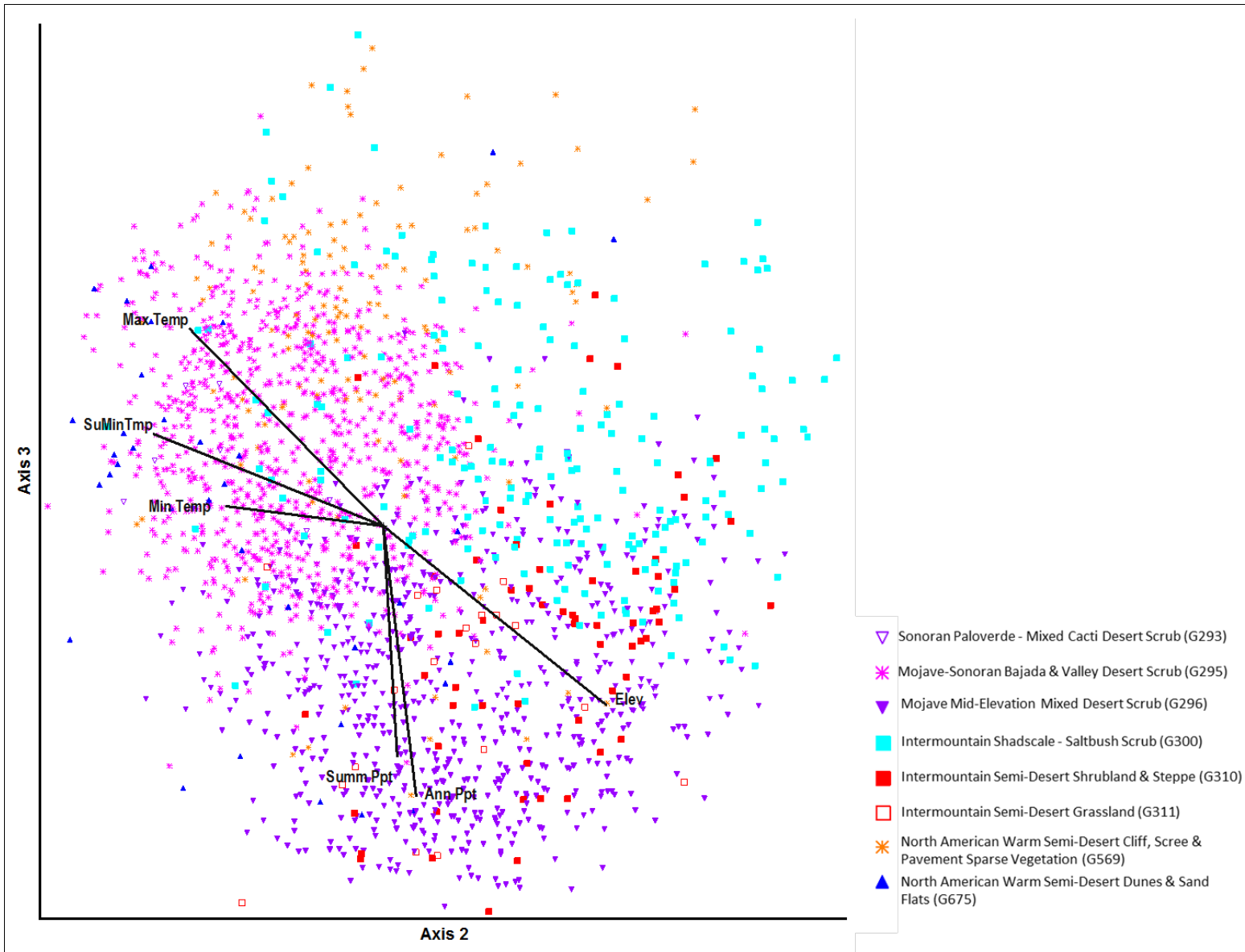


Figure 7. Ordination for a subset of classification samples, shown with USNVC Groups and correlated environmental variables ($r > 0.16$)

NatureServe staff has also updated or written global vegetation descriptions, which were added to their BIOTICS database. Global information on 100 alliances and on 115 new associations (i.e., those associations with a sample size of at least 10 and with at least one other citation) is provided online (see: <http://usnvc.org/> or <https://explorer.natureserve.org/> for Ecological Communities & Systems).

In this classification, we also have documented a variety of rare alliances and associations within the four park units. The global ranks and state ranks (for California) can be found in the descriptions. Riparian alliances or associations that are somewhat rare (ranked globally as G3) include shrublands of *Pluchea sericea*, meadow associations with *Distichlis spicata* and *Juncus cooperi*, and woodland associations of *Salix laevigata* and *Prosopis pubescens* along playas, streams, and springs in DEVA and MOJA. Upland types that are globally rare (G1) include the associations of *Swallenia alexandrae* on sand dunes and *Hecastocleis shockleyi* on rocky calcareous slopes in DEVA. Other rare to somewhat rare types (G2 to G3) include shrubland stands with *Eriogonum heermannii*, *Buddleja utahensis*, *Mortonia utahensis*, and *Salvia funerea* on rocky calcareous slopes distributed from DEVA to LAKE and MOJA. See Appendix F for select photographs of rare vegetation types.

From the data in this vegetation inventory project, we have classified a variety of alliances and associations that are new to the USNVC and the *Manual of California Vegetation* state classification. These include the *Phoenix dactylifera* - *Washingtonia filifera* ruderal woodland alliance; *Amphipappus fremontii* - *Salvia funerea*, *Cylindropuntia acanthocarpa* / *Pleuraphis rigida*, *Mortonia utahensis*, *Peucephyllum schottii* - *Pleurocoronis pluriseta*, and *Vitis arizonica* - *Vitis girdiana* scrub and shrubland alliances; *Calamagrostis scopulorum* - *Andropogon glomeratus* hanging garden alliance, *Amsinckia menziesii* - *Amsinckia tessellata* - *Phacelia* spp. herbaceous, *Brassica tournefortii* - *Malcolmia africana* ruderal herbaceous, and *Sphaeralcea ambigua* - *Sphaeralcea coccinea* - *Sphaeralcea parvifolia* dry meadow alliances; and the *Chorizanthe rigida* - *Geraea canescens* desert pavement alliance.

We also have broadened and/or redefined various mixed species alliances, including the following updates: *Eriogonum wrightii* - *Eriogonum heermannii* - *Buddleja utahensis*, *Eriogonum fasciculatum* - *Viguiera parishii*, *Hymenoclea salsola* - *Bebbia juncea*, *Ephedra nevadensis* - *Lycium andersonii* - *Grayia spinosa*, *Prunus fasciculata* - *Salazaria mexicana*, *Psoralea fremontii* - *Psoralea polydenius* shrubland alliances, and the *Eleocharis palustris* - *Eleocharis rostellata* alkaline-saline herbaceous alliance. Additionally, NatureServe has broadened 10 other alliance concepts upon revising the USNVC. We have written new descriptions for these alliances, which have been collapsed from two or more separate alliance concepts, including *Acacia greggii* - *Hyptis emoryi* - *Justicia californica*, *Baccharis emoryi* - *Baccharis sergiloides*, *Chilopsis linearis* - *Psoralea spinosus*, *Prosopis glandulosa* - *Prosopis velutina* - *Prosopis pubescens*, *Salix gooddingii* - *Salix laevigata* riparian and desert wash alliances; *Suaeda moquinii* - *Salicornia rubra* - *Isocoma acradenia* Alkaline Wet Scrub Alliance; *Leymus cinereus* - *Leymus triticoides* and *Sporobolus airoides* - *Muhlenbergia asperifolia* - *Spartina gracilis* alkaline wet meadow alliances; *Aloysia wrightii* - *Pericome caudata* - *Ephedra nevadensis* sparsely vegetated and *Dicoria canescens* - *Abronia villosa* - *Panicum urvilleanum* dune alliances.

Reflecting upon this variety of vegetation types, two USNVC groups have the highest number of alliances. The Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope Group (G541) has nine alliances, and the Mojave Mid-Elevation Mixed Desert Scrub Group (G296) has thirteen alliances. These groups exhibit an unusual diversity of vegetation along alluvial washes and mid-elevation transition zones, representing significant importance to the ecological and regional habitats of the Mojave Desert.

Of the four MOJN parks, DEVA has the highest number of vegetation alliances (i.e., approximately 20 more than MOJA and 30 more than LAKE), which reflects this park's tremendous diversity in elevation range, climatic variability, topographic features, and geomorphic surfaces. Specific to this park are high-elevation conifer alliances with *Pinus longaeva* and *Pinus flexilis*, as well as higher-elevation sagebrush alliances with *Artemisia arbuscula* and *Artemisia nova*. DEVA also has more significant wetland spring, playa and meadow areas with alliances such as *Eleocharis palustris* - *Eleocharis rostellata* Alkaline-Saline Herbaceous and *Poa secunda* - *Muhlenbergia richardsonis* - *Carex douglasii* Moist Meadow, among others. Particular to both LAKE and MOJA (and not in DEVA) are mid-elevation scrub alliances of *Quercus turbinella* and *Juniperus californica*, plus wash types of *Chilopsis linearis* - *Psoralea argyrea* and *Acacia greggii* - *Hyptis emoryi* - *Justicia californica* Desert Wash Scrub. Additionally, MOJA and CAMO have unusual herbaceous assemblages, including rare grasslands of *Pleuraphis jamesii*, while LAKE has unique gypsum barrens with *Ephedra* spp. - *Leymus salinus* - *Eriogonum corymbosum* sparse vegetation.

CNPS and partners also are providing input on the vegetation mapping efforts. This includes the LAKE effort by BOR and partners (see Salas et al. 2016), and the mapping efforts at MOJA and DEVA by Cogan Technology, Inc. and partners. Staff at CNPS, Julie Evens, and CDFW, Todd Keeler-Wolf, have reviewed the LAKE mapping classification with other partners, including Joe Stevens of the Colorado Natural Heritage Program (CNHP), in September 2012. CNPS staff have participated with BOR on two map reconnaissance trips (in January and April 2013), and we have provided general input on the ecological and floristic components of the vegetation classification. Additionally, CNPS and CNHP staff have participated in training of field crews on accuracy assessment (AA) sampling at LAKE (in February 2014), which included field testing of the key, plant identification, and general overview of AA sampling. All partners also have participated in the AA analysis meeting at LAKE (in August 2015) to discuss types that appeared to be mis-classified or that did not meet desired accuracy, and a completed map and mapping report has been produced for LAKE (Salas et al. 2016). The mapping effort at MOJA and CAMO is mid-way in process with a draft vegetation map, a map reconnaissance trip in 2014, and two map verification trips completed in the spring of 2017 and 2019, while the mapping at DEVA has begun as of 2018.

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Appendix A. Field Forms for New Vegetation Data (Phase 2)

Figures A1–A4 are the field forms used for new vegetation data in Phase 2 (Fall 2010–Spring 2011).

MOJN VEGETATION CLASSIFICATION and MAPPING PROGRAM				LAME/MOJA/DEVA, 2010 - 2011	
Classification Plot Field Form, ver. 10/04/2010					
PLOT LOCATION INFORMATION					
Plot Code: _____		Survey Date: _____		Crew: _____	
Park Site Name: _____			Park (Circle one): LAME, DEVA, MOJA		
Surveyors: _____			State (Circle one): AZ, CA, NV		
Datum: UTM NAD83 11/12 Other _____			Waypoint #: _____		
GPS Unit#: _____		GPS Error (+/-): _____		Plot size: 1000 m2	
ID#/BPU# _____		Grid Code _____		Elev. (m) _____	
Plot Corner SW: UTME _____ UTMN _____			GPS Comments: _____		
Plot Shape: Square <u>31.6m</u> x <u>31.6m</u> or			Rectangle: Length _____ bearing _____		
Circle: Radius 17.8 m			Declination: 14 ° East		
Monument Placed at: _____			Width _____ bearing _____		
Directions to Plot (driving and hiking):					
Photos: Photos are taken from the plot corners looking diagonally across the plot. Use a whiteboard to include plot #, photo direction, date taken in each photo. Include descriptions for additional photos in the 'View from Photopoint' column. Camera #: _____					
View#	Photo#	Time	Bearing	Photographer	View from Photopoint
1			SW corner → NE		
2			SE corner → NW		
3			NE corner → SW		
4			NW corner → SE		
Plot representativeness: Describe how representative the plot is of the stand surrounding it.					
ENVIRONMENTAL DESCRIPTION					
Relative Stand Size: 1-3000m2 3000-10,000m2 (1ha) 1ha-10ha >10 ha (1-3x plot size) (3-10x plot) (10 - 100x plot) (> 100x plot)			Slope _____ (degrees) Aspect _____ (degrees- use 360 for N)		
Landform: Alluvial fan, Alluvial flat, Bajada, Badlands, Basin, Basin floor, Playa, Valley, Valley floor, Desert Pavement, Cinder cone, Lava field, Dome, Butte, Mesa, Hill, Ridge, Bench, Mountain, Mountain slope, Mountain valley, Canyon, Ravine, Sand dune, Sand sheet, Dune field, Interfluvium, Bluff, Stream terrace, Stream channel, Drainage channel, Wash, Other _____					
Topographic Position: HighLevel HighSlope MidSlope BackSlope StepinSlope LowSlope ToeSlope LowLevel Interfluvium Channel Wall Channel Bed Basin Floor					
Geology: Alluvium, <u>Igneous Plutonic</u> , Granite, Diorite, Gabbro, <u>Igneous Volcanic</u> , Andesite, Basalt, Dacite, Rhyolite, Volcanic breccia, <u>Sedimentary</u> , Conglomerate (rounded), Breccia (angular), Claystone, Mudstone, Sandstone, Siltstone, Shale, Dolostone, Limestone, Marl, Gypsum, <u>Metamorphic</u> , Gneiss, Schist, Slate, <u>Aeolian Deposit</u> , Sand dune, Sand sheets, Obscured by soil, Other _____					
Cowardin System ____ Upland ____ Palustrine		Hydrologic Regime (based on frequency and duration of flooding) ____ Permanently Flooded ____ Semi-permanently Flooded ____ Intermittently Flooded ____ Seasonally Flooded ____ Temporarily flooded ____ Saturated ____ Unknown			

Initial and Date: Crew Lead Error Check _____ PDF/Basic Entry _____ Full Database Entry _____ Page 1

Figure A1. Classification plot field form (page 1) for the MOJN Vegetation Classification and Mapping Program.

MOJN Vegetation Classification and Mapping Program, ver. 10/04/10		LAKE/MOJA/DEVA 2010-2011
PLOT CODE: _____		Date: _____
ENVIRONMENTAL DESCRIPTION (cont.)		
Non-Vegetated Surface Cover: <i>(For cover of <1% record percent cover to the nearest 0.1 percent. Sum = 100%)</i>		
<input type="checkbox"/> Other = Fines (<2 mm) <input type="checkbox"/> Bedrock (non-transported rock) <input type="checkbox"/> Small Rocks (2 mm – 25cm) <input type="checkbox"/> Litter/Duff (dead plant material <3 cm diameter) <input type="checkbox"/> Large Rocks (>25cm) <input type="checkbox"/> Woody debris (dead wood ≥3cm) <input type="checkbox"/> Water		
Soil Texture (see soil key): <input type="checkbox"/> sand <input type="checkbox"/> silt loam <input type="checkbox"/> sandy clay <input type="checkbox"/> silty clay <input type="checkbox"/> loamy sand <input type="checkbox"/> silt <input type="checkbox"/> clay <input type="checkbox"/> peat <input type="checkbox"/> sandy loam <input type="checkbox"/> loam <input type="checkbox"/> clay loam <input type="checkbox"/> muck		Phenology: 1-Leaf Out, 2-Flower, 3-Past Flower, 4-Winter (leafless...) Herbaceous: _____ Shrub: _____ Trees: _____
Hydrologic Evidence <i>(More than one feature may be circled if present)</i> Surface Water w/in 25m? YES/NO Wash Seep Spring Stream River		% Soil Moisture <i>(Estimation of 3 categories should total 100%)</i> _____% dry _____% moist _____% saturated
Animal Use Evidence: <input type="checkbox"/> Burrows <input type="checkbox"/> Animal / Game Trails <input type="checkbox"/> Animal Sighting (Who? _____) <input type="checkbox"/> Scat (Whose? _____) <input type="checkbox"/> Vegetation Damage (animal) <input type="checkbox"/> Other: _____ <input type="checkbox"/> Browsing Evidence <input type="checkbox"/> Bedding Sites <input type="checkbox"/> None <input type="checkbox"/> Grazing Evidence <input type="checkbox"/> Nests (Whose? _____)		
Anthropogenic Disturbance: <input type="checkbox"/> Campsite Evidence <input type="checkbox"/> Vegetation Damage (human) <input type="checkbox"/> Trails <input type="checkbox"/> ORV Evidence <input type="checkbox"/> Rock Cairns <input type="checkbox"/> Historic Feature <input type="checkbox"/> Microbiotic Crust Damage <input type="checkbox"/> Archaeological Feature <input type="checkbox"/> Trash <input type="checkbox"/> Other: _____ <input type="checkbox"/> Developments <input type="checkbox"/> None		Natural Disturbances: <input type="checkbox"/> Drought (tree & shrub die-back) <input type="checkbox"/> Fire <input type="checkbox"/> Flood <input type="checkbox"/> Mass Wasting <input type="checkbox"/> Water gullies <input type="checkbox"/> Vegetation Damage (insects, wind) <input type="checkbox"/> Other: _____ <input type="checkbox"/> None
Landscape Context: <i>(Narrative description of plot location within greater landscape (e.g. upper bajada slope at base of low ridge of hills))</i> 		
Stand Description\General Comments: <i>Describe general vegetation conditions (e.g. healthy, large percent dead), homogeneity of the vegetation, phenological phase at time of observation, successional stage, recent fire and/or other disturbances.</i> 		
Adjacent Alliances: 1. _____ Distance/Direction _____ Describe Location: _____ 2. _____ Distance/Direction _____ Describe Location: _____		

Initial and Date: Crew Lead Error Check _____ PDF/Basic Entry _____ Full Database Entry _____ Page 2

Figure A2. Classification plot field form (page 2) for the MOJN Vegetation Classification and Mapping Program.

Vegetation Strata and Vegetation Cover

Stratum categories: T1 – tree >10m, T2 – tree 5-10m, T3 – tree or shrub 2-5m, S1 – shrub 1-2m, S2 - shrub 50cm – 1m, S3 – shrub <50cm, H-herbaceous, N-nonvascular

S	Species	%Cover	S	Species	%Cover	S	Species	%Cover	S	Species	%Cov
									N	CRUST	
									N		
									N		
											Species Outside Plot

Cover Classes for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Note: Epiphytes and vines are recorded in the stratum in which they occur

Species Outside Plot: Record species within the stand but not within the plot.

Percent Cover by Stratum

Stratum	T1	T2	T3	S1	S2	S3	H	N
% Cover								
						Total vegetation cover		

Unidentified Plants

Unknown Plant Code:	Unknown Plant Code:	Unknown Plant Code:
Photos:	Photos:	Photos:
Grass Annual Perennial Shrub Tree	Grass Annual Perennial Shrub Tree	Grass Annual Perennial Shrub Tree
Family?	Family?	Family?
Leaves?	Leaves?	Leaves?
Flowers?	Flowers?	Flowers?
Seeds?	Seeds?	Seeds?
Other Description:	Other Description:	Other Description:
Voucher? Y/N	Voucher? Y/N	Voucher? Y/N

Figure A3. Classification plot field form (page 3) for the MOJN Vegetation Classification and Mapping Program.

Observation Point Field Form, ver. 10/04/2010																		
OBSERVATION LOCATION INFORMATION																		
Plot Code: _____		Survey Date: _____		Gear#: _____		Park (Circle one): LAME, DEVA, MOJA												
Park Site Name: _____				State (Circle one): AZ, CA, NV														
Surveyors: _____				Provisional Alliance: _____														
				Provisional Association: _____														
Datum: UTM NAD83 11/ 12 Other _____		GPS Unit#: _____		Waypoint #: _____		GPS Error (+/-): _____												
ID#/BPU# _____		Grid Code _____		GPS Comments: _____														
GPS Location: UTME _____				UTMN _____		Elevation (m): _____												
Camera#: _____		Photo#: N _____ E _____ S _____ W _____		Addl. Photos (Dir/#) _____														
Site description: Describe general vegetation conditions, landscape context, homogeneity of the vegetation, successional stage, recent fire, other disturbances.																		
ENVIRONMENTAL DESCRIPTION																		
Relative Stand Size:																		
1-3000m2		3000-10,000m2 (1ha)		1ha-10ha		>10 ha												
1-3x plot size		(3-10x plot)		(10- 100x plot)		(> 100x plot)												
Slope _____ (degrees)						Aspect _____ (use 360° for N)												
Landform: Alluvial fan, Alluvial flat, Bajada, Badlands, Basin, Basin floor, Playa, Valley, Valley floor, Desert Pavement, Cinder cone, Lava field, Dome, Butte, Mesa, Hill, Ridge, Bench, Mountain, Mountain slope, Mountain valley, Canyon, Ravine, Sand dune, Sand sheet, Dune field, Interfluvium, Bluff, Stream terrace, Stream channel, Drainage channel, Wash, Other _____																		
Topographic Position: HighLevel HighSlope MidSlope BackSlope StepinSlope LowSlope ToeSlope LowLevel Interfluvium Channel Wall Channel Bed Basin																		
Geology: Alluvium, <u>Igneous Plutonic</u> , Granite, Diorite, Gabbro, <u>Igneous Volcanic</u> , Andesite, Basalt, Dacite, Rhyolite, Volcanic breccia, <u>Sedimentary</u> , Conglomerate (rounded), Breccia (angular), Claystone, Mudstone, Sandstone, Siltstone, Shale, Dolostone, Limestone, Marl, Gypsum, <u>Metamorphic</u> , Gneiss, Schist, Slate, <u>Aeolian Deposit</u> , Sand dune, Sand sheets, Obscured by soil, Other _____																		
Non-Vegetated Surface Cover: <i>(For cover of <1% record percent cover to the nearest 0.1 percent. Sum = 100%)</i> _____ Other = Fines (<2 mm) _____ Bedrock (non-transported rock) _____ Small Rocks (2 mm - 2.5cm) _____ Litter/Duff (dead plant material <3 cm diameter) _____ Large Rocks (2.5cm+) _____ Woody debris (dead wood >3cm) _____ Water					Phenology: 1-Leaf Out, 2-Flower, 3-Past Flower, 4-Winter (leafless ...) Herbaceous: _____ Shrub: _____ Trees: _____ Cowardin System: Upland/Palustrine													
Soil Texture (see soil key): _____ sand _____ silt loam _____ sandy clay _____ silty clay _____ loamy sand _____ silt _____ clay _____ peat _____ sandy loam _____ loam _____ clay loam _____ muck					Disturbance Natural: Disturbance Anthropogenic:													
VEGETATION DESCRIPTION																		
Stratum Categories		T1 >10m		T2 5-10m		T3 2-5m		S1 1-2m		S2 0.5-1m		S3 <0.5m		H		N		
% Stratum Cover																		
S	Dominant Species	%	S	Dominant Species	%	S	Dominant Species	%	S	Dominant Species	%	S	Dominant Species	%				
Total Veg. Cover																		
Cover classes for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%																		
Adjacent Alliances																		
1. _____						Distance/Dir: _____						Describe Location: _____						
2. _____						Distance/Dir: _____						Describe Location: _____						
Initial and Date: _____						Crew Lead Error Check _____						PDF/Basic Entry _____						
						Full Database Entry _____						Page 1 of 2						

Figure A4. Observation point field form for the MOJN Vegetation Classification and Mapping Program.

Appendix B. Locations for Vegetation Field Surveys Representing Riparian/Wash and Upland Alliances at Lake Mead National Recreation Area

Figures B1–B2 are vegetation survey maps for Lake Mead National Recreation Area.

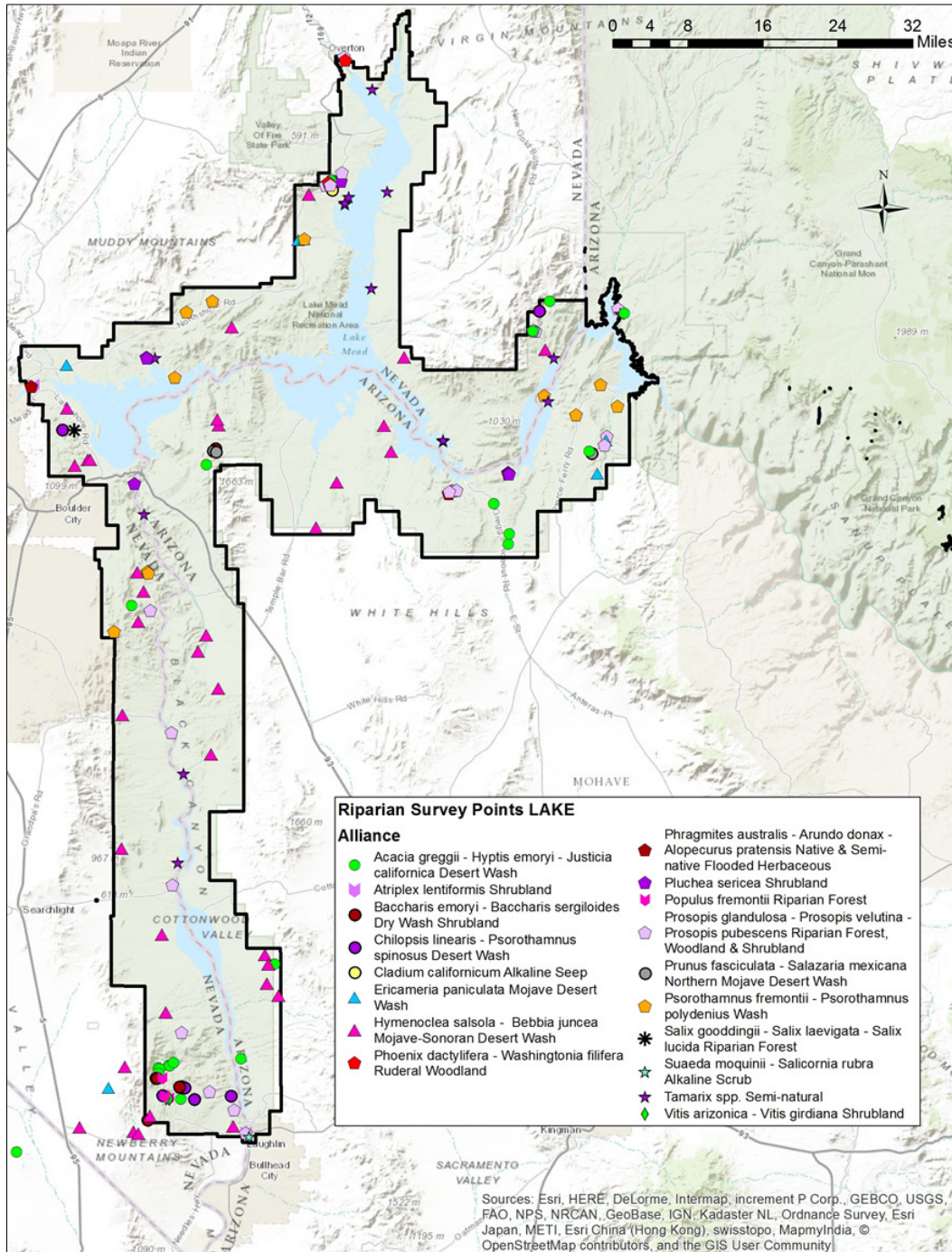


Figure B1. Riparian survey points at Lake Mead National Recreation Area.

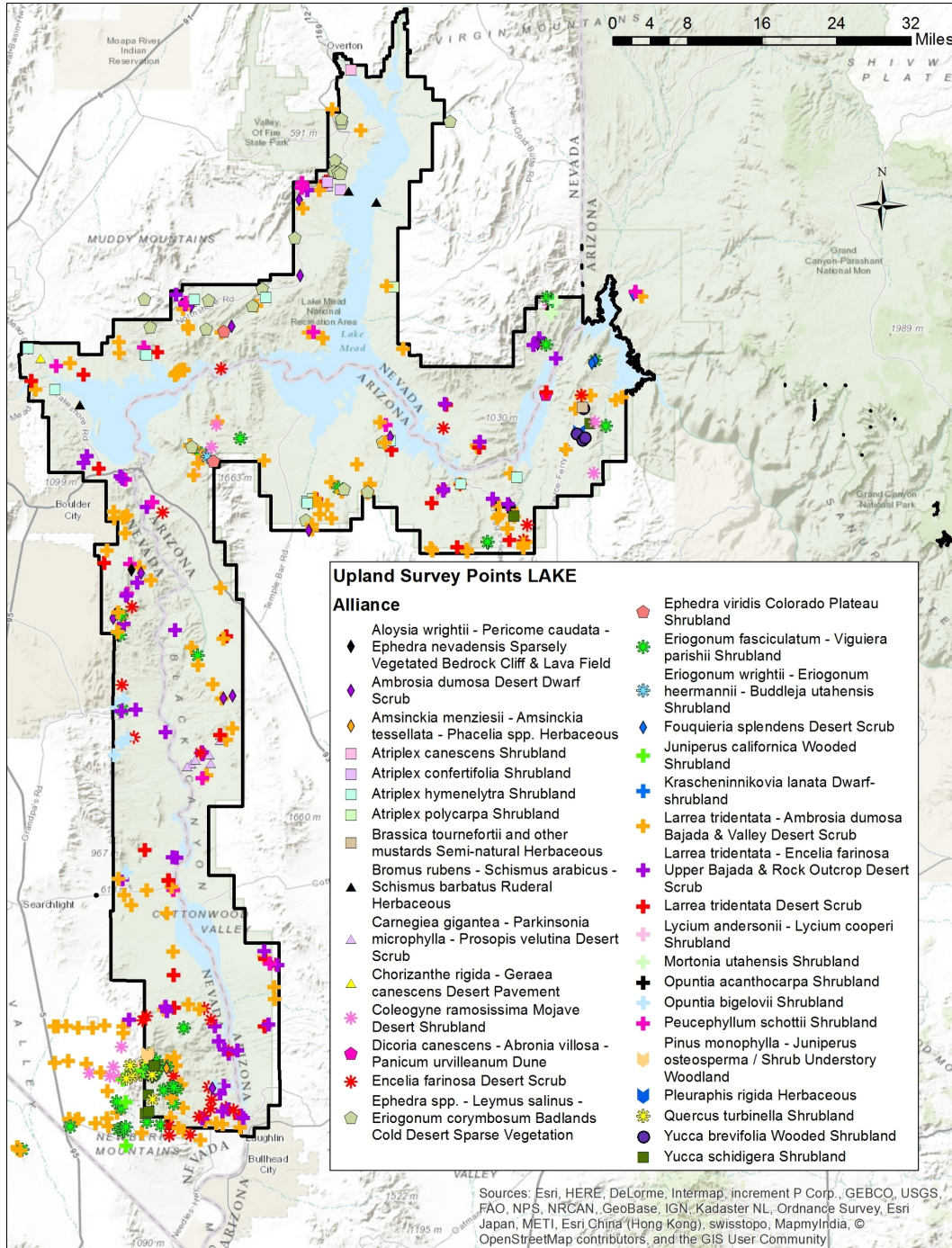


Figure B2. Upland survey points at Lake Mead National Recreation Area.

Appendix C. Locations for Vegetation Field Surveys Representing Riparian/Wash and Upland Alliances at Death Valley National Park

Figures C1–C4 are vegetation survey maps for Death Valley National Park.

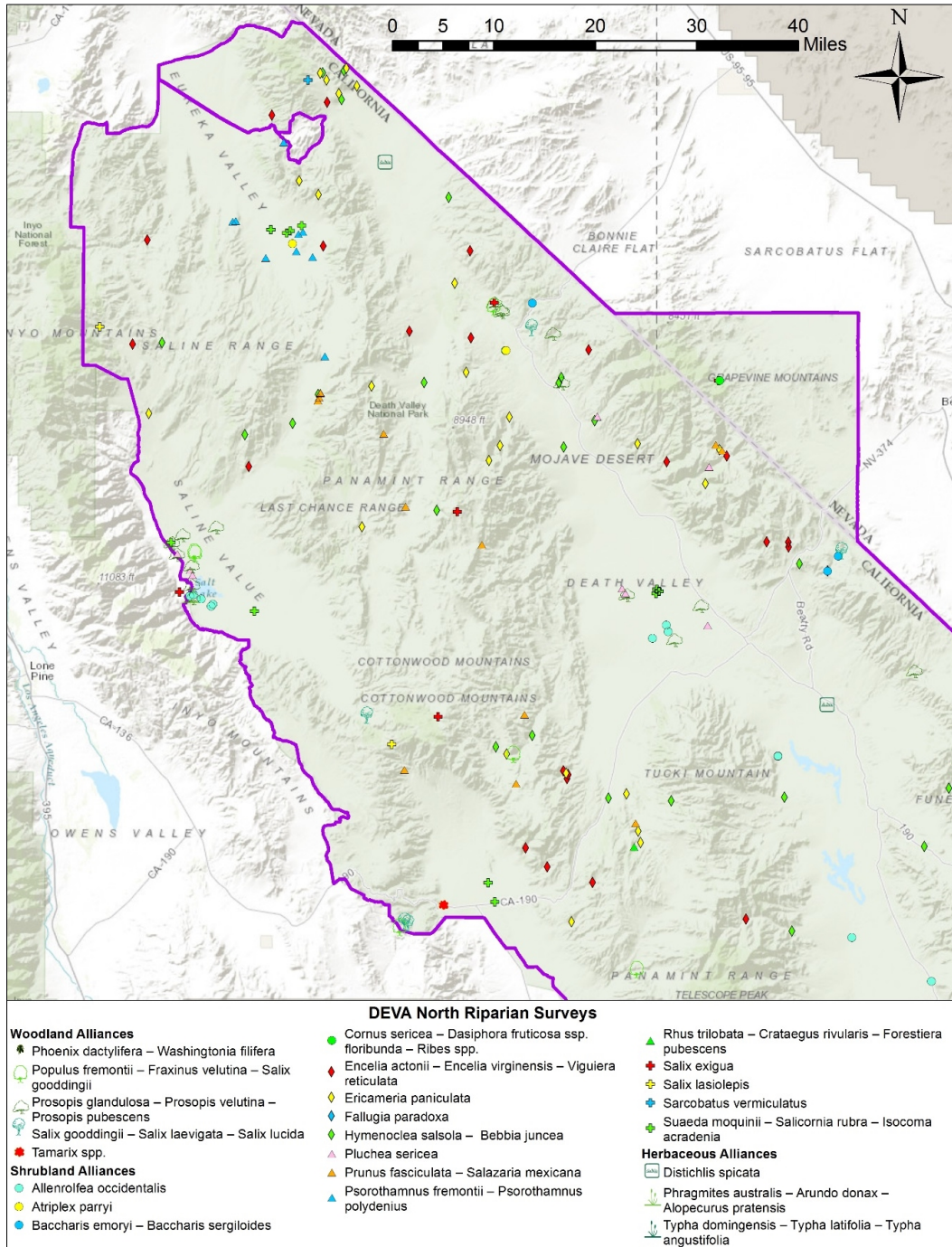


Figure C1. North riparian surveys at Death Valley National Park.

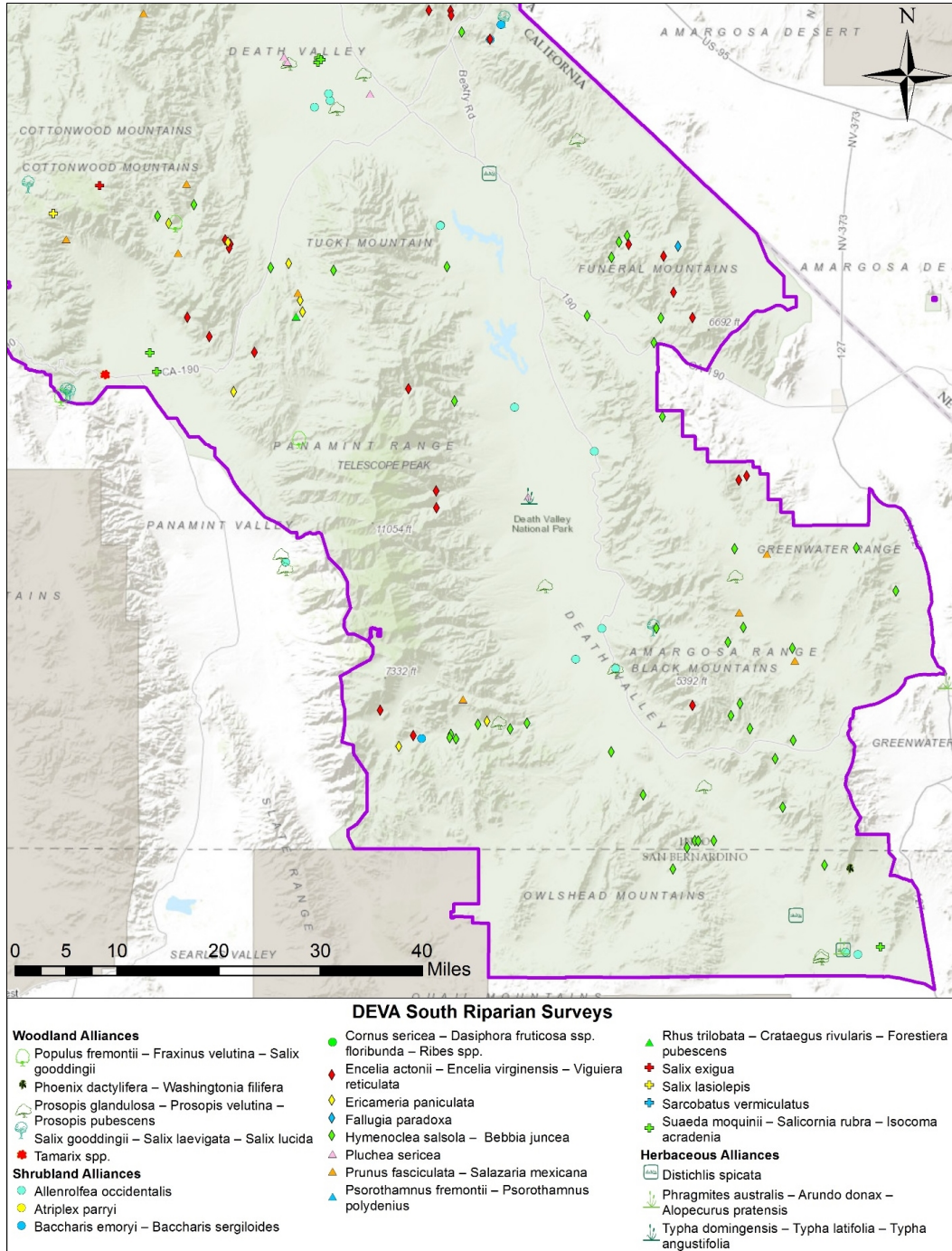


Figure C2. South riparian surveys at Death Valley National Park.

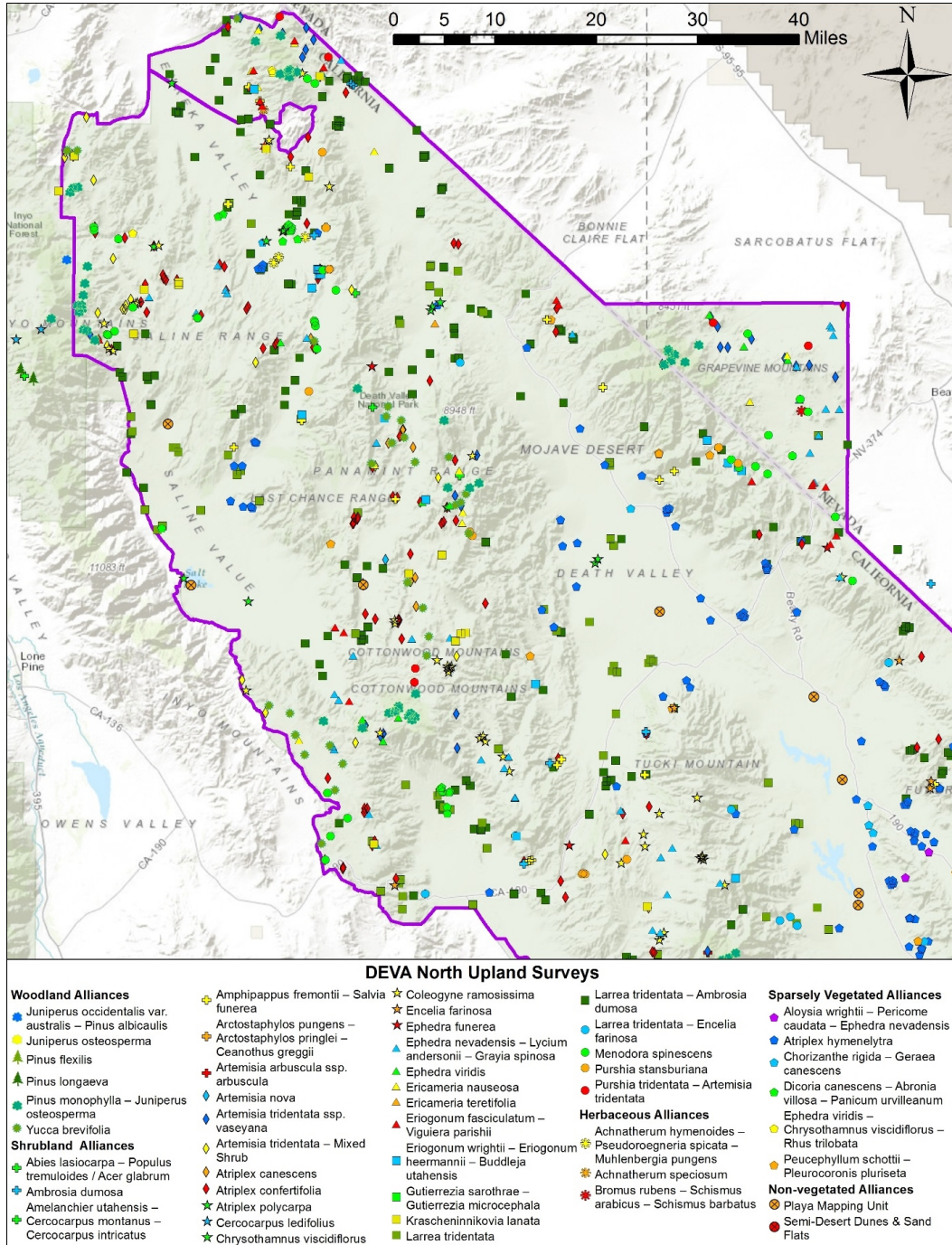


Figure C3. North upland surveys at Death Valley National Park.

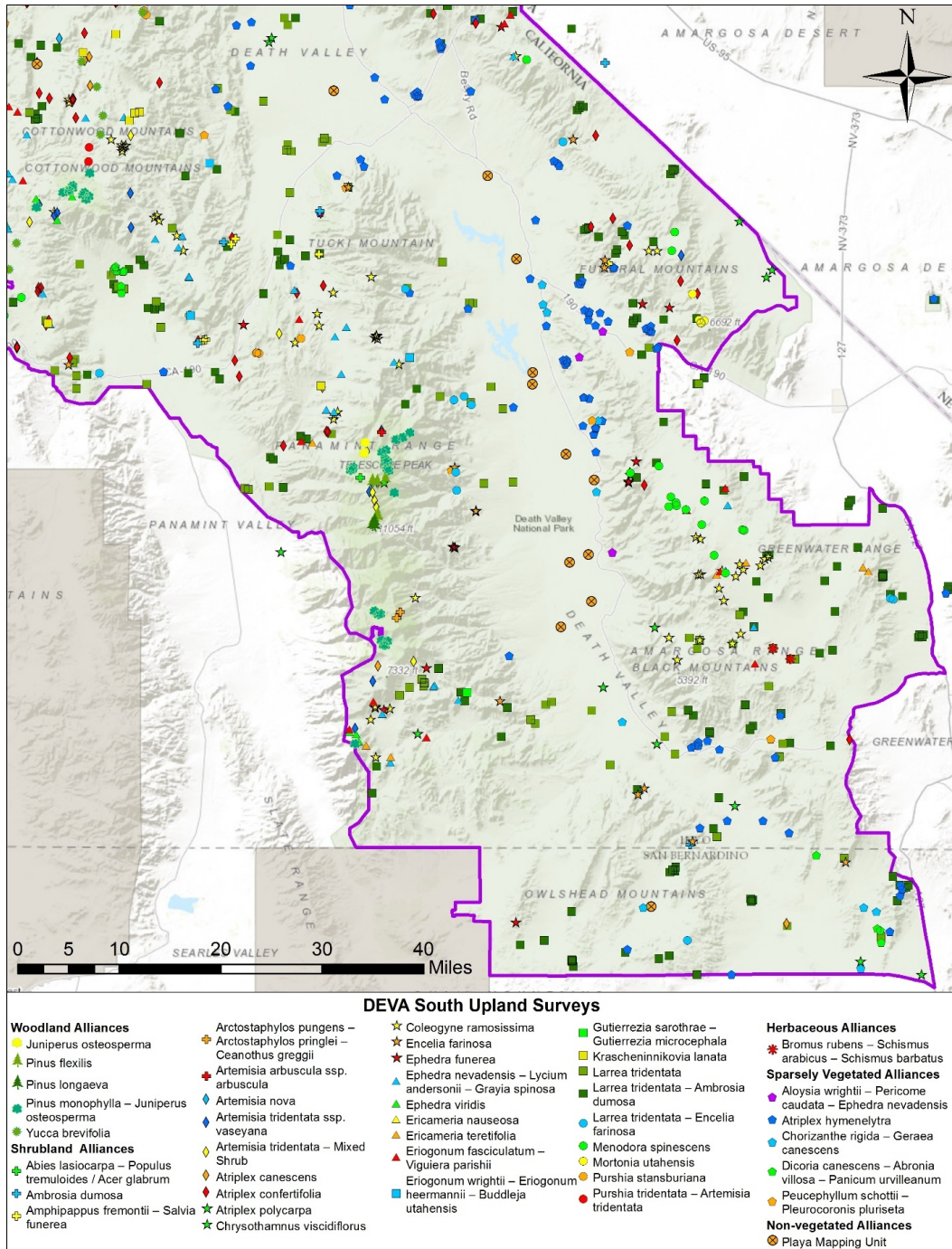


Figure C4. South upland surveys at Death Valley National Park.

Appendix D. Locations for Vegetation Field Surveys Representing Riparian/Wash and Upland Alliances at Mojave National Preserve and Castle Mountains National Monument

Figures D1–D2 are vegetation survey maps for Mojave National Preserve and Castle Mountains National Monument.

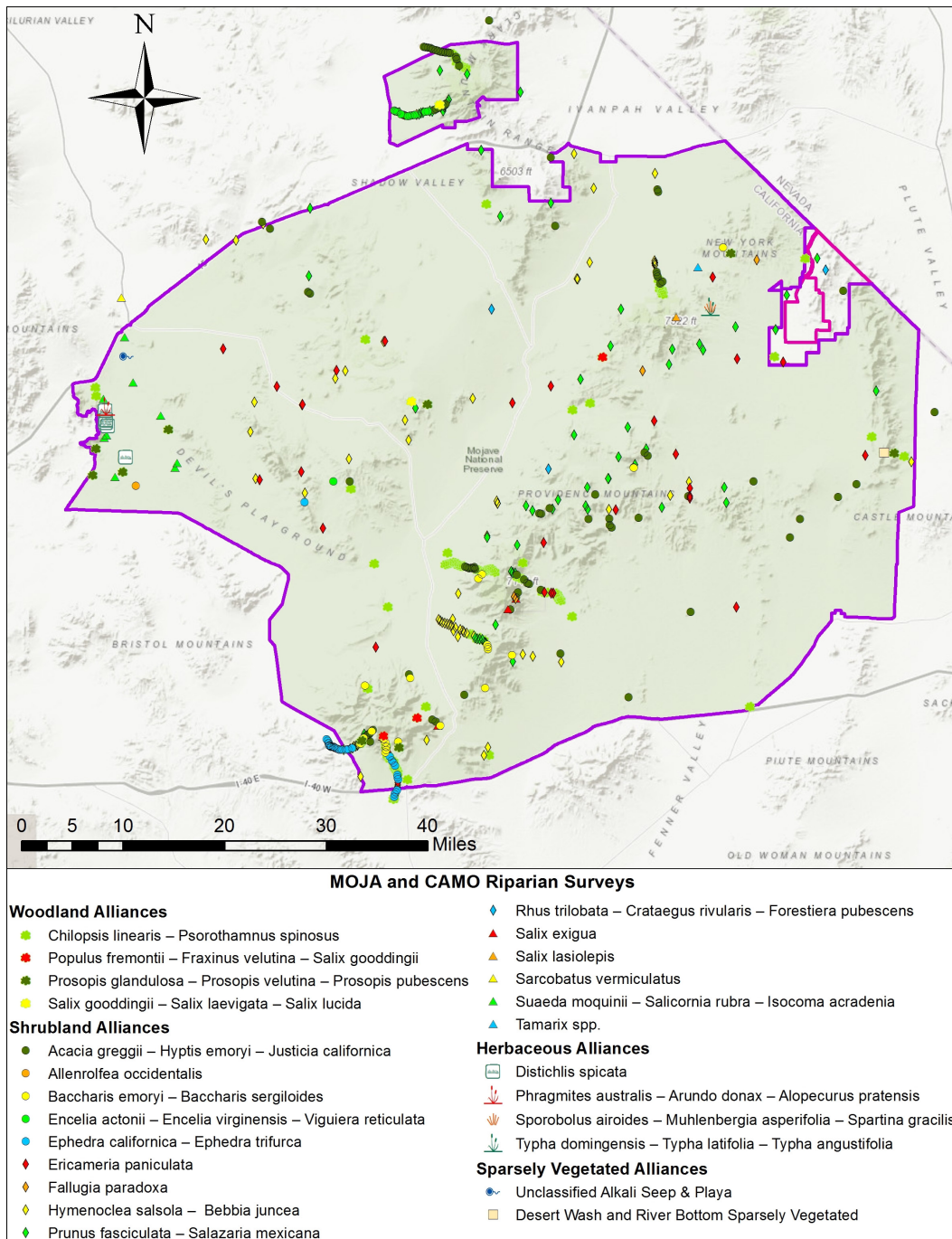


Figure D1. Riparian surveys at Mojave National Preserve and Castle Mountains National Monument.

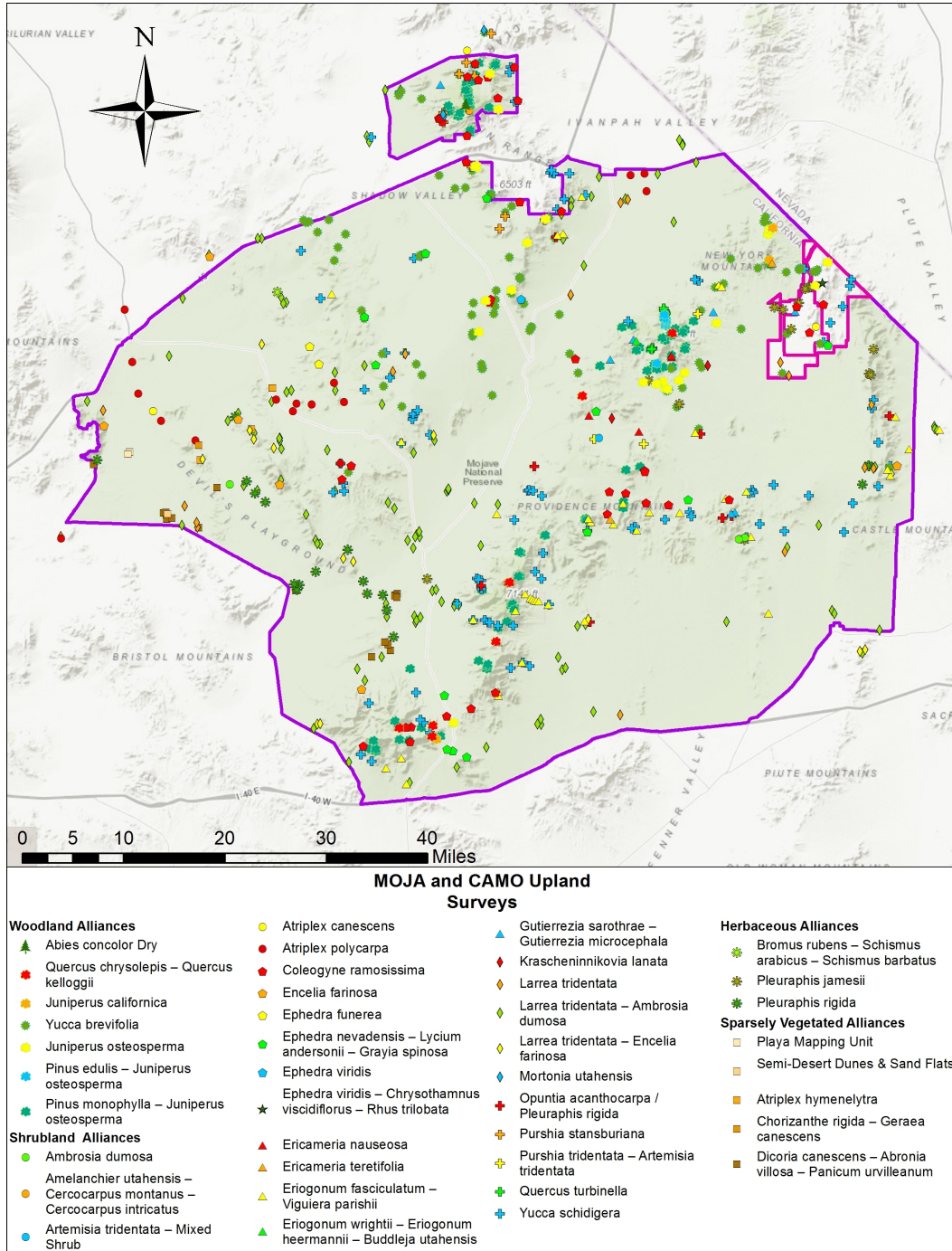


Figure D2. Upland surveys at Mojave National Preserve and Castle Mountains National Monument.

Appendix E. Plant taxa identified in the field surveys used for the DEVA, LAKE and MOJA vegetation classification

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Abies concolor</i>	white fir	Tree	Pinaceae	–	–	x
<i>Abronia</i>	sand verbena	Herb	Nyctaginaceae	x	–	–
<i>Abronia nana</i>	dwarf sand verbena	Herb	Nyctaginaceae	x	–	–
<i>Abronia villosa</i>	desert sand verbena	Herb	Nyctaginaceae	x	x	x
<i>Abutilon parvulum</i>	dwarf Indian mallow	Herb	Malvaceae	–	–	x
<i>Acacia greggii</i>	catclaw acacia	Shrub	Fabaceae	–	x	x
<i>Acamptopappus</i>	goldenhead	Shrub	Asteraceae	x	x	x
<i>Acamptopappus shockleyi</i>	Shockley's goldenhead	Shrub	Asteraceae	x	–	x
<i>Acamptopappus sphaerocephalus</i>	rayless goldenhead	Shrub	Asteraceae	x	x	x
<i>Acer glabrum</i>	Rocky Mountain maple	Shrub	Aceraceae	x	–	–
<i>Achnatherum</i>	needlegrass	Herb	Poaceae	x	x	x
<i>Achnatherum aridum</i>	Mormon needlegrass	Herb	Poaceae	x	x	–
<i>Achnatherum hymenoides</i>	Indian ricegrass	Herb	Poaceae	x	x	x
<i>Achnatherum nevadense</i>	Nevada needlegrass	Herb	Poaceae	x	–	–
<i>Achnatherum parishii</i>	Parish's needlegrass	Herb	Poaceae	x	–	x
<i>Achnatherum pinetorum</i>	pine needlegrass	Shrub	Poaceae	x	–	x
<i>Achnatherum speciosum</i>	desert needlegrass	Herb	Poaceae	x	x	x
<i>Achyronychia cooperi</i>	onyxflower	Herb	Caryophyllaceae	x	x	x
<i>Acourtia wrightii</i>	brownfoot	Herb	Asteraceae	–	x	x
<i>Adenophyllum cooperi</i>	Cooper's dogweed	Herb	Asteraceae	x	x	x
<i>Adenophyllum porophylloides</i>	San Felipe dogweed	Herb	Asteraceae	x	x	x
<i>Adiantum capillus-veneris</i>	common maidenhair	Herb	Pteridaceae	x	x	x
<i>Agave deserti</i>	desert agave	Shrub	Agavaceae	–	–	x
<i>Agave utahensis</i>	Utah agave	Shrub	Agavaceae	–	x	x
<i>Ageratina herbacea</i>	fragrant snakeroot	Shrub	Asteraceae	–	–	x
<i>Agrostis</i>	bentgrass	Herb	Poaceae	–	–	x
<i>Aliciella hutchinsifolia</i>	desert pale gilia	Herb	Polemoniaceae	x	–	–
<i>Aliciella latifolia</i>	broad-leaf gilia	Herb	Polemoniaceae	x	–	–
<i>Aliciella leptomeria</i>	sand gilia	Herb	Polemoniaceae	x	x	–
<i>Aliciella micromeria</i>	dainty gilia	Herb	Polemoniaceae	–	x	–
<i>Aliciella triodon</i>	coyote gilia	Herb	Polemoniaceae	x	–	–
<i>Allenrolfea occidentalis</i>	iodinebush	Shrub	Chenopodiaceae	x	x	x
<i>Allionia incarnata</i>	trailing windmills	Herb	Nyctaginaceae	x	x	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Allium</i>	onion	Herb	Liliaceae	x	x	x
<i>Allophyllum gilioides</i>	dense false gilyflower	Herb	Polemoniaceae	x	-	-
<i>Aloysia wrightii</i>	Wright's beebrush	Shrub	Verbenaceae	-	x	x
<i>Amaranthus</i>	pigweed	Herb	Amaranthaceae	x	-	x
<i>Amaranthus albus</i>	prostrate pigweed	Herb	Amaranthaceae	-	x	-
<i>Amaranthus fimbriatus</i>	fringed amaranth	Herb	Amaranthaceae	-	x	x
<i>Ambrosia</i>	ragweed	Herb	Asteraceae	x	-	-
<i>Ambrosia acanthicarpa</i>	flatspine bur ragweed	Herb	Asteraceae	-	-	x
<i>Ambrosia dumosa</i>	burrobush	Shrub	Asteraceae	x	x	x
<i>Ambrosia eriocentra</i>	woolly fruit bur ragweed	Shrub	Asteraceae	-	x	x
<i>Amelanchier utahensis</i>	Utah serviceberry	Shrub	Rosaceae	x	-	x
<i>Amorpha fruticosa</i>	false indigo bush	Shrub	Fabaceae	-	x	-
<i>Amphipappus fremontii</i>	Fremont's chaffbush	Shrub	Asteraceae	x	x	x
<i>Amsinckia</i>	fiddleneck	Herb	Boraginaceae	x	x	x
<i>Amsonia tomentosa</i>	woolly bluestar	Herb	Apocynaceae	x	x	x
<i>Andropogon glomeratus</i>	bushy bluestem	Herb	Poaceae	x	x	x
<i>Androstephium breviflorum</i>	pink funnel lily	Herb	Liliaceae	-	x	-
<i>Anemone tuberosa</i>	tuber anemone	Herb	Ranunculaceae	x	-	x
<i>Anemopsis californica</i>	yerba mansa	Herb	Saururaceae	x	x	x
<i>Anisocoma acaulis</i>	scalebud	Herb	Asteraceae	x	x	x
<i>Antheropeas</i>	easterbonnets	Herb	Asteraceae	x	x	x
<i>Anulocaulis annulatus</i>	valley ringstem	Herb	Nyctaginaceae	x	-	-
<i>Anulocaulis leiosolenus</i>	southwestern ringstem	Herb	Nyctaginaceae	-	x	-
<i>Apocynum cannabinum</i>	Indianhemp	Herb	Apocynaceae	-	x	-
<i>Arabis</i>	rockcress	Herb	Brassicaceae	x	x	x
<i>Arabis glaucovalvula</i>	bluepod rockcress	Herb	Brassicaceae	x	-	-
<i>Arabis holboellii</i>	Holboell's rockcress	Herb	Brassicaceae	x	-	-
<i>Arabis inyoensis</i>	Inyo rockcress	Herb	Brassicaceae	x	-	-
<i>Arabis lyallii</i>	Lyall's rockcress	Herb	Brassicaceae	x	-	-
<i>Arabis perennans</i>	perennial rockcress	Herb	Brassicaceae	x	x	x
<i>Arabis puberula</i>	silver rockcress	Herb	Brassicaceae	-	x	x
<i>Arabis pulchra</i>	beautiful rockcress	Herb	Brassicaceae	x	-	x
<i>Arabis shockleyi</i>	Shockley's rockcress	Herb	Brassicaceae	x	-	-
<i>Arceuthobium divaricatum</i>	pinyon dwarf mistletoe	Shrub	Viscaceae	x	-	-
<i>Arctomecon californica</i>	California bearpoppy	Herb	Papaveraceae	-	x	-
<i>Arctomecon merriamii</i>	desert bearpoppy	Herb	Papaveraceae	x	-	x
<i>Arctostaphylos nevadensis</i>	pinemat manzanita	Shrub	Ericaceae	-	x	-

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Arctostaphylos pungens</i>	pointleaf manzanita	Shrub	Ericaceae	–	–	x
<i>Arenaria</i>	sandwort	Herb	Caryophyllaceae	x	x	x
<i>Arenaria aberrans</i>	Mt. Dellenbaugh sandwort	Herb	Caryophyllaceae	–	–	x
<i>Arenaria kingie</i>	King's sandwort	Herb	Caryophyllaceae	x	–	–
<i>Arenaria macradenia</i>	Mojave sandwort	Herb	Caryophyllaceae	x	x	x
<i>Argemone</i>	pricklypoppy	Herb	Papaveraceae	x	x	x
<i>Argemone corymbosa</i>	Mojave pricklypoppy	Herb	Papaveraceae	x	–	x
<i>Argemone munita</i>	flatbud pricklypoppy	Herb	Papaveraceae	x	x	x
<i>Argyrochosma jonesii</i>	Jones' false cloak fern	Herb	Pteridaceae	x	–	x
<i>Argythamnia neomexicana</i>	New Mexico silverbush	Herb	Euphorbiaceae	–	x	x
<i>Aristida adscensionis</i>	sixweeks threeawn	Herb	Poaceae	x	–	x
<i>Aristida purpurea</i>	purple threeawn	Herb	Poaceae	x	x	x
<i>Artemisia</i>	sagebrush	Shrub	Asteraceae	x	–	x
<i>Artemisia arbuscula</i>	little sagebrush	Shrub	Asteraceae	x	–	x
<i>Artemisia bigelovii</i>	Bigelow sage	Shrub	Asteraceae	x	–	x
<i>Artemisia dracunculus</i>	tarragon	Shrub	Asteraceae	x	–	x
<i>Artemisia ludoviciana</i>	white sagebrush	Shrub	Asteraceae	x	x	x
<i>Artemisia nova</i>	black sagebrush	Shrub	Asteraceae	x	–	x
<i>Artemisia tridentata</i>	big sagebrush	Shrub	Asteraceae	x	–	x
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	mountain big sagebrush	Shrub	Asteraceae	x	–	–
<i>Asclepias asperula</i>	spider milkweed	Herb	Asclepiadaceae	–	–	x
<i>Asclepias eriocarpa</i>	woollypod milkweed	Herb	Asclepiadaceae	–	–	x
<i>Asclepias erosa</i>	desert milkweed	Herb	Asclepiadaceae	x	–	x
<i>Asclepias nyctaginifolia</i>	Mojave milkweed	Herb	Asclepiadaceae	–	x	–
<i>Asclepias subulata</i>	rush milkweed	Herb	Asclepiadaceae	–	x	x
<i>Asclepias vestita</i>	woolly milkweed	Herb	Asclepiadaceae	x	–	–
<i>Astragalus</i>	milkvetch	Herb	Fabaceae	x	x	x
<i>Astragalus amphioxys</i>	Crescent milkvetch	Herb	Fabaceae	–	x	–
<i>Astragalus coccineus</i>	scarlet milkvetch	Herb	Fabaceae	x		x
<i>Astragalus geyeri</i> var. <i>triquetrus</i>	Geyer's milkvetch	Herb	Fabaceae	–	x	–
<i>Astragalus inyoensis</i>	Inyo milkvetch	Herb	Fabaceae	x	–	–
<i>Astragalus layneae</i>	widow's milkvetch	Herb	Fabaceae	x	–	x
<i>Astragalus lentiginosus</i>	freckled milkvetch	Herb	Fabaceae	x	x	x
<i>Astragalus mohavensis</i>	Mojave milkvetch	Herb	Fabaceae	x	–	x
<i>Astragalus newberryi</i>	Newberry's milkvetch	Herb	Fabaceae	x	–	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Astragalus nutans</i>	Providence Mountain milkvetch	Herb	Fabaceae	–	x	x
<i>Astragalus nuttallianus</i>	smallflowered milkvetch	Herb	Fabaceae	x	x	x
<i>Astragalus oophorus</i>	egg milkvetch	Herb	Fabaceae	x	–	–
<i>Astragalus panamintensis</i>	Panamint milkvetch	Herb	Fabaceae	x	–	–
<i>Astragalus preussii</i>	Preuss' milkvetch	Herb	Fabaceae	–	x	–
<i>Astragalus purshii</i>	woollypod milkvetch	Herb	Fabaceae	x	–	–
<i>Astragalus sabulonum</i>	gravel milkvetch	Herb	Fabaceae	–	x	–
<i>Astrolepis cochisensis</i>	Cochise scaly cloakfern	Herb	Pteridaceae	–	–	x
<i>Atrichoseris platyphylla</i>	parachute plant	Herb	Asteraceae	x	x	x
<i>Atriplex</i>	saltbush	Shrub	Chenopodiaceae	x	x	–
<i>Atriplex canescens</i>	fourwing saltbush	Shrub	Chenopodiaceae	x	x	x
<i>Atriplex confertifolia</i>	shadscale saltbush	Shrub	Chenopodiaceae	x	x	x
<i>Atriplex hymenelytra</i>	desertholly	Shrub	Chenopodiaceae	x	x	x
<i>Atriplex lentiformis</i>	big saltbush	Shrub	Chenopodiaceae	x	x	x
<i>Atriplex parryi</i>	Parry's saltbush	Shrub	Chenopodiaceae	x	–	–
<i>Atriplex phyllostegia</i>	leafcover saltweed	Herb	Chenopodiaceae	–	–	x
<i>Atriplex polycarpa</i>	cattle saltbush	Shrub	Chenopodiaceae	x	x	x
<i>Atriplex spinifera</i>	spinescale saltbush	Shrub	Chenopodiaceae	x	–	–
<i>Atriplex torreyi</i>	Torrey's saltbush	Shrub	Chenopodiaceae	x	–	–
<i>Avena fatua</i>	wild oat	Herb	Poaceae	–	–	x
<i>Baccharis</i>	baccharis	Shrub	Asteraceae	x	x	–
<i>Baccharis brachyphylla</i>	shortleaf baccharis	Shrub	Asteraceae	x	x	x
<i>Baccharis emoryi</i>	Emory's baccharis	Shrub	Asteraceae	x	x	–
<i>Baccharis salicifolia</i>	mule-fat	Shrub	Asteraceae	x	x	x
<i>Baccharis sarothroides</i>	desertbroom	Shrub	Asteraceae	–	x	–
<i>Baccharis sergiloides</i>	desert baccharis	Shrub	Asteraceae	x	x	x
<i>Baileya</i>	desert marigold	Herb	Asteraceae	x	–	x
<i>Baileya multiradiata</i>	desert marigold	Herb	Asteraceae	x	x	x
<i>Baileya pauciradiata</i>	laxflower	Herb	Asteraceae	–	–	x
<i>Baileya pleniradiata</i>	woolly desert marigold	Herb	Asteraceae	x	–	x
<i>Bassia americana</i>	green molly	Herb	Chenopodiaceae	x	–	–
<i>Bassia scoparia</i>	burningbush	Herb	Chenopodiaceae	–	x	–
<i>Bebbia juncea</i>	sweetbush	Shrub	Asteraceae	x	x	x
<i>Berula erecta</i>	cutleaf waterparsnip	Herb	Apiaceae	x	–	–
<i>Blepharidachne kingii</i>	King's eyelashgrass	Herb	Poaceae	x	–	–
<i>Boerhavia</i>	spiderling	Herb	Nyctaginaceae	–	–	x
<i>Boerhavia coulteri</i>	Coulter's spiderling	Herb	Nyctaginaceae	–	–	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Bothriochloa barbinodis</i>	cane bluestem	Herb	Poaceae	–	–	x
<i>Bouteloua</i>	grama	Herb	Poaceae	x	–	–
<i>Bouteloua aristidoides</i>	needle grama	Herb	Poaceae	–	x	x
<i>Bouteloua barbata</i>	sixweeks grama	Herb	Poaceae	–	x	x
<i>Bouteloua curtipendula</i>	sideoats grama	Herb	Poaceae	–	x	x
<i>Bouteloua eriopoda</i>	black grama	Herb	Poaceae	–	–	x
<i>Bouteloua gracilis</i>	blue grama	Herb	Poaceae	–	–	x
<i>Bouteloua trifida</i>	red grama	Herb	Poaceae	–	x	x
<i>Brassica tournefortii</i>	Asian mustard	Herb	Brassicaceae	–	x	x
<i>Brickellia</i>	brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia arguta</i>	pungent brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia atractyloides</i>	spearleaf brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia californica</i>	California brickellbush	Shrub	Asteraceae	–	x	x
<i>Brickellia desertorum</i>	desert brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia grandiflora</i>	tasselflower brickellbush	Shrub	Asteraceae	x	–	–
<i>Brickellia incana</i>	woolly brickellbush	Shrub	Asteraceae	–	x	x
<i>Brickellia knappiana</i>	Knapp brickellbush	Shrub	Asteraceae	–	–	x
<i>Brickellia longifolia</i>	longleaf brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia microphylla</i>	littleleaf brickellbush	Shrub	Asteraceae	x	x	x
<i>Brickellia nevinii</i>	Nevin's brickellbush	Shrub	Asteraceae	x	–	x
<i>Brickellia oblongifolia</i>	Mojave brickellbush	Shrub	Asteraceae	x	–	x
<i>Bromus</i>	brome	Herb	Poaceae	x	x	x
<i>Bromus arizonicus</i>	Arizona brome	Herb	Poaceae	x	x	–
<i>Bromus berteruanus</i>	Chilean chess	Herb	Poaceae	x	x	x
<i>Bromus carinatus</i>	California brome	Herb	Poaceae	x	–	x
<i>Bromus diandrus</i>	ripgut brome	Herb	Poaceae	–	x	x
<i>Bromus rubens</i>	red brome	Herb	Poaceae	x	x	x
<i>Bromus tectorum</i>	cheatgrass	Herb	Poaceae	x	x	x
<i>Buddleja utahensis</i>	Utah butterflybush	Shrub	Buddlejaceae	x	x	x
<i>Calochortus</i>	mariposa lily	Herb	Liliaceae	x	x	x
<i>Calochortus clavatus</i>	clubhair mariposa lily	Herb	Liliaceae	–	x	–
<i>Calochortus flexuosus</i>	winding mariposa lily	Herb	Liliaceae	x	x	x
<i>Calochortus kennedyi</i>	desert mariposa lily	Herb	Liliaceae	x	–	x
<i>Calycoseris</i>	tackstem	Herb	Asteraceae	x	x	x
<i>Camissonia</i>	suncup	Herb	Onagraceae	x	x	x
<i>Camissonia boothii</i>	Booth's evening primrose	Herb	Onagraceae	x	x	x
<i>Camissonia brevipes</i>	yellow cups	Herb	Onagraceae	x	x	x

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<i>Camissonia californica</i>	California suncup	Herb	Onagraceae	–	x	–
<i>Camissonia cardiophylla</i>	heartleaf suncup	Herb	Onagraceae	x	–	–
<i>Camissonia chamaenerioides</i>	longcapsule suncup	Herb	Onagraceae		x	–
<i>Camissonia claviformis</i>	browneyes	Herb	Onagraceae	x	x	x
<i>Camissonia kernensis</i>	Kern County evening primrose	Herb	Onagraceae	x	–	–
<i>Camissonia multijuga</i>	froststem suncup	Herb	Onagraceae	–	x	–
<i>Camissonia pallida</i>	paleyellow suncup	Herb	Onagraceae	–	–	x
<i>Camissonia pterosperma</i>	wingfruit suncup	Herb	Onagraceae	x	–	–
<i>Camissonia refracta</i>	narrowleaf suncup	Herb	Onagraceae	x	x	x
<i>Camissonia walkeri</i>	Walker's suncup	Herb	Onagraceae	x	–	–
<i>Carex</i>	sedge	Herb	Cyperaceae	x	x	x
<i>Carex alma</i>	sturdy sedge	Herb	Cyperaceae	–	–	x
<i>Carex douglasii</i>	Douglas' sedge	Herb	Cyperaceae	x	–	–
<i>Carex praegracilis</i>	clustered field sedge	Herb	Cyperaceae	x	–	x
<i>Castilleja</i>	Indian paintbrush	Herb	Scrophulariaceae	x	x	x
<i>Castilleja angustifolia</i>	northwestern Indian paintbrush	Herb	Scrophulariaceae	x	x	x
<i>Castilleja applegatei</i>	wavyleaf Indian paintbrush	Herb	Scrophulariaceae	x	–	–
<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush	Herb	Scrophulariaceae	x	x	x
<i>Castilleja minor</i> ssp. <i>minor</i>	lesser Indian paintbrush	Herb	Scrophulariaceae	x	–	–
<i>Castilleja nana</i>	dwarf alpine Indian paintbrush	Herb	Scrophulariaceae	x	–	–
<i>Catalpa bignonioides</i>	southern catalpa	Tree	Bignoniaceae	–	–	x
<i>Caulanthus</i>	wild cabbage	Herb	Brassicaceae	x	–	x
<i>Caulanthus cooperi</i>	Cooper's wild cabbage	Herb	Brassicaceae	x	x	x
<i>Caulanthus crassicaulis</i>	thickstem wild cabbage	Herb	Brassicaceae	x	–	–
<i>Caulanthus glaucus</i>	glaucous wild cabbage	Herb	Brassicaceae	x	–	–
<i>Caulanthus pilosus</i>	hairy wild cabbage	Herb	Brassicaceae	x	–	–
<i>Ceanothus greggii</i>	desert ceanothus	Shrub	Rhamnaceae	–	–	x
<i>Ceanothus greggii</i> var. <i>vestitus</i>	Mojave ceanothus	Shrub	Rhamnaceae	x	–	–
<i>Celtis laevigata</i> var. <i>reticulata</i>	netleaf hackberry	Tree	Ulmaceae	–	–	x
<i>Centaurium exaltatum</i>	desert centauray	Herb	Gentianaceae	–	–	x
<i>Centrostegia thurberi</i>	red triangles	Herb	Polygonaceae	x	x	x
<i>Cercis orbiculata</i>	California redbud	Shrub	Fabaceae	x	–	–

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<i>Cercocarpus intricatus</i>	littleleaf mountain mahogany	Shrub	Rosaceae	x	–	x
<i>Cercocarpus ledifolius</i>	curl-leaf mountain mahogany	Shrub	Rosaceae	x	–	–
<i>Chaenactis</i>	pincushion	Herb	Asteraceae	x	x	x
<i>Chaenactis carphoclinia</i>	pebble pincushion	Herb	Asteraceae	x	x	x
<i>Chaenactis douglasii</i>	Douglas' dustymaiden	Herb	Asteraceae	x	–	–
<i>Chaenactis fremontii</i>	pincushion flower	Herb	Asteraceae	x	x	x
<i>Chaenactis macrantha</i>	bighead dustymaiden	Herb	Asteraceae	x	x	–
<i>Chaenactis stevioides</i>	Esteve's pincushion	Herb	Asteraceae	x	x	x
<i>Chaenactis xantiana</i>	fleshcolor pincushion	Herb	Asteraceae	–	x	–
<i>Chaetopappa ericoides</i>	rose heath	Herb	Asteraceae	x	–	x
<i>Chamaebatiaria millefolium</i>	desert sweet	Shrub	Rosaceae	x	–	–
<i>Chamaesyce</i>	sandmat	Herb	Euphorbiaceae	x	x	x
<i>Chamaesyce albomarginata</i>	whitemargin sandmat	Herb	Euphorbiaceae	x	x	x
<i>Chamaesyce fendleri</i>	Fendler's sandmat	Herb	Euphorbiaceae	–	x	–
<i>Chamaesyce micromera</i>	Sonoran sandmat	Herb	Euphorbiaceae	x	x	–
<i>Chamaesyce ocellata</i>	Contura Creek sandmat	Herb	Euphorbiaceae	–	x	–
<i>Chamaesyce parishii</i>	Parish's sandmat	Herb	Euphorbiaceae	x	–	–
<i>Chamaesyce parryi</i>	Parry's sandmat	Herb	Euphorbiaceae	–	x	x
<i>Chamaesyce polycarpa</i>	smallseed sandmat	Herb	Euphorbiaceae	x	x	x
<i>Chamaesyce revoluta</i>	threadstem sandmat	Herb	Euphorbiaceae	–	–	x
<i>Chamaesyce setiloba</i>	Yuma sandmat	Herb	Euphorbiaceae	x	–	x
<i>Cheilanthes</i>	lipfern	Herb	Pteridaceae	x	–	x
<i>Cheilanthes covillei</i>	Coville's lipfern	Herb	Pteridaceae	–	–	x
<i>Cheilanthes feei</i>	slender lipfern	Herb	Pteridaceae	x	–	x
<i>Cheilanthes parryi</i>	Parry's lipfern	Herb	Pteridaceae	x	x	x
<i>Cheilanthes viscida</i>	viscid lipfern	Herb	Pteridaceae	–	–	x
<i>Cheilanthes wootonii</i>	beaded lipfern	Herb	Pteridaceae	–	–	x
<i>Chenopodium</i>	goosefoot	Herb	Chenopodiaceae	x	x	x
<i>Chilopsis linearis</i>	desert willow	Tree	Bignoniaceae	–	x	x
<i>Chorisiva nevadensis</i>	Nevada sumpweed	Herb	Asteraceae	–	x	–
<i>Chorizanthe</i>	spineflower	Herb	Polygonaceae	x	–	x
<i>Chorizanthe brevicornu</i>	brittle spineflower	Herb	Polygonaceae	x	x	x
<i>Chorizanthe corrugata</i>	wrinkled spineflower	Herb	Polygonaceae	x	x	–
<i>Chorizanthe rigida</i>	devil's spineflower	Herb	Polygonaceae	x	x	x
<i>Chorizanthe watsonii</i>	fivetooth spineflower	Herb	Polygonaceae	x	–	–
<i>Chrysothamnus</i>	rabbitbrush	Shrub	Asteraceae	x	–	x

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<i>Chrysothamnus albidus</i>	whiteflower rabbitbrush	Shrub	Asteraceae	x	–	–
<i>Chrysothamnus depressus</i>	longflower rabbitbrush	Shrub	Asteraceae	x	–	x
<i>Chrysothamnus greenei</i>	Greene's rabbitbrush	Shrub	Asteraceae	x	–	–
<i>Chrysothamnus viscidiflorus</i>	yellow rabbitbrush	Shrub	Asteraceae	x	–	x
<i>Cirsium</i>	thistle	Herb	Asteraceae	x	x	x
<i>Cirsium arizonicum</i>	Arizona thistle	Herb	Asteraceae	–	–	x
<i>Cirsium mohavense</i>	Mojave thistle	Herb	Asteraceae	x	x	–
<i>Cirsium neomexicanum</i>	New Mexico thistle	Herb	Asteraceae	x	x	x
<i>Cirsium occidentale</i>	cobwebby thistle	Herb	Asteraceae	x	x	–
<i>Cirsium virginense</i>	virgin thistle	Herb	Asteraceae	–	x	–
<i>Cistanthe monandra</i>	common pussypaws	Herb	Portulacaceae	–	x	x
<i>Cladium californicum</i>	California sawgrass	Herb	Cyperaceae	x	x	–
<i>Claytonia</i>	springbeauty	Herb	Portulacaceae	–	–	x
<i>Claytonia perfoliata</i>	miner's lettuce	Herb	Portulacaceae	x	x	x
<i>Clematis ligusticifolia</i>	western white clematis	Shrub	Ranunculaceae	x	–	–
<i>Cleome isomeris</i>	bladderpod spiderflower	Shrub	Capparaceae	–	–	x
<i>Cleome lutea</i>	yellow spiderflower	Herb	Capparaceae	x	–	–
<i>Cleomella obtusifolia</i>	Mojave cleomella	Herb	Capparaceae	x	–	x
<i>Coleogyne ramosissima</i>	blackbrush	Shrub	Rosaceae	x	x	x
<i>Collinsia callosa</i>	desertmountain blue eyed Mary	Herb	Scrophulariaceae	x	–	–
<i>Conyza</i>	horseweed	Herb	Asteraceae	x	x	x
<i>Cordylanthus</i>	bird's-beak	Herb	Scrophulariaceae	x	–	x
<i>Cordylanthus parviflorus</i>	purple bird's-beak	Herb	Scrophulariaceae	–	–	x
<i>Coreopsis</i>	tickseed	Herb	Asteraceae	x	–	x
<i>Coreopsis bigelovii</i>	Bigelow's tickseed	Herb	Asteraceae	x	–	–
<i>Crepis acuminata</i>	tapertip hawksbeard	Herb	Asteraceae	x	–	–
<i>Crepis runcinata</i> ssp. <i>hallii</i>	Hall's hawksbeard	Herb	Asteraceae	x	–	–
<i>Cressa truxillensis</i>	spreading alkaliweed	Herb	Convolvulaceae	x	–	x
<i>Croton californicus</i>	California croton	Herb	Euphorbiaceae	x	x	x
<i>Cryptantha</i>	cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha angustifolia</i>	Panamint cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha barbiger</i>	bearded cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha cinerea</i>	James' cryptantha	Herb	Boraginaceae	x	–	–
<i>Cryptantha circumscissa</i>	cushion cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha confertiflora</i>	basin yellow cryptantha	Herb	Boraginaceae	x	–	x
<i>Cryptantha decipiens</i>	gravelbar cryptantha	Herb	Boraginaceae	x	–	–
<i>Cryptantha echinella</i>	prickly cryptantha	Herb	Boraginaceae	x	–	–

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<i>Cryptantha flavocolata</i>	roughseed cryptantha	Herb	Boraginaceae	x	–	x
<i>Cryptantha gracilis</i>	narrowstem cryptantha	Herb	Boraginaceae	x	–	–
<i>Cryptantha holoptera</i>	winged cryptantha	Herb	Boraginaceae	x	–	–
<i>Cryptantha maritima</i>	Guadalupe cryptantha	Herb	Boraginaceae	x	x	–
<i>Cryptantha micrantha</i>	redroot cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha nevadensis</i>	Nevada cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha pterocarya</i>	wingnut cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha racemosa</i>	bushy cryptantha	Herb	Boraginaceae	x	–	–
<i>Cryptantha recurvata</i>	curvenut cryptantha	Herb	Boraginaceae	–	x	x
<i>Cryptantha tumulosa</i>	New York Mountain cryptantha	Herb	Boraginaceae	x	–	x
<i>Cryptantha utahensis</i>	scented cryptantha	Herb	Boraginaceae	x	x	x
<i>Cryptantha virginensis</i>	Virgin River cryptantha	Herb	Boraginaceae	x	–	x
Cryptogamic crust	–	Non- vasc	–	x	x	x
<i>Cucurbita palmata</i>	coyote gourd	Herb	Cucurbitaceae	x	x	x
<i>Cuscuta</i>	dodder	Herb	Cuscutaceae	x	x	x
<i>Cylindropuntia acanthocarpa</i>	buck-horn cholla	Shrub	Cactaceae	x	x	x
<i>Cylindropuntia bigelovii</i>	teddybear cholla	Shrub	Cactaceae	–	x	–
<i>Cylindropuntia echinocarpa</i>	Wiggins' cholla	Shrub	Cactaceae	x	x	x
<i>Cylindropuntia ramosissima</i>	branched pencil cholla	Shrub	Cactaceae	x	x	x
<i>Cymopterus</i>	springparsley	Herb	Apiaceae	x	–	–
<i>Cymopterus aboriginum</i>	Indian springparsley	Herb	Apiaceae	x	–	–
<i>Cymopterus gilmanii</i>	Gilman's springparsley	Herb	Apiaceae	x	–	–
<i>Cymopterus multinervatus</i>	purplenerve springparsley	Herb	Apiaceae	–	x	–
<i>Cymopterus purpurascens</i>	widewing springparsley	Herb	Apiaceae	x	x	x
<i>Cynanchum utahense</i>	Utah swallow-wort	Herb	Asclepiadaceae	–	x	x
<i>Cynodon dactylon</i>	Bermudagrass	Herb	Poaceae	x	x	x
<i>Cyperus</i>	flatsedge	Herb	Cyperaceae	–	–	x
<i>Dactylis glomerata</i>	orchardgrass	Herb	Poaceae	x	–	–
<i>Dalea</i>	prairie clover	Herb	Fabaceae	x	–	x
<i>Dalea mollis</i>	hairy prairie clover	Herb	Fabaceae	x	x	–
<i>Dalea mollissima</i>	soft prairie clover	Herb	Fabaceae	x	x	x
<i>Dalea searlsiae</i>	Searls' prairie clover	Herb	Fabaceae	–	–	x
<i>Dasyochloa pulchella</i>	low woollygrass	Herb	Poaceae	x	x	x
<i>Datura wrightii</i>	sacred thorn-apple	Herb	Solanaceae	–	x	x
<i>Daucus pusillus</i>	American wild carrot	Herb	Apiaceae	–	–	x
<i>Dedeckera eurekaensis</i>	July gold	Shrub	Polygonaceae	x	–	–

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<i>Delphinium parishii</i>	desert larkspur	Herb	Ranunculaceae	x	x	x
<i>Descurainia</i>	tansymustard	Herb	Brassicaceae	x	x	x
<i>Descurainia californica</i>	Sierra tansymustard	Herb	Brassicaceae	x	–	–
<i>Descurainia pinnata</i>	western tansymustard	Herb	Brassicaceae	x	x	x
<i>Descurainia sophia</i>	herb sophia	Herb	Brassicaceae	x	x	x
<i>Dichelostemma capitatum</i>	bluedicks	Herb	Liliaceae	x	x	x
<i>Dicoria canescens</i>	desert twinbugs	Herb	Asteraceae	x	x	x
<i>Distichlis spicata</i>	saltgrass	Herb	Poaceae	x	x	x
<i>Dithyrea californica</i>	California shieldpod	Herb	Brassicaceae	x	x	x
<i>Draba cuneifolia</i>	wedgeleaf draba	Herb	Brassicaceae	x	x	x
<i>Dudleya</i>	dudleya	Herb	Crassulaceae	–	–	x
<i>Dudleya pulverulenta</i>	chalk dudleya	Herb	Crassulaceae	–	x	x
<i>Dudleya saxosa</i>	Panamint liveforever	Herb	Crassulaceae	x	–	x
<i>Echinocactus polycephalus</i>	cottontop cactus	Shrub	Cactaceae	x	x	x
<i>Echinocereus engelmannii</i>	Engelmann's hedgehog cactus	Shrub	Cactaceae	x	x	x
<i>Echinocereus mojavensis</i>	Mojave kingcup cactus	Shrub	Cactaceae	x	x	x
<i>Echinochloa crus-galli</i>	barnyardgrass	Herb	Poaceae	–	x	–
<i>Echinomastus johnsonii</i>	Johnson's fishhook cactus	Shrub	Cactaceae	x	x	–
<i>Eleocharis</i>	spikerush	Herb	Cyperaceae	x	x	x
<i>Eleocharis geniculata</i>	Canada spikesedge	Herb	Cyperaceae	–	x	–
<i>Eleocharis palustris</i>	common spikerush	Herb	Cyperaceae	–	x	–
<i>Eleocharis parishii</i>	Parish's spikerush	Herb	Cyperaceae	x	–	x
<i>Eleocharis rostellata</i>	beaked spikerush	Herb	Cyperaceae	x	x	
<i>Elymus elymoides</i>	squirreltail	Herb	Poaceae	x	x	x
<i>Elymus glaucus</i>	blue wildrye	Herb	Poaceae	x	–	–
<i>Elymus multisetus</i>	big squirreltail	Herb	Poaceae	x	–	–
<i>Elymus trachycaulus</i>	slender wheatgrass	Herb	Poaceae	–	–	x
<i>Emmenanthe penduliflora</i>	whisperingbells	Herb	Hydrophyllaceae	x	x	x
<i>Encelia</i>	brittlebush	Shrub	Asteraceae	x	x	x
<i>Encelia actonii</i>	Acton's brittlebush	Shrub	Asteraceae	x	–	x
<i>Encelia farinosa</i>	brittlebush	Shrub	Asteraceae	x	x	x
<i>Encelia frutescens</i>	button brittlebush	Shrub	Asteraceae	x	x	x
<i>Encelia resinifera</i>	sticky brittlebush	Shrub	Asteraceae	–	x	–
<i>Encelia virginensis</i>	Virgin River brittlebush	Shrub	Asteraceae	x	x	x
<i>Enceliopsis argophylla</i>	silverleaf sunray	Herb	Asteraceae	–	x	–
<i>Enceliopsis covillei</i>	Panamint daisy	Herb	Asteraceae	x	–	–
<i>Enceliopsis nudicaulis</i>	nakedstem sunray	Herb	Asteraceae	x	–	–

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<i>Enneapogon desvauxii</i>	nineawn pappusgrass	Herb	Poaceae	–	–	x
<i>Ephedra</i>	jointfir	Shrub	Ephedraceae	x	x	x
<i>Ephedra aspera</i>	rough jointfir	Shrub	Ephedraceae	–	–	x
<i>Ephedra californica</i>	California jointfir	Shrub	Ephedraceae	x	–	x
<i>Ephedra funerea</i>	Death Valley jointfir	Shrub	Ephedraceae	x	–	x
<i>Ephedra nevadensis</i>	Nevada jointfir	Shrub	Ephedraceae	x	x	x
<i>Ephedra torreyana</i>	Torrey's jointfir	Shrub	Ephedraceae	–	x	–
<i>Ephedra trifurca</i>	longleaf jointfir	Shrub	Ephedraceae	x	–	x
<i>Ephedra viridis</i>	mormon tea	Shrub	Ephedraceae	x	x	x
<i>Epilobium</i>	willowherb	Herb	Onagraceae	–	–	x
<i>Epipactis gigantea</i>	stream orchid	Herb	Orchidaceae	x	x	–
<i>Equisetum</i>	horsetail	Herb	Equisetaceae	x	–	–
<i>Equisetum laevigatum</i>	smooth horsetail	Herb	Equisetaceae	x	–	x
<i>Eragrostis cilianensis</i>	stinkgrass	Herb	Poaceae	–	x	–
<i>Eragrostis minor</i>	little lovegrass	Herb	Poaceae	–	–	x
<i>Eremalche exilis</i>	white mallow	Herb	Malvaceae	–	–	x
<i>Eremalche rotundifolia</i>	desert fivespot	Herb	Malvaceae	x	x	x
<i>Eriastrum</i>	woollystar	Herb	Polemoniaceae	x	x	x
<i>Eriastrum densifolium</i>	giant woollystar	Herb	Polemoniaceae	–	–	x
<i>Eriastrum diffusum</i>	miniature woollystar	Herb	Polemoniaceae	x	x	x
<i>Eriastrum eremicum</i>	desert woollystar	Herb	Polemoniaceae	x	x	–
<i>Eriastrum pluriflorum</i>	Tehachapi woollystar	Herb	Polemoniaceae	–	x	x
<i>Eriastrum sparsiflorum</i>	Great Basin woollystar	Herb	Polemoniaceae	x	x	–
<i>Eriastrum wilcoxii</i>	Wilcox's woollystar	Herb	Polemoniaceae	x	–	x
<i>Ericameria</i>	goldenbush	Shrub	Asteraceae	x	x	x
<i>Ericameria cooperi</i>	Cooper's goldenbush	Shrub	Asteraceae	x	–	x
<i>Ericameria cuneata</i>	cliff goldenbush	Shrub	Asteraceae	x	x	x
<i>Ericameria gilmanii</i>	whiteflower goldenbush	Shrub	Asteraceae	x	–	–
<i>Ericameria laricifolia</i>	turpentine bush	Shrub	Asteraceae	x	x	x
<i>Ericameria linearifolia</i>	narrowleaf goldenbush	Shrub	Asteraceae	x	x	x
<i>Ericameria nana</i>	dwarf goldenbush	Shrub	Asteraceae	x	x	–
<i>Ericameria nauseosa</i>	rubber rabbitbrush	Shrub	Asteraceae	x	x	x
<i>Ericameria paniculata</i>	Mojave rabbitbrush	Shrub	Asteraceae	x	x	x
<i>Ericameria parryi</i> var. <i>aspra</i>	Parry's rabbitbrush	Shrub	Asteraceae	x	–	x
<i>Ericameria teretifolia</i>	green rabbitbrush	Shrub	Asteraceae	x	–	x
<i>Erigeron</i>	fleabane	Herb	Asteraceae	x	–	x
<i>Erigeron aphanactis</i>	rayless shaggy fleabane	Herb	Asteraceae	x	–	x

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<i>Erigeron argentatus</i>	silver fleabane	Herb	Asteraceae	x	–	–
<i>Erigeron breweri</i>	Brewer's fleabane	Herb	Asteraceae	x	–	x
<i>Erigeron clokeyi</i>	Clokey's fleabane	Herb	Asteraceae	x	–	–
<i>Erigeron concinnus</i>	Navajo fleabane	Herb	Asteraceae	x	–	x
<i>Erigeron divergens</i>	spreading fleabane	Herb	Asteraceae	–	–	x
<i>Erigeron eatonii</i>	Eaton's fleabane	Herb	Asteraceae	x	–	–
<i>Erigeron utahensis</i>	Utah fleabane	Shrub	Asteraceae	–	–	x
<i>Eriodictyon angustifolium</i>	narrowleaf yerba santa	Shrub	Hydrophyllaceae	–	–	x
<i>Eriogonum</i>	buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum brachypodum</i>	Parry's buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum cernuum</i> var. <i>cernuum</i>	nodding buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum contiguum</i>	Reveal's buckwheat	Herb	Polygonaceae	–	–	x
<i>Eriogonum corymbosum</i> var. <i>glutinosum</i>	crispleaf buckwheat	Shrub	Polygonaceae	–	x	–
<i>Eriogonum davidsonii</i>	Davidson's buckwheat	Herb	Polygonaceae	x	–	x
<i>Eriogonum deflexum</i>	flatcrown buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum divaricatum</i>	divergent buckwheat	Herb	Polygonaceae	–	x	–
<i>Eriogonum elatum</i>	tall woolly buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum eremicola</i>	Telescope Peak buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum fasciculatum</i>	Eastern Mojave buckwheat	Shrub	Polygonaceae	x	x	x
<i>Eriogonum gilmanii</i>	Gilman's buckwheat	Shrub	Polygonaceae	x	–	–
<i>Eriogonum glandulosum</i>	acorn buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum gracillimum</i>	rose and white buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum heermannii</i>	Heermann's buckwheat	Shrub	Polygonaceae	x	x	x
<i>Eriogonum hoffmannii</i>	Hoffmann's buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum inflatum</i>	desert trumpet	Herb	Polygonaceae	x	x	x
<i>Eriogonum infrafractum</i>	napkinring	Herb	Polygonaceae	x	–	–
<i>Eriogonum maculatum</i>	spotted buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum mensicola</i>	crescent buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum microthecum</i>	slender buckwheat	Shrub	Polygonaceae	x	x	x
<i>Eriogonum mohavense</i>	Western Mojave buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum nidularium</i>	birdnest buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum nudum</i>	naked buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum nutans</i>	Dugway buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum ovalifolium</i>	cushion buckwheat	Herb	Polygonaceae	x	–	–

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<i>Eriogonum palmerianum</i>	Palmer's buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum panamintense</i>	Panamint Mountain buckwheat	Herb	Polygonaceae	x	–	x
<i>Eriogonum plumatella</i>	yucca buckwheat	Shrub	Polygonaceae	–	x	x
<i>Eriogonum pusillum</i>	yellowturbans	Herb	Polygonaceae	x	x	x
<i>Eriogonum reniforme</i>	kidneyleaf buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum rixfordii</i>	pagoda buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum rupinum</i>	Wyman Creek buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum saxatile</i>	hoary buckwheat	Herb	Polygonaceae	x	x	–
<i>Eriogonum shockleyi</i>	Shockley's buckwheat	Herb	Polygonaceae	x	–	–
<i>Eriogonum thomasii</i>	Thomas' buckwheat	Herb	Polygonaceae	x	x	x
<i>Eriogonum thornei</i>	Thorne's buckwheat	Herb	Polygonaceae	–	–	x
<i>Eriogonum trichopes</i>	little deserttrumpet	Herb	Polygonaceae	x	x	x
<i>Eriogonum umbellatum</i>	sulphur-flower buckwheat	Shrub	Polygonaceae	x	–	x
<i>Eriogonum viscidulum</i>	sticky buckwheat	Herb	Polygonaceae	–	x	–
<i>Eriogonum wrightii</i>	bastardsage	Shrub	Polygonaceae	x	x	x
<i>Erioneuron pilosum</i>	hairy woollygrass	Herb	Poaceae	–	–	x
<i>Eriophyllum</i>	woolly sunflower	Herb	Asteraceae	x	x	x
<i>Erodium cicutarium</i>	redstem stork's bill	Herb	Geraniaceae	x	x	x
<i>Erodium texanum</i>	Texas stork's bill	Herb	Geraniaceae	x	x	x
<i>Erysimum capitatum</i>	sanddune wallflower	Herb	Brassicaceae	x	–	–
<i>Eschscholzia</i>	California poppy	Herb	Papaveraceae	x	x	x
<i>Eschscholzia glyptosperma</i>	desert poppy	Herb	Papaveraceae	x	x	x
<i>Eschscholzia minutiflora</i>	pygmy poppy	Herb	Papaveraceae	x	x	x
<i>Escobaria vivipara</i>	spiny star	Shrub	Cactaceae	x	–	x
<i>Eucnide urens</i>	desert stingbush	Shrub	Loasaceae	x	x	x
<i>Eucrypta</i>	hideseed	Herb	Hydrophyllaceae	x	x	x
<i>Eucrypta chrysanthemifolia</i>	spotted hideseed	Herb	Hydrophyllaceae	x	x	–
<i>Eucrypta micrantha</i>	dainty desert hideseed	Herb	Hydrophyllaceae	x	x	x
<i>Euphorbia</i>	spurge	Herb	Euphorbiaceae	x	x	x
<i>Fagonia laevis</i>	California fagonbush	Shrub	Zygophyllaceae	x	–	–
<i>Fallugia paradoxa</i>	Apache plume	Shrub	Rosaceae	x	x	x
<i>Fendlerella utahensis</i>	Utah fendlerbush	Shrub	Hydrangeaceae	x	–	x
<i>Ferocactus cylindraceus</i>	California barrel cactus	Shrub	Cactaceae	x	x	x
<i>Ficus carica</i>	edible fig	Shrub	Moraceae	x	–	–
<i>Forestiera pubescens</i>	stretchberry	Shrub	Oleaceae	x	–	x
<i>Fouquieria splendens</i>	ocotillo	Tree	Fouquieriaceae	–	x	–

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<i>Frangula californica</i> ssp. <i>ursina</i>	California buckthorn	Shrub	Rhamnaceae	–	–	x
<i>Frasera albomarginata</i>	desert frasera	Herb	Gentianaceae	x	–	x
<i>Frasera puberulenta</i>	Inyo frasera	Herb	Gentianaceae	x	–	–
<i>Fraxinus anomala</i>	singleleaf ash	Tree	Oleaceae	x	–	x
<i>Funastrum cynanchoides</i>	fringed twinevine	Herb	Asclepiadaceae	–	x	x
<i>Funastrum hirtellum</i>	hairy milkweed	Herb	Asclepiadaceae	x	x	x
<i>Galium</i>	bedstraw	Herb	Rubiaceae	x	–	x
<i>Galium angustifolium</i>	narrowleaf bedstraw	Herb	Rubiaceae	–	–	x
<i>Galium aparine</i>	stickywilly	Herb	Rubiaceae	–	x	–
<i>Galium hilendiae</i>	Hilend's bedstraw	Shrub	Rubiaceae	x	–	–
<i>Galium multiflorum</i>	shrubby bedstraw	Shrub	Rubiaceae	x	–	–
<i>Galium munzii</i>	Munz's bedstraw	Herb	Rubiaceae	–	–	x
<i>Galium parishii</i>	Parish's bedstraw	Herb	Rubiaceae	–	–	x
<i>Galium proliferum</i>	limestone bedstraw	Herb	Rubiaceae	–	x	–
<i>Galium stellatum</i>	starry bedstraw	Shrub	Rubiaceae	x	x	x
<i>Garrya flavescens</i>	ashy silktassel	Shrub	Garryaceae	–	x	x
<i>Gaura coccinea</i>	scarlet beeblossom	Herb	Onagraceae	–	–	x
<i>Gaura sinuata</i>	wavyleaf beeblossom	Herb	Onagraceae	–	–	x
<i>Gayophytum diffusum</i> ssp. <i>parviflorum</i>	spreading groundsmoke	Herb	Onagraceae	x	–	–
<i>Gayophytum ramosissimum</i>	pinyon groundsmoke	Herb	Onagraceae	x	–	–
<i>Geraea canescens</i>	hairy desertsunflower	Herb	Asteraceae	x	x	x
<i>Gilia</i>	gilia	Herb	Polemoniaceae	x	x	x
<i>Gilia brecciarum</i>	Nevada gilia	Herb	Polemoniaceae	x	–	–
<i>Gilia cana</i>	showy gilia	Herb	Polemoniaceae	x	–	–
<i>Gilia latiflora</i>	hollyleaf gilia	Herb	Polemoniaceae	x	x	x
<i>Gilia minor</i>	little gilia	Herb	Polemoniaceae	–	x	–
<i>Gilia ophthalmoides</i>	eyed gilia	Herb	Polemoniaceae	x	–	–
<i>Gilia scopulorum</i>	rock gilia	Herb	Polemoniaceae	x	x	–
<i>Gilia sinuata</i>	rosy gilia	Herb	Polemoniaceae	–	x	–
<i>Gilia transmontana</i>	transmontane gilia	Herb	Polemoniaceae	x	x	–
<i>Gilmania luteola</i>	goldencarpet	Herb	Polygonaceae	x	–	–
<i>Glandularia gooddingii</i>	southwestern mock vervain	Herb	Verbenaceae	x	x	x
<i>Glossopetalon spinescens</i>	spiny greasebush	Shrub	Crossosomataceae	x	–	x
<i>Glycyrrhiza lepidota</i>	American licorice	Herb	Fabaceae	x	–	–
<i>Glyptopleura marginata</i>	carveseed	Herb	Asteraceae	x	x	x

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<i>Gnaphalium</i>	cudweed	Herb	Asteraceae	–	–	x
<i>Grayia spinosa</i>	spiny hopsage	Shrub	Chenopodiaceae	x	x	x
<i>Grusonia</i>	cholla	Shrub	Cactaceae	–	x	–
<i>Grusonia parishii</i>	matted cholla	Shrub	Cactaceae	–	x	x
<i>Guillenia lasiophylla</i>	California mustard	Herb	Brassicaceae	x	x	x
<i>Gutierrezia</i>	snakeweed	Shrub	Asteraceae	x	x	x
<i>Gutierrezia microcephala</i>	threadleaf snakeweed	Shrub	Asteraceae	x	x	x
<i>Gutierrezia sarothrae</i>	broom snakeweed	Shrub	Asteraceae	x	x	x
<i>Hazardia brickellioides</i>	brickellbush goldenweed	Shrub	Asteraceae	x	–	–
<i>Hecastocleis shockleyi</i>	prickleleaf	Shrub	Asteraceae	x	–	–
<i>Hedeoma nana</i>	dwarf false pennyroyal	Herb	Lamiaceae	–	x	x
<i>Helianthus</i>	sunflower	Herb	Asteraceae	–	x	–
<i>Helianthus annuus</i>	common sunflower	Herb	Asteraceae	–	–	x
<i>Helianthus nuttallii</i>	Nuttall's sunflower	Herb	Asteraceae	x	–	–
<i>Heliomeris hispida</i>	rough false goldeneye	Herb	Asteraceae		–	x
<i>Heliomeris multiflora</i>	showy goldeneye	Herb	Asteraceae	x	–	x
<i>Heliotropium curassavicum</i>	salt heliotrope	Herb	Boraginaceae	x	x	x
<i>Hesperocallis undulata</i>	desert lily	Herb	Liliaceae	–	x	x
<i>Hesperostipa comata</i>	needle and thread	Herb	Poaceae	x	x	–
<i>Heuchera</i>	alumroot	Herb	Saxifragaceae	x	–	x
<i>Hibiscus denudatus</i>	paleface	Shrub	Malvaceae	–	x	–
<i>Holmgrenanthe petrophila</i>	rocklady	Herb	Scrophulariaceae	x	–	–
<i>Holodiscus discolor</i>	oceanspray	Shrub	Rosaceae	x	–	x
<i>Holodiscus dumosus</i>	rockspirea	Shrub	Rosaceae	x	–	–
<i>Hordeum murinum</i>	mouse barley	Herb	Poaceae	x	x	x
<i>Hymenoclea salsola</i>	burrobrush	Shrub	Asteraceae	x	x	x
<i>Hymenopappus filifolius</i>	fineleaf hymenopappus	Herb	Asteraceae	–	–	x
<i>Hymenoxys cooperi</i>	Cooper's rubberweed	Herb	Asteraceae	–	–	x
<i>Hyptis emoryi</i>	desert lavender	Shrub	Lamiaceae	–	x	–
<i>Ipomopsis arizonica</i>	Arizona ipomopsis	Herb	Polemoniaceae	–	–	x
<i>Ipomopsis congesta</i>	ballhead ipomopsis	Herb	Polemoniaceae	x	–	–
<i>Ipomopsis polycladon</i>	manybranched ipomopsis	Herb	Polemoniaceae	x	x	x
<i>Iris</i>	iris	Herb	Iridaceae	x	–	–
<i>Isocoma acradenia</i>	alkali goldenbush	Shrub	Asteraceae	–	x	x
<i>Jamesia americana</i>	fivepetal cliffbush	Shrub	Hydrangeaceae	x	–	–
<i>Juncus</i>	rush	Herb	Juncaceae	x	–	x
<i>Juncus acutus</i>	spiny rush	Herb	Juncaceae	–	x	–

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<i>Juncus arcticus</i>	arctic rush	Herb	Juncaceae	x	x	x
<i>Juncus bufonius</i>	toad rush	Herb	Juncaceae	–	x	–
<i>Juncus cooperi</i>	Cooper's rush	Herb	Juncaceae	x	x	x
<i>Juncus interior</i>	inland rush	Herb	Juncaceae	–	–	x
<i>Juncus macrophyllus</i>	longleaf rush	Herb	Juncaceae	–	–	x
<i>Juncus mexicanus</i>	Mexican rush	Herb	Juncaceae	x	–	x
<i>Juncus orthophyllus</i>	straightleaf rush	Herb	Juncaceae	x	–	–
<i>Juncus torreyi</i>	Torrey's rush	Herb	Juncaceae	–	–	x
<i>Juncus xiphioides</i>	irisleaf rush	Herb	Juncaceae	x	x	x
<i>Juniperus</i>	juniper	Tree	Cupressaceae	x	–	–
<i>Juniperus californica</i>	California juniper	Tree	Cupressaceae	x	x	x
<i>Juniperus grandis</i>	western juniper	Tree	Cupressaceae	x	–	–
<i>Juniperus osteosperma</i>	Utah juniper	Tree	Cupressaceae	x	–	x
<i>Kallstroemia californica</i>	California caltrop	Herb	Zygophyllaceae	–	–	x
<i>Kallstroemia parviflora</i>	warty caltrop	Herb	Zygophyllaceae	–	–	x
<i>Keckiella antirrhinoides</i>	snapdragon penstemon	Shrub	Scrophulariaceae	x	x	x
<i>Keckiella rothrockii</i>	Rothrock's keckiella	Shrub	Scrophulariaceae	x	–	–
<i>Koeleria macrantha</i>	prairie Junegrass	Herb	Poaceae	x	–	–
<i>Krameria</i>	ratany	Shrub	Krameriaceae	x	–	x
<i>Krameria erecta</i>	littleleaf ratany	Shrub	Krameriaceae	x	x	x
<i>Krameria grayi</i>	white ratany	Shrub	Krameriaceae	–	x	x
<i>Krascheninnikovia lanata</i>	winterfat	Shrub	Chenopodiaceae	x	x	x
<i>Lactuca</i>	lettuce	Herb	Asteraceae	x	x	x
<i>Langloisia</i>	langloisia	Herb	Polemoniaceae	x	x	–
<i>Langloisia setosissima</i>	Great Basin langloisia	Herb	Polemoniaceae	x	x	x
<i>Lappula occidentalis</i>	flatspine stickseed	Herb	Boraginaceae	–	–	x
<i>Larrea tridentata</i>	creosote bush	Shrub	Zygophyllaceae	x	x	x
<i>Lasthenia glabrata</i>	yellowray goldfields	Herb	Asteraceae	–	–	x
<i>Layia glandulosa</i>	whitedaisy tidytips	Herb	Asteraceae	x	–	x
<i>Lepidium</i>	pepperweed	Herb	Brassicaceae	x	x	x
<i>Lepidium densiflorum</i>	common pepperweed	Herb	Brassicaceae	x	x	–
<i>Lepidium flavum</i>	yellow pepperweed	Herb	Brassicaceae	x	–	–
<i>Lepidium fremontii</i>	desert pepperweed	Shrub	Brassicaceae	x	x	x
<i>Lepidium lasiocarpum</i>	shaggyfruit pepperweed	Herb	Brassicaceae	x	x	x
<i>Lepidium virginicum</i>	Virginia pepperweed	Herb	Brassicaceae	x	–	–
<i>Lepidospartum latisquamum</i>	Nevada broomsage	Shrub	Asteraceae	x	–	x
<i>Lepidospartum squamatum</i>	California broomsage	Shrub	Asteraceae	x	–	–

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<i>Leptochloa fusca</i>	Malabar sprangletop	Herb	Poaceae	–	x	–
<i>Leptodactylon</i>	pricklyphlox	Herb	Polemoniaceae	x	–	–
<i>Leptosiphon aureus</i>	golden linanthus	Herb	Polemoniaceae	x	x	x
<i>Leptosiphon nuttallii</i>	Nuttall's linanthus	Herb	Polemoniaceae	x	–	–
<i>Lesquerella kingii</i>	King bladderpod	Herb	Brassicaceae	x	–	x
<i>Lesquerella tenella</i>	Moapa bladderpod	Herb	Brassicaceae	–	x	–
<i>Lessingia lemmonii</i>	Lemmon's lessingia	Herb	Asteraceae	–	–	x
<i>Lewisia rediviva</i>	bitter root	Herb	Portulacaceae	x	–	–
<i>Leymus cinereus</i>	basin wildrye	Herb	Poaceae	x	–	–
<i>Leymus salinus</i>	saline wildrye	Herb	Poaceae	x	–	x
<i>Leymus triticoides</i>	beardless wildrye	Herb	Poaceae	x	–	–
<i>Linanthus</i>	linanthus	Herb	Polemoniaceae	x	x	x
<i>Linanthus arenicola</i>	sanddune linanthus	Herb	Polemoniaceae	x	x	–
<i>Linanthus bigelovii</i>	Bigelow's linanthus	Herb	Polemoniaceae	x	x	–
<i>Linanthus demissus</i>	desertsnow	Herb	Polemoniaceae	x	x	–
<i>Linanthus dichotomus</i>	eveningsnow	Herb	Polemoniaceae	x	x	–
<i>Linanthus filiformis</i>	yellow gilia	Herb	Polemoniaceae	x	x	–
<i>Linanthus jonesii</i>	Jones' linanthus	Herb	Polemoniaceae	x	x	–
<i>Linanthus pungens</i>	granite prickly phlox	Herb	Polemoniaceae	x	x	x
<i>Linum</i>	flax	Herb	Linaceae	x	x	x
<i>Loeseliastrum</i>	calico	Herb	Polemoniaceae	x	x	x
<i>Loeseliastrum depressum</i>	depressed ipomopsis	Herb	Polemoniaceae	x	–	–
<i>Logfia californica</i>	California cottonrose	Herb	Asteraceae	–	–	x
<i>Lolium rigidum</i>	Wimmera ryegrass	Herb	Poaceae	–	x	–
<i>Lomatium</i>	desertparsley	Herb	Apiaceae	x	–	x
<i>Lomatium foeniculaceum</i> ssp. <i>inyoense</i>	Inyo biscuitroot	Herb	Apiaceae	x	–	–
<i>Lomatium nevadense</i>	Nevada biscuitroot	Herb	Apiaceae	x	–	x
<i>Lomatium parryi</i>	Utah desertparsley	Herb	Apiaceae	x	x	x
<i>Lotus</i>	trefoil	Herb	Fabaceae	x	x	x
<i>Lotus humistratus</i>	foothill deervetch	Herb	Fabaceae	–	x	–
<i>Lotus rigidus</i>	shrubby deervetch	Shrub	Fabaceae	x	x	x
<i>Lotus salsuginosus</i>	coastal bird's-foot trefoil	Herb	Fabaceae	–	x	x
<i>Lotus strigosus</i>	strigose bird's-foot trefoil	Herb	Fabaceae	x	–	–
<i>Lupinus</i>	lupine	Herb	Fabaceae	x	x	x
<i>Lupinus andersonii</i>	Anderson's lupine	Herb	Fabaceae	x	–	–
<i>Lupinus argenteus</i>	silvery lupine	Shrub	Fabaceae	x	–	–
<i>Lupinus arizonicus</i>	Arizona lupine	Herb	Fabaceae	x	x	–

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<i>Lupinus brevicaulis</i>	shortstem lupine	Herb	Fabaceae	x	–	–
<i>Lupinus caudatus</i> ssp. <i>caudatus</i>	tailcup lupine	Herb	Fabaceae	x	–	–
<i>Lupinus concinnus</i>	bajada lupine	Herb	Fabaceae	–	x	x
<i>Lupinus excubitus</i>	grape soda lupine	Shrub	Fabaceae	x	–	–
<i>Lupinus flavoculatus</i>	yelloweyes	Herb	Fabaceae	x	–	–
<i>Lupinus holmgrenianus</i>	Holmgren's lupine	Herb	Fabaceae	x	–	–
<i>Lupinus magnificus</i>	Panamint Mountain lupine	Shrub	Fabaceae	x	–	–
<i>Lupinus meionanthus</i>	Lake Tahoe lupine	Herb	Fabaceae	x	–	–
<i>Lupinus palmeri</i>	bluebonnet lupine	Herb	Fabaceae	x	–	–
<i>Lupinus shockleyi</i>	purple desert lupine	Herb	Fabaceae	–	x	x
<i>Lupinus sparsiflorus</i>	Coulter's lupine	Herb	Fabaceae	–	x	x
<i>Lycium</i>	desert-thorn	Shrub	Solanaceae	x	x	x
<i>Lycium andersonii</i>	water jacket	Shrub	Solanaceae	x	x	x
<i>Lycium californicum</i>	California desert-thorn	Shrub	Solanaceae	–	x	–
<i>Lycium cooperi</i>	peach thorn	Shrub	Solanaceae	x	x	x
<i>Lycium pallidum</i>	pale desert-thorn	Shrub	Solanaceae	x	x	–
<i>Lycium parishii</i>	Parish's desert-thorn	Shrub	Solanaceae	x	–	–
<i>Lycium torreyi</i>	Torrey wolfberry	Shrub	Solanaceae	–	x	–
<i>Lythrum californicum</i>	California loosestrife	Herb	Lythraceae	x	–	x
<i>Machaeranthera</i>	tansyaster	Herb	Asteraceae	x	–	x
<i>Machaeranthera arida</i>	arid tansyaster	Herb	Asteraceae	–	–	x
<i>Machaeranthera canescens</i>	hoary tansyaster	Herb	Asteraceae	x	–	x
<i>Machaeranthera carnososa</i>	shrubby alkaliaster	Herb	Asteraceae	x	–	–
<i>Machaeranthera gracilis</i>	slender goldenweed	Herb	Asteraceae	–	–	x
<i>Machaeranthera pinnatifida</i>	lacy tansyaster	Shrub	Asteraceae	–	x	–
<i>Machaeranthera tanacetifolia</i>	tanseyleaf tansyaster	Herb	Asteraceae	–	–	x
<i>Mahonia fremontii</i>	Fremont's mahonia	Shrub	Berberidaceae	–	–	x
<i>Maianthemum stellatum</i>	starry false lily of the valley	Herb	Liliaceae	x	–	–
<i>Malacothrix</i>	desertdandelion	Herb	Asteraceae	x	x	x
<i>Malacothrix californica</i>	California desertdandelion	Herb	Asteraceae	x	–	x
<i>Malacothrix coulteri</i>	snake's head	Herb	Asteraceae	x	x	–
<i>Malacothrix glabrata</i>	smooth desertdandelion	Herb	Asteraceae	x	x	x
<i>Malacothrix sonchoides</i>	sowthistle desertdandelion	Herb	Asteraceae	x	–	–
<i>Malcolmia africana</i>	African mustard	Herb	Brassicaceae	–	x	–
<i>Malva neglecta</i>	common mallow	Herb	Malvaceae	–	x	–

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<i>Mammillaria tetrancistra</i>	common fishhook cactus	Shrub	Cactaceae	x	x	x
<i>Marah fabaceus</i>	California manroot	Herb	Cucurbitaceae	–	x	–
<i>Marah macrocarpus</i>	Cucamonga manroot	Herb	Cucurbitaceae	–	x	–
<i>Marina parryi</i>	Parry's false prairie-clover	Herb	Fabaceae	–	x	–
<i>Marrubium vulgare</i>	horehound	Herb	Lamiaceae	x	–	x
<i>Matelea parvifolia</i>	spearleaf	Herb	Asclepiadaceae	–	–	x
<i>Maurandella antirrhiniflora</i>	roving sailor	Herb	Scrophulariaceae	–	x	x
<i>Medicago sativa</i>	alfalfa	Herb	Fabaceae	x	–	–
<i>Melica frutescens</i>	woody melicgrass	Herb	Poaceae	–	–	x
<i>Melica imperfecta</i>	smallflower melicgrass	Herb	Poaceae	–	–	x
<i>Melilotus</i>	sweetclover	Herb	Fabaceae	x	x	x
<i>Menodora</i>	menodora	Shrub	Oleaceae	–	–	x
<i>Menodora scabra</i>	rough menodora	Shrub	Oleaceae	–	x	x
<i>Menodora spinescens</i>	spiny menodora	Shrub	Oleaceae	x	x	x
<i>Mentzelia</i>	blazingstar	Herb	Loasaceae	x	x	x
<i>Mentzelia albicaulis</i>	whitestem blazingstar	Herb	Loasaceae	x	x	x
<i>Mentzelia involucrata</i>	whitebract blazingstar	Herb	Loasaceae	x	–	–
<i>Mentzelia montana</i>	variegated-bract blazingstar	Herb	Loasaceae	x	–	–
<i>Mentzelia multiflora</i> var. <i>longiloba</i>	Adonis blazingstar	Herb	Loasaceae	–	–	x
<i>Mentzelia nitens</i>	shining blazingstar	Herb	Loasaceae	x	x	–
<i>Mentzelia obscura</i>	Pacific blazingstar	Herb	Loasaceae	x	–	–
<i>Mentzelia oreophila</i>	Argus blazingstar	Herb	Loasaceae	x	x	–
<i>Mentzelia pterosperma</i>	wingseed blazingstar	Herb	Loasaceae	–	–	x
<i>Mentzelia reflexa</i>	reflexed blazingstar	Herb	Loasaceae	x	–	–
<i>Mentzelia tricuspis</i>	spinyhair blazingstar	Herb	Loasaceae	–	x	–
<i>Microseris lindleyi</i>	Lindley's silverpuffs	Herb	Asteraceae	x	x	x
<i>Mimulus</i>	monkeyflower	Herb	Scrophulariaceae	x	x	x
<i>Mimulus bigelovii</i>	Bigelow's monkeyflower	Herb	Scrophulariaceae	x	x	x
<i>Mimulus cardinalis</i>	scarlet monkeyflower	Herb	Scrophulariaceae	–	x	–
<i>Mimulus fremontii</i>	Fremont's monkeyflower	Herb	Scrophulariaceae	x	x	–
<i>Mimulus guttatus</i>	seep monkeyflower	Herb	Scrophulariaceae	x	x	x
<i>Mimulus parishii</i>	Parish's monkeyflower	Herb	Scrophulariaceae	–	–	x
<i>Mimulus parryi</i>	annual redspot monkeyflower	Herb	Scrophulariaceae	–	x	–
<i>Mimulus rubellus</i>	little redstem monkeyflower	Herb	Scrophulariaceae	–	x	x

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<i>Mimulus rupicola</i>	Death Valley monkeyflower	Herb	Scrophulariaceae	x	–	–
<i>Mirabilis</i>	four o'clock	Herb	Nyctaginaceae	x	x	x
<i>Mirabilis albida</i>	white four o'clock	Herb	Nyctaginaceae	–	–	x
<i>Mirabilis coccinea</i>	scarlet four o'clock	Herb	Nyctaginaceae	–	–	x
<i>Mirabilis laevis</i>	desert wishbone-bush	Herb	Nyctaginaceae	x	x	x
<i>Mirabilis multiflora</i>	Colorado four o'clock	Herb	Nyctaginaceae	x	x	x
<i>Mirabilis pumila</i>	dwarf four o'clock	Herb	Nyctaginaceae	–	–	x
<i>Mohavea</i>	mohavea	Herb	Scrophulariaceae	x	–	–
<i>Mohavea breviflora</i>	golden desert-snapdragon	Herb	Scrophulariaceae	x	x	–
<i>Mohavea confertiflora</i>	ghost flower	Herb	Scrophulariaceae	–	x	x
<i>Mollugo cerviana</i>	threadstem carpetweed	Herb	Molluginaceae	–	–	x
<i>Monardella</i>	monardella	Shrub	Lamiaceae	x	–	x
<i>Monardella linoides</i>	flaxleaf monardella	Shrub	Lamiaceae	x	x	x
<i>Monoptilon</i>	desertstar	Herb	Asteraceae	x	x	x
<i>Mortonia utahensis</i>	Utah mortonia	Shrub	Celastraceae	x	x	x
<i>Muhlenbergia</i>	Muhly	Herb	Poaceae	x	–	x
<i>Muhlenbergia asperifolia</i>	scratchgrass	Herb	Poaceae	x	x	x
<i>Muhlenbergia fragilis</i>	delicate muhly	Herb	Poaceae	–	–	x
<i>Muhlenbergia microsperma</i>	littleseed muhly	Herb	Poaceae	x	–	x
<i>Muhlenbergia porteri</i>	bush muhly	Herb	Poaceae	x	x	x
<i>Muhlenbergia rigens</i>	deergrass	Herb	Poaceae	–	–	x
<i>Myosurus cupulatus</i>	Arizona mousetail	Herb	Ranunculaceae	–	–	x
<i>Nama</i>	fiddleleaf	Herb	Hydrophyllaceae	x	–	–
<i>Nama aretioides</i>	ground nama	Herb	Hydrophyllaceae	x	–	–
<i>Nama demissum</i>	purplemat	Herb	Hydrophyllaceae	x	x	x
<i>Nama pusillum</i>	eggleaf fiddleleaf	Herb	Hydrophyllaceae	x	x	–
<i>Nasturtium officinale</i>	watercress	Herb	Brassicaceae	x	–	x
<i>Nemacaulis</i>	cottonheads	Herb	Polygonaceae	x	x	–
<i>Nemacaulis denudata</i>	cottonheads	Herb	Polygonaceae	–	–	x
<i>Nemacladus</i>	threadplant	Herb	Campanulaceae	x	x	x
<i>Neogaerrhinum filipes</i>	yellow twining snapdragon	Herb	Scrophulariaceae	x	x	x
<i>Nerium oleander</i>	oleander	Shrub	Apocynaceae	x	x	–
<i>Nicolletia occidentalis</i>	Mojave hole-in-the-sand plant	Herb	Asteraceae	–	x	x
<i>Nicotiana</i>	tobacco	Herb	Solanaceae	x	–	x

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<i>Nicotiana attenuata</i>	coyote tobacco	Herb	Solanaceae	x	x	–
<i>Nicotiana obtusifolia</i>	desert tobacco	Herb	Solanaceae	x	x	x
<i>Nitrophila occidentalis</i>	boraxweed	Herb	Chenopodiaceae	x	–	x
<i>Nolina bigelovii</i>	Bigelow's nolina	Shrub	Liliaceae	–	x	–
<i>Notholaena californica</i>	California cloak fern	Herb	Pteridaceae	–	–	x
<i>Oenothera</i>	evening primrose	Herb	Onagraceae	x	x	x
<i>Oenothera caespitosa</i>	tufted evening primrose	Herb	Onagraceae	x	x	x
<i>Oenothera californica</i>	California evening primrose	Herb	Onagraceae	x	–	x
<i>Oenothera deltoides</i>	birdcage evening primrose	Herb	Onagraceae	x	x	x
<i>Oenothera elata</i>	Hooker's evening primrose	Herb	Onagraceae	x	–	–
<i>Oenothera primiveris</i>	desert evening primrose	Herb	Onagraceae	x	–	x
<i>Oligomeris linifolia</i>	lineleaf whitepuff	Herb	Resedaceae	x	x	x
<i>Opuntia</i>	pricklypear	Shrub	Cactaceae	x	–	x
<i>Opuntia basilaris</i>	beavertail pricklypear	Shrub	Cactaceae	x	x	x
<i>Opuntia chlorotica</i>	dollarjoint pricklypear	Shrub	Cactaceae	–	x	x
<i>Opuntia engelmannii</i>	cactus apple	Shrub	Cactaceae	–	x	x
<i>Opuntia phaeacantha</i>	tulip pricklypear	Shrub	Cactaceae	–		x
<i>Opuntia polyacantha</i> var. <i>erinacea</i>	grizzlybear pricklypear	Shrub	Cactaceae	x	x	x
<i>Oreostemma alpigenum</i> var. <i>andersonii</i>	tundra aster	Herb	Asteraceae	x	–	–
<i>Orobanche</i>	broomrape	Herb	Orobanchaceae	x	–	x
<i>Orobanche fasciculata</i>	clustered broomrape	Herb	Orobanchaceae	x	–	x
<i>Oxytheca perfoliata</i>	roundleaf oxytheca	Herb	Polygonaceae	x	–	x
<i>Packera multilobata</i>	lobeleaf groundsel	Herb	Asteraceae	x	–	x
<i>Palafoxia arida</i>	desert palafox	Herb	Asteraceae	x	–	x
<i>Panicum</i>	panicgrass	Herb	Poaceae	–	–	x
<i>Panicum urvilleanum</i>	desert panicgrass	Herb	Poaceae	–	–	x
<i>Parietaria hespera</i>	rillita pellitory	Herb	Urticaceae	x	x	x
<i>Parkinsonia</i>	paloverde	Tree	Fabaceae	–	x	–
<i>Parkinsonia aculeata</i>	Jerusalem thorn	Tree	Fabaceae	–	x	–
<i>Parkinsonia microphylla</i>	yellow paloverde	Tree	Fabaceae	–	x	–
<i>Pectis papposa</i>	manybristle chinchweed	Herb	Asteraceae	x	–	x
<i>Pectocarya</i>	combseed	Herb	Boraginaceae	x	x	x
<i>Pectocarya heterocarpa</i>	chuckwalla combseed	Herb	Boraginaceae	x	x	x
<i>Pectocarya platycarpa</i>	broadfruit combseed	Herb	Boraginaceae	x	x	x

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<i>Pectocarya recurvata</i>	curvenut combseed	Herb	Boraginaceae	x	x	x
<i>Pectocarya setosa</i>	moth combseed	Herb	Boraginaceae	x	x	x
<i>Pediomelum castoreum</i>	beaver Indian breadroot	Herb	Fabaceae	–	x	–
<i>Pellaea</i>	cliffbrake	Herb	Pteridaceae	x	–	x
<i>Pellaea breweri</i>	Brewer's cliffbrake	Herb	Pteridaceae	x	–	x
<i>Pellaea mucronata</i>	birdfoot cliffbrake	Herb	Pteridaceae	–	–	x
<i>Pellaea truncata</i>	spiny cliffbrake	Herb	Pteridaceae	–	–	x
<i>Penstemon</i>	beardtongue	Herb	Scrophulariaceae	x	x	x
<i>Penstemon calcareus</i>	limestone beardtongue	Herb	Scrophulariaceae	x	–	x
<i>Penstemon eatonii</i>	firecracker penstemon	Herb	Scrophulariaceae	x	x	x
<i>Penstemon floridus</i>	Panamint beardtongue	Herb	Scrophulariaceae	x	–	–
<i>Penstemon fruticiformis</i>	Death Valley beardtongue	Shrub	Scrophulariaceae	x	–	–
<i>Penstemon monoensis</i>	Mono penstemon	Herb	Scrophulariaceae	x	–	–
<i>Penstemon pahutensis</i>	Paiute beardtongue	Herb	Scrophulariaceae	x	–	–
<i>Penstemon palmeri</i>	Palmer's penstemon	Herb	Scrophulariaceae	x	x	x
<i>Penstemon rostriflorus</i>	Bridge penstemon	Herb	Scrophulariaceae	x	–	x
<i>Penstemon scapoides</i>	pinyon beardtongue	Herb	Scrophulariaceae	x	–	–
<i>Penstemon speciosus</i>	royal penstemon	Herb	Scrophulariaceae	x	–	x
<i>Penstemon stephensii</i>	Stephens' penstemon	Herb	Scrophulariaceae	–	–	x
<i>Penstemon thurberi</i>	Thurber's penstemon	Shrub	Scrophulariaceae	–	–	x
<i>Perityle emoryi</i>	Emory's rockdaisy	Herb	Asteraceae	x	x	x
<i>Perityle megalcephala</i>	Nevada rockdaisy	Shrub	Asteraceae	x	–	x
<i>Petalonyx nitidus</i>	shinyleaf sandpaper plant	Shrub	Loasaceae	x	x	x
<i>Petalonyx parryi</i>	Parry's sandpaper plant	Shrub	Loasaceae	–	x	–
<i>Petalonyx thurberi</i>	Thurber's sandpaper plant	Shrub	Loasaceae	x	x	x
<i>Petradoria pumila</i>	rock goldenrod	Herb	Asteraceae	–	–	x
<i>Petrophytum caespitosum</i>	mat rockspirea	Shrub	Rosaceae	x	–	x
<i>Peucephyllum schottii</i>	Schott's pygmycedar	Shrub	Asteraceae	x	x	x
<i>Phacelia</i>	phacelia	Herb	Hydrophyllaceae	x	x	x
<i>Phacelia affinis</i>	limestone phacelia	Herb	Hydrophyllaceae	x	x	–
<i>Phacelia austromontana</i>	Southern Sierra phacelia	Herb	Hydrophyllaceae	–	–	x
<i>Phacelia calthifolia</i>	calthaleaf phacelia	Herb	Hydrophyllaceae	x	x	–
<i>Phacelia campanularia</i>	desertbells	Herb	Hydrophyllaceae	–	–	x
<i>Phacelia crenulata</i>	cleftleaf wildheliotrope	Herb	Hydrophyllaceae	x	x	x
<i>Phacelia curvipes</i>	Washoe phacelia	Herb	Hydrophyllaceae	x	–	–
<i>Phacelia distans</i>	distant phacelia	Herb	Hydrophyllaceae	x	x	–
<i>Phacelia fremontii</i>	Fremont's phacelia	Herb	Hydrophyllaceae	x	x	x

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<i>Phacelia hastata</i>	silverleaf phacelia	Herb	Hydrophyllaceae	x	–	–
<i>Phacelia ivesiana</i>	Ives' phacelia	Herb	Hydrophyllaceae	–	x	x
<i>Phacelia lemmonii</i>	Lemmon's phacelia	Herb	Hydrophyllaceae	x	x	x
<i>Phacelia mustelina</i>	weasel phacelia	Herb	Hydrophyllaceae	x	–	–
<i>Phacelia neglecta</i>	alkali phacelia	Herb	Hydrophyllaceae	–	x	x
<i>Phacelia palmeri</i>	Palmer's phacelia	Herb	Hydrophyllaceae	–	x	–
<i>Phacelia pedicellata</i>	pedicellate phacelia	Herb	Hydrophyllaceae	–	–	x
<i>Phacelia perityloides</i>	Panamint phacelia	Herb	Hydrophyllaceae	x	–	–
<i>Phacelia pulchella</i>	beautiful phacelia	Herb	Hydrophyllaceae	x	x	–
<i>Phacelia rotundifolia</i>	roundleaf phacelia	Herb	Hydrophyllaceae	x	x	x
<i>Phacelia vallis-mortae</i>	Death Valley phacelia	Herb	Hydrophyllaceae	x	x	x
<i>Philadelphus microphyllus</i>	littleleaf mock orange	Shrub	Hydrangeaceae	–	–	x
<i>Phlox</i>	phlox	Herb	Polemoniaceae	x	x	–
<i>Phlox caespitosa</i>	tufted phlox	Shrub	Polemoniaceae	x	–	–
<i>Phlox diffusa</i>	spreading phlox	Herb	Polemoniaceae	x	–	–
<i>Phlox stansburyi</i>	cold-desert phlox	Herb	Polemoniaceae	x	–	x
<i>Phoenix dactylifera</i>	date palm	Tree	Arecaceae	x	–	–
<i>Pholisma arenarium</i>	desert christmas tree	Herb	Lennoaceae	–	–	x
<i>Pholistoma auritum</i>	blue fiestaflower	Herb	Hydrophyllaceae	x	–	–
<i>Pholistoma membranaceum</i>	white fiestaflower	Herb	Hydrophyllaceae	x	x	x
<i>Phoradendron californicum</i>	mesquite mistletoe	Shrub	Viscaceae	x	x	x
<i>Phoradendron densum</i>	dense mistletoe	Shrub	Viscaceae	x	–	–
<i>Phoradendron juniperinum</i>	juniper mistletoe	Shrub	Viscaceae	x	–	x
<i>Phragmites australis</i>	common reed	Herb	Poaceae	x	x	x
<i>Physalis</i>	groundcherry	Herb	Solanaceae	x	x	x
<i>Physalis crassifolia</i>	yellow nightshade groundcherry	Herb	Solanaceae	x	x	x
<i>Physalis hederifolia</i>	ivyleaf groundcherry	Herb	Solanaceae	x	x	x
<i>Physalis pubescens</i>	husk tomato	Herb	Solanaceae	–	–	x
<i>Physaria chambersii</i>	Chambers' twinpod	Herb	Brassicaceae	–	–	x
<i>Picrothamnus desertorum</i>	bud sagebrush	Shrub	Asteraceae	x	–	–
<i>Pinus edulis</i>	twoneedle pinyon	Tree	Pinaceae	–	–	x
<i>Pinus flexilis</i>	limber pine	Tree	Pinaceae	x	–	–
<i>Pinus longaeva</i>	Great Basin bristlecone pine	Tree	Pinaceae	x	–	–
<i>Pinus monophylla</i>	singleleaf pinyon	Tree	Pinaceae	x	x	x
<i>Plagiobothrys</i>	popcornflower	Herb	Boraginaceae	x	x	x
<i>Plantago</i>	plantain	Herb	Plantaginaceae	x	x	x

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<i>Plantago major</i>	common plantain	Herb	Plantaginaceae	x	–	x
<i>Plantago ovata</i>	desert Indianwheat	Herb	Plantaginaceae	x	x	x
<i>Plantago patagonica</i>	woolly plantain	Herb	Plantaginaceae	x	x	x
<i>Platanthera sparsiflora</i>	sparse-flowered bog orchid	Herb	Orchidaceae	x	–	–
<i>Pleiocanthus spinosus</i>	thorn skeletonweed	Shrub	Asteraceae	x	–	–
<i>Pleuraphis</i>	galleta grass	Herb	Poaceae	x	–	–
<i>Pleuraphis jamesii</i>	James' galleta	Herb	Poaceae	x	–	x
<i>Pleuraphis rigida</i>	big galleta	Herb	Poaceae	x	x	x
<i>Pleurocoronis pluriseta</i>	bush arrowleaf	Shrub	Asteraceae	x	x	x
<i>Pluchea odorata</i>	sweetscent	Herb	Asteraceae	–	x	–
<i>Pluchea sericea</i>	arrowweed	Shrub	Asteraceae	x	x	–
<i>Poa</i>	bluegrass	Herb	Poaceae	x	x	x
<i>Poa annua</i>	annual bluegrass	Herb	Poaceae	x	–	–
<i>Poa bigelovii</i>	Bigelow's bluegrass	Herb	Poaceae	–	–	x
<i>Poa fendleriana</i>	muttongrass	Herb	Poaceae	x	x	x
<i>Poa secunda</i>	Sandberg bluegrass	Herb	Poaceae	x	–	x
<i>Polygala acanthoclada</i>	desert polygala	Shrub	Polygalaceae	–	x	x
<i>Polygala heterorhyncha</i>	beaked spiny polygala	Shrub	Polygalaceae	x	–	–
<i>Polygonum douglasii</i>	Douglas' knotweed	Herb	Polygonaceae	x	–	–
<i>Polypogon interruptus</i>	ditch rabbitsfoot grass	Herb	Poaceae	x	x	–
<i>Polypogon monspeliensis</i>	annual rabbitsfoot grass	Herb	Poaceae	x	x	x
<i>Polypogon viridis</i>	beardless rabbitsfoot grass	Herb	Poaceae	–	x	x
<i>Populus angustifolia</i>	narrowleaf cottonwood	Tree	Salicaceae	x	x	–
<i>Populus fremontii</i>	Fremont cottonwood	Tree	Salicaceae	x	x	x
<i>Porophyllum gracile</i>	slender poreleaf	Herb	Asteraceae	x	x	x
<i>Portulaca</i>	purslane	Herb	Portulacaceae	–	–	x
<i>Portulaca halimoides</i>	silkcotton purslane	Herb	Portulacaceae	–	–	x
<i>Portulaca oleracea</i>	little hogweed	Herb	Portulacaceae	–	–	x
<i>Potentilla</i>	cinquefoil	Herb	Rosaceae	x	–	–
<i>Prenanthes exiguua</i>	brightwhite	Herb	Asteraceae	x	x	x
<i>Prosopis</i>	mesquite	Tree	Fabaceae	x	–	x
<i>Prosopis glandulosa</i>	honey mesquite	Tree	Fabaceae	x	x	x
<i>Prosopis pubescens</i>	screwbean mesquite	Tree	Fabaceae	x	x	x
<i>Prunus</i>	plum	Shrub	Rosaceae	–	–	x
<i>Prunus andersonii</i>	desert peach	Shrub	Rosaceae	x	–	–
<i>Prunus eremophila</i>	Mojave Desert plum	Shrub	Rosaceae	–	–	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Prunus fasciculata</i>	desert almond	Shrub	Rosaceae	x	x	x
<i>Psathyrotes annua</i>	annual psathyrotes	Herb	Asteraceae	x	x	–
<i>Psathyrotes pilifera</i>	hairybeast turtleback	Herb	Asteraceae	–	x	–
<i>Psathyrotes ramosissima</i>	velvet turtleback	Herb	Asteraceae	x	x	–
<i>Pseudognaphalium luteoalbum</i>	Jersey cudweed	Herb	Asteraceae	x	–	–
<i>Psilostrophe cooperi</i>	whitestem paperflower	Shrub	Asteraceae	–	x	x
<i>Psorothamnus</i>	dalea	Shrub	Fabaceae	x	–	x
<i>Psorothamnus arborescens</i>	Mojave indigobush	Shrub	Fabaceae	x	x	x
<i>Psorothamnus emoryi</i>	dyebush	Shrub	Fabaceae	x	–	–
<i>Psorothamnus fremontii</i>	Fremont's dalea	Shrub	Fabaceae	x	x	x
<i>Psorothamnus polydenius</i>	Nevada dalea	Shrub	Fabaceae	x	–	–
<i>Psorothamnus spinosus</i>	smoketree	Tree	Fabaceae	x	x	x
<i>Pterostegia drymarioides</i>	woodland pterostegia	Herb	Polygonaceae	x	x	x
<i>Pteryxia terebinthina</i>	turpentine wavewing	Herb	Apiaceae	x	–	–
<i>Purshia glandulosa</i>	desert bitterbrush	Shrub	Rosaceae	x	–	x
<i>Purshia stansburiana</i>	Stansbury cliffrose	Shrub	Rosaceae	x	–	x
<i>Purshia tridentata</i>	antelope bitterbrush	Shrub	Rosaceae	x	–	x
<i>Quercus chrysolepis</i>	canyon live oak	Tree	Fagaceae	–	x	x
<i>Quercus turbinella</i>	Sonoran scrub oak	Shrub	Fagaceae	–	x	x
<i>Rafinesquia</i>	plumeseed	Herb	Asteraceae	x	x	–
<i>Rafinesquia neomexicana</i>	New Mexico plumeseed	Herb	Asteraceae	x	x	x
<i>Ranunculus andersonii</i>	Anderson's buttercup	Herb	Ranunculaceae	x	–	–
<i>Ranunculus cymbalaria</i>	alkali buttercup	Herb	Ranunculaceae	x	–	–
<i>Rhamnus ilicifolia</i>	hollyleaf redberry	Shrub	Rhamnaceae	–	x	x
<i>Rhus trilobata</i>	skunkbush sumac	Shrub	Anacardiaceae	x	x	x
<i>Ribes</i>	currant	Shrub	Grossulariaceae	x	–	–
<i>Ribes cereum</i>	wax currant	Shrub	Grossulariaceae	x	–	–
<i>Ribes montigenum</i>	gooseberry currant	Shrub	Grossulariaceae	x	–	–
<i>Ribes velutinum</i>	desert gooseberry	Shrub	Grossulariaceae	x	x	x
<i>Rosa woodsii</i>	Woods' rose	Shrub	Rosaceae	x	–	–
<i>Rumex</i>	dock	Herb	Polygonaceae	–	–	x
<i>Rumex crispus</i>	curly dock	Herb	Polygonaceae	–	–	x
<i>Rumex hymenosepalus</i>	canaigre dock	Herb	Polygonaceae	–	–	x
<i>Rumex salicifolius</i>	willow dock	Herb	Polygonaceae	x	–	–
<i>Salazaria mexicana</i>	Mexican bladdersage	Shrub	Lamiaceae	x	x	x
<i>Salix</i>	willow	Tree	Salicaceae	x	x	–
<i>Salix exigua</i>	narrowleaf willow	Shrub	Salicaceae	x	x	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Salix gooddingii</i>	Goodding's willow	Tree	Salicaceae	x	x	x
<i>Salix laevigata</i>	red willow	Tree	Salicaceae	x	-	-
<i>Salix lasiolepis</i>	arroyo willow	Shrub	Salicaceae	x	-	x
<i>Salix tracyi</i>	Tracy's willow	Shrub	Salicaceae	-	x	-
<i>Salsola</i>	Russian thistle	Herb	Chenopodiaceae	x	x	x
<i>Salvia</i>	sage	Shrub	Lamiaceae	-	x	-
<i>Salvia columbariae</i>	chia	Herb	Lamiaceae	x	x	x
<i>Salvia dorrii</i>	purple sage	Shrub	Lamiaceae	x	x	x
<i>Salvia funerea</i>	woolly sage	Shrub	Lamiaceae	x	-	-
<i>Salvia mohavensis</i>	Mojave sage	Shrub	Lamiaceae	-	x	x
<i>Salvia pachyphylla</i>	blue sage	Shrub	Lamiaceae	x	-	x
<i>Sambucus nigra</i>	black elderberry	Shrub	Caprifoliaceae	x	-	x
<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	seaside brookweed	Herb	Primulaceae	-	x	-
<i>Sanvitalia abertii</i>	Abert's creeping zinnia	Herb	Asteraceae	-	-	x
<i>Sarcobatus vermiculatus</i>	greasewood	Shrub	Chenopodiaceae	x	-	x
<i>Sarcocornia utahensis</i>	Utah swampfire	Herb	Chenopodiaceae	x	-	-
<i>Schismus</i>	Mediterranean grass	Herb	Poaceae	x	x	x
<i>Schoenoplectus americanus</i>	chairmaker's bulrush	Herb	Cyperaceae	x	x	x
<i>Schoenoplectus pungens</i>	common threesquare	Herb	Cyperaceae	x	-	-
<i>Schoenus nigricans</i>	black bogrush	Herb	Cyperaceae	x	-	-
<i>Scirpus</i>	bulrush	Herb	Cyperaceae	x	x	-
<i>Sclerocactus polyancistrus</i>	redspined fishhook cactus	Shrub	Cactaceae	x	-	-
<i>Scleropogon brevifolius</i>	Burrograss	Herb	Poaceae	-	-	x
<i>Scopulophila rixfordii</i>	Rixford's rockwort	Shrub	Caryophyllaceae	x	-	-
<i>Scrophularia</i>	figwort	Herb	Scrophulariaceae	x	-	-
<i>Sedum niveum</i>	Davidson's stonecrop	Herb	Crassulaceae	-	-	x
<i>Selaginella leucobryoides</i>	Mojave spikemoss	Herb	Selaginellaceae	-	-	x
<i>Selinocarpus nevadensis</i>	desert moonpod	Herb	Nyctaginaceae	-	x	-
<i>Senecio</i>	ragwort	Shrub	Asteraceae	x	-	x
<i>Senecio flaccidus</i>	threadleaf ragwort	Shrub	Asteraceae	x	x	x
<i>Senecio mohavensis</i>	Mojave ragwort	Herb	Asteraceae	x	x	x
<i>Senecio spartioides</i>	broom-like ragwort	Shrub	Asteraceae	x	-	-
<i>Senna armata</i>	desertsenna	Shrub	Fabaceae	x	x	x
<i>Senna covesii</i>	Coues' cassia	Shrub	Fabaceae	-	x	-
<i>Sesuvium verrucosum</i>	verrucose seapurslane	Herb	Aizoaceae	-	x	-
<i>Sibara deserti</i>	desert winged rockcress	Herb	Brassicaceae	x	-	-
<i>Silene antirrhina</i>	sleepy silene	Herb	Caryophyllaceae	-	x	-

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Silene verecunda</i>	San Francisco campion	Herb	Caryophyllaceae	–	–	x
<i>Sisymbrium</i>	hedgemustard	Herb	Brassicaceae	x	x	x
<i>Sisyrinchium funereum</i>	Funeral Mountain blue-eyed grass	Herb	Iridaceae	x	–	–
<i>Sisyrinchium halophilum</i>	Nevada blue-eyed grass	Herb	Iridaceae	–	–	x
<i>Solanum</i>	nightshade	Herb	Solanaceae	x	–	–
<i>Solidago</i>	goldenrod	Herb	Asteraceae	x	–	x
<i>Solidago canadensis</i>	Canada goldenrod	Herb	Asteraceae	x	x	–
<i>Solidago spectabilis</i>	Nevada goldenrod	Herb	Asteraceae	x	–	–
<i>Solidago spectabilis</i> var. <i>confinis</i>	Nevada goldenrod	Herb	Asteraceae	x	x	x
<i>Sonchus asper</i>	spiny sowthistle	Herb	Asteraceae	x	x	–
<i>Sonchus oleraceus</i>	common sowthistle	Herb	Asteraceae	x	x	x
<i>Sphaeralcea ambigua</i>	desert globemallow	Herb	Malvaceae	x	x	x
<i>Sphaeralcea rusbyi</i>	Rusby's globemallow	Herb	Malvaceae	–	–	x
<i>Sphaeromeria cana</i>	gray chickensage	Shrub	Asteraceae	x	–	–
<i>Sporobolus</i>	dropseed	Herb	Poaceae	x	–	x
<i>Sporobolus airoides</i>	alkali sacaton	Herb	Poaceae	x	x	x
<i>Sporobolus contractus</i>	spike dropseed	Herb	Poaceae	x	–	x
<i>Sporobolus cryptandrus</i>	sand dropseed	Herb	Poaceae	x	x	x
<i>Stachys albens</i>	whitestem hedgenettle	Herb	Lamiaceae	x	–	–
<i>Stanleya elata</i>	Panamint princesplume	Herb	Brassicaceae	x	–	–
<i>Stanleya pinnata</i>	desert princesplume	Herb	Brassicaceae	x	x	x
<i>Stenotus acaulis</i>	stemless mock goldenweed	Herb	Asteraceae	x	–	–
<i>Stephanomeria</i>	wirelettuce	Herb	Asteraceae	x	–	x
<i>Stephanomeria exigua</i>	small wirelettuce	Herb	Asteraceae	x	x	x
<i>Stephanomeria minor</i>	lesser wirelettuce	Herb	Asteraceae	–	x	–
<i>Stephanomeria parryi</i>	Parry's wirelettuce	Herb	Asteraceae	x	x	x
<i>Stephanomeria pauciflora</i>	brownplume wirelettuce	Shrub	Asteraceae	x	x	x
<i>Stillingia linearifolia</i>	queen's-root	Herb	Euphorbiaceae	–	x	x
<i>Stillingia spinulosa</i>	annual toothleaf	Herb	Euphorbiaceae	–	–	x
<i>Streptanthella longirostris</i>	longbeak streptanthella	Herb	Brassicaceae	x	x	x
<i>Streptanthus cordatus</i>	heartleaf twistflower	Herb	Brassicaceae	x	–	x
<i>Stylocline</i>	neststraw	Herb	Asteraceae	x	x	x
<i>Suaeda moquinii</i>	Mojave seablite	Shrub	Chenopodiaceae	x	x	x
<i>Swallenia alexandrae</i>	Eureka dunegrass	Herb	Poaceae	x	–	–
<i>Symphoricarpos</i>	snowberry	Shrub	Caprifoliaceae	x	–	x

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Syntrichopappus fremontii</i>	yellowray Fremont's-gold	Herb	Asteraceae	x	–	x
<i>Tamarix</i>	tamarisk	Tree	Tamaricaceae	–	x	–
<i>Tamarix aphylla</i>	Athel tamarisk	Tree	Tamaricaceae	x	x	–
<i>Tamarix ramosissima</i>	saltcedar	Shrub	Tamaricaceae	x	x	x
<i>Taraxacum officinale</i>	common dandelion	Herb	Asteraceae	x	–	x
<i>Tetracoccus hallii</i>	Hall's shrubby-spurge	Shrub	Euphorbiaceae	–	x	–
<i>Tetracoccus ilicifolius</i>	hollybush	Shrub	Euphorbiaceae	x	–	–
<i>Tetradymia</i>	horsebrush	Shrub	Asteraceae	x	–	x
<i>Tetradymia argyraea</i>	striped cottonthorn	Shrub	Asteraceae	–	–	x
<i>Tetradymia axillaris</i>	longspine horsebrush	Shrub	Asteraceae	x	–	–
<i>Tetradymia canescens</i>	spineless horsebrush	Shrub	Asteraceae	x	–	x
<i>Tetradymia glabrata</i>	littleleaf horsebrush	Shrub	Asteraceae	x	–	–
<i>Tetradymia spinosa</i>	shortspine horsebrush	Shrub	Asteraceae	x	x	–
<i>Tetradymia stenolepis</i>	Mojave cottonthorn	Shrub	Asteraceae	x	x	x
<i>Thamnosma montana</i>	turpentinebroom	Shrub	Rutaceae	x	x	x
<i>Thelypodium integrifolium</i>	entireleaved thelypody	Herb	Brassicaceae	x	x	x
<i>Thymophylla pentachaeta</i> var. <i>belenidium</i>	fiveneedle pricklyleaf	Herb	Asteraceae	–	x	x
<i>Thysanocarpus curvipes</i>	sand fringepod	Herb	Brassicaceae	x	x	x
<i>Thysanocarpus laciniatus</i>	mountain fringepod	Herb	Brassicaceae	–	–	x
<i>Tidestromia</i>	honeysweet	Shrub	Amaranthaceae	x	x	x
<i>Tiquilia canescens</i>	woody crinklemat	Shrub	Boraginaceae	–	x	x
<i>Tiquilia latior</i>	matted crinklemat	Shrub	Boraginaceae	–	x	–
<i>Tiquilia nuttallii</i>	Nuttall's crinklemat	Herb	Boraginaceae	x	–	–
<i>Tiquilia plicata</i>	fanleaf crinklemat	Herb	Boraginaceae	x	x	x
<i>Tragia ramosa</i>	branched noseburn	Herb	Euphorbiaceae	–	–	x
<i>Tricardia watsonii</i>	threehearts	Herb	Hydrophyllaceae	x	x	–
<i>Trichoptilium incisum</i>	yellowdome	Herb	Asteraceae	–	x	x
<i>Tridens muticus</i>	slim tridens	Herb	Poaceae	x	x	x
<i>Triglochin</i>	arrowgrass	Herb	Juncaginaceae	x	–	–
<i>Tsuga mertensiana</i>	mountain hemlock	Tree	Pinaceae	x	–	–
<i>Typha</i>	cattail	Herb	Typhaceae	x	x	x
<i>Urtica dioica</i>	stinging nettle	Herb	Urticaceae	x	–	–
<i>Veronica americana</i>	American speedwell	Herb	Scrophulariaceae	x	–	–
<i>Veronica anagallis-aquatica</i>	water speedwell	Herb	Scrophulariaceae	x	–	x
<i>Viguiera parishii</i>	Parish's goldeneye	Shrub	Asteraceae	x	x	x
<i>Viguiera reticulata</i>	netvein goldeneye	Shrub	Asteraceae	x	–	–
<i>Vitis</i>	grape	Shrub	Vitaceae	x	–	–

Scientific Name	Common Name	Life Form	Family	DEVA	LAKE	MOJA
<i>Vitis arizonica</i>	canyon grape	Shrub	Vitaceae	–	x	–
<i>Vitis girdiana</i>	desert wild grape	Shrub	Vitaceae	x	x	–
<i>Vulpia</i>	fescue	Herb	Poaceae	x	x	x
<i>Washingtonia filifera</i>	California fan palm	Tree	Arecaceae	x	x	x
<i>Woodsia</i>	cliff fern	Herb	Dryopteridaceae	–	–	x
<i>Xanthium strumarium</i>	rough cocklebur	Herb	Asteraceae	x	x	–
<i>Xylorhiza cognata</i>	Mecca woodyaster	Shrub	Asteraceae	x	–	–
<i>Xylorhiza tortifolia</i>	Mojave woodyaster	Herb	Asteraceae	x	x	x
<i>Yabea microcarpa</i>	false carrot	Herb	Apiaceae	–	–	x
<i>Yucca baccata</i>	banana yucca	Shrub	Agavaceae	–	x	x
<i>Yucca brevifolia</i>	Joshua tree	Tree	Agavaceae	x	x	x
<i>Yucca elata</i>	soaptree yucca	Tree	Agavaceae	–	x	–
<i>Yucca schidigera</i>	Mojave yucca	Shrub	Agavaceae	–	x	x
<i>Zigadenus brevibracteatus</i>	desert deathcamas	Herb	Liliaceae	–	–	x
<i>Ziziphus obtusifolia</i>	lotebush	Shrub	Rhamnaceae	–	x	–

Appendix F. Select photographs of rare vegetation at DEVA, LAKE, MOJA, and CAMO

Figures F1–F8 are photographs of rare vegetation at Death Valley National Park, Lake Mead National Recreation Area, Mojave National Preserve, and Castle Mountains National Monument.



Figure F1. *Pluchea sericea* Wet Shrubland Alliance at DEVA in Badwater Basin (left) and *Juncus cooperi* Herbaceous Association at MOJA along Soda Lake (right).



Figure F2. *Salix gooddingii* - *Salix laevigata* Riparian Forest Alliance at DEVA at Darwin Falls (left) and *Prosopis glandulosa* - *Prosopis velutina* - *Prosopis pubescens* Riparian Alliance at DEVA in Grapevine Spring (right).



Figure 3. *Amphipappus fremontii* - *Salvia funerea* Shrubland Alliance at DEVA in Titus Canyon (left) and *Encelia actonii* - *Encelia virginensis* - *Viguiera reticulata* Shrubland Alliance at DEVA in Echo Canyon (right).



Figure 4. *Hecastocleis shockleyi* Shrubland Association at DEVA in Titus Canyon (left) and *Eriogonum wrightii* spp. *wrightii* Shrubland Association at MOJA at 4th of July Canyon in the New York Mountains (right).



Figure 5. *Mortonia utahensis* Scrub Alliance at LAKE on Gold Butte in the Indian Hills (left) and *Purshia stansburiana* Scrub Alliance at DEVA in the Last Chance Range (right).



Figure 6. *Viguiera reticulata* Shrubland Association at DEVA in the Red Amphitheatre of the Funeral Mountains (left) and *Pleuraphis jamesii* Grassland Alliance at CAMO in the Pinto Valley of the Castle Mountains (right).



Figure 7. *Dicoria canescens* - *Abronia villosa* - *Panicum urvilleanum* Dune Alliance at DEVA in the Panamint Dunes (left) and *Swallenia alexandrae* Sparse Vegetation Association at DEVA on the Eureka Dunes (right).



Figure 8. *Panicum urvilleanum* Sparse Vegetation Association at MOJA on the Kelso Dunes (left) and *Pleuraphis rigida* Desert Grassland Alliance at MOJA on the dune apron of the Kelso Dunes (right).

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