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A VASCULAR FLORA OF THE KIAVAH WILDERNESS, SCODIE MOUNTAINS, KERN COUNTY, CALIFORNIA

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ABSTRACT

Congress designated the Kiavah Wilderness in 1994 under the California Desert Protection Act. It is located in the Scodie Mountains in Kern County, ca. 24 km (15 mi) east of Lake Isabella and 24 km (15 mi) west of Ridgecrest, and encompasses a total of 137 mi² (354 km²) with elevations ranging from 1000 to 2200 m (3500–7294 ft). The Wilderness is ecologically important because it occurs in a transition zone between two floristic provinces, the Sierra Nevada of the California Floristic Province and the Mojave Desert of the Desert Province. It is of cultural significance because it has a rich history of Native Americans harvesting pinyon pine nuts and inhabiting the land. Prior to the study ca. 290 vascular plant taxa had been documented, primarily along roads and the Pacific Crest Trail. Jim Shevock and Barbara Ertter made significant collections and contributions to the floristic inventory during the 1980s and early 1990s, and LeRoy Gross added valuable collections in 2005 and 2006. The purpose of the project was to inventory the vascular plant taxa throughout the Kiavah Wilderness, document special status plants, and assess invasive non-native plants. The project took place in 2013–2015, and 68 days were spent in the field. It coincided with three severe to exceptional drought years, the driest span for the site in recorded history. During the study large stands of *Pinus monophylla*, found in the Wilderness and much of the Southwest, experienced large die-offs. About 1300 plant specimens were collected for the study, which are deposited at RSA, CAS, and UCR. In total, 70 families, 240 genera, 457 species, and 477 minimum-rank taxa were documented, including those collected previously. A total of 28 non-native taxa (5.9% of the flora) and 26 special status plants (5.4%) were documented. Three special status taxa previously documented in the Wilderness were not relocated: *Lewisia disepala* (Montiaceae), *Cordylanthus rigidus* subsp. *brevibracteatus* (Orobanchaceae), and *Delphinium purpusii* (Ranunculaceae). A range extension for *Eriophyllum mohavense* (Asteraceae) was documented.

Key words: California, drought, flora, Kiavah Wilderness, Mojave Desert, Pacific Crest Trail, Scodie Mountains, southern Sierra Nevada, vascular plants.

INTRODUCTION

Herbarium collections provide invaluable data for researchers studying ecology, biogeography, evolution, systematics and climate change to better understand the patterns of biodiversity and the processes that shape these patterns (Prather et al. 2004). Locating, identifying and mapping plant populations are essential first steps towards understanding the flora of a particular area. After a site is thoroughly explored and documented, newly gathered information can be added to preexisting knowledge to gain a greater understanding of plant diversity at different scales, including regional and continental. Floristic studies are particularly important for understanding the relationship between plants and climate, especially in context of climate change. This report is the result of a floristic study conducted over three years that coincided with a severe drought. It is projected that California will continue to experience periods of extended drought throughout the rest of the century (Williams et al. 2015). Knowing this, continued study and monitoring of the California flora are vital to predict where native and invasive plant species will

persist, increase or decline, and how these plants may be managed.

The Kiavah Wilderness is located ca. 24 km (15 mi) east of Lake Isabella and 24 km (15 mi) west of Ridgecrest in Kern County, California (Fig. 1). Its ecological importance derives from its occurrence in a transition zone between two floristic provinces, the Sierra Nevada of the California Floristic Province (higher elevations) and the Mojave Desert of the Desert Province (lower elevations) (Baldwin et al. 2002). The Wilderness covers most of the Scodie Mountains, which is a component range of the southern Sierra Nevada. A small portion of the northern end of the Scodie Mountains lies outside the Wilderness boundary. The Kiavah Wilderness encompasses a total of 354 km² (137 mi²), of which 160 km² (62 mi²) are managed by the U.S. Department of the Interior, Bureau of Land Management (BLM) and 194 km² (75 mi²) are managed by the U.S. Department of Agriculture (USDA), Sequoia National Forest (SNF), and Kern River Ranger District (BLM 2017).

Southwest of the Scodie Mountains, separated by Kelso Valley, are the Piute Mountains, another range of the Sierra Nevada (Fig. 1). The South Fork of the Kern River, Chimney Creek and Canebrake Creek border the Scodies on the north. To the northeast is the Owens Peak Wilderness, separated from the Scodie Mountains by Walker Pass and Highway 178. A popular off-highway vehicle (OHV) recreational area located on the Jawbone-Butterbrecht Area of Critical Environmental Concern flanks the southern and southeastern boundary of the

Fig. 1. The Kiavah Wilderness in the Scodie Mountains, Kern County, California. Maps created in ArcGIS, vers. 10.4 (ESRI, Redlands, CA).

Kiavah Wilderness in the Indian Wells-Searles Valley of the Mojave Desert. Private property parcels abut sections along the north, east and west borders of the Wilderness. The Canebrake Ecological Reserve, managed by the California Department of Fish and Wildlife, is located in Scodie and Cap canyons (CDFW 2016). The Canebrake Ecological Reserve is closed to the public and a permit must be obtained to enter the reserve.

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Fig. 2. Topography, major canyons, notable springs and place names in the Kiavah Wilderness (source imagery: GoogleEarth 2016).

Access into the Kiavah Wilderness is via two main routes, Horse Canyon Road/McIver's 4 × 4 road (36E52) and the Pacific Crest Trail (PCT) (Adkinson 2001; PCTA 2014; Fig. 1, 2). Horse Canyon Road is a rugged and difficult 4 × 4 road that winds its way into the Wilderness and terminates at McIver's Cabin at 2040 m elevation (6696 ft). A large section of this road (ca. 13 km, 8 mi) is part of the PCT that was constructed during the 1980s and transects the Wilderness for 16 mi (25.7 km), from Bird Spring Pass (1637 m, 5371 ft elevation) to Walker Pass Campground (1542 m, 5060 ft). There is an unmaintained trail on the southwest side of the Wilderness from Cane Canyon (1220 m, 4000 ft elevation) to Yellow Jacket Spring (1790 m, 5873 ft). Maintained dirt roads terminate in Sage Canyon and Cow Haven Canyon; from these, one can hike into the Wilderness. Beyond the PCT, no maintained trails exist but cattle and deer trails are abundant.

PHYSICAL SETTING

Topography

The Kiavah Wilderness encompasses portions of six USGS 7.5' topographic quadrangle maps: Cane Canyon, Freeman Junction, Horse Canyon, Onyx, Owens Peak, and Walker Pass. Three valleys and two passes (Fig. 2) surround the Scodie Mountains. Scodie Mountain is the highest point at 2223 m (7294 ft). The next highest peaks in the Wilderness are Skinner Peak

at 2170 m (7120 ft), followed by Pinyon and Onyx peaks at 2074 m (6805 ft) and 1598 m (5244 ft), respectively. The higher elevations are part of the crest of the Sierra Nevada and are steep-sided, rugged ridges that trend in an east-west direction. Located in the southeastern section of the Wilderness is a large unnamed plateau that has gentle rolling topography. Baker (1912) described the plateau as "broad-topped summit mountains." Lower elevations (900–1300 m, 3000–4500 ft) are characterized by gentler slopes that extend into valleys as long narrow shoulders that gradually decrease in elevation (Baker 1912).

Major canyons include Bird Spring, Horse, Sage, Boulder and Cow Haven canyons, all of which drain into Indian Wells-Searles Valley (Fig. 2). This watershed provides drinking water to residents of Inyokern and Ridgecrest (EPA 2016). Major canyons draining into the South Fork Kern River are Short, Cane, Cholla, Scodie, Smith, Cap and Spring canyons.

Geology

The history of the Sierra Nevada can be traced back to ca. 542 million years ago (mya) during the Cambrian Period of the Paleozoic Era. At that time, what is now the Sierra Nevada was the floor of an ancient sea where sediments from exposed mountains to the east settled (Hill 2006). At the time of the Triassic Period of the Mesozoic Era, ca. 250–210 mya, magma rose to

Fig. 3. Geologic map of the Kiavah Wilderness and surrounding area (adapted from CDC 2010).

the surface and cooled to form the Sierran granite core (Hill 2006). Around the Cretaceous Period, 144–66 mya, the Sierra Nevada began to lift and tilt westward and most of the Sierran plutons were formed to create the foundation of the Sierra Nevada batholith (Hill 2006; Hall 2007). Near the beginning of the Cenozoic Era, 65 mya, the Sierra Nevada began to take shape owing to plate tectonics (Hall 2007). During the Pliocene Epoch, 6–8 mya, the Garlock fault along the southern Sierra Nevada continued to move westward, thus allowing for crestral uplift of the southern Sierra Nevada (Hall 2007). By ca. 2 mya, during the Pleistocene Epoch, the Sierra Nevada reached its present height and extent.

Geologic surveys and maps identify the main rock type of the Scodie Mountains as plutonic, Mesozoic in age and characterized by granite, quartz monzonite, granodiorite and quartz diorite (Fig. 3; CDC 2010). Alluvial deposits are described as light brown in color from the feldspar of the Sierra granite (Baker 1912). Alluvial deposits can be found in the older alluvial, lake, playa and terrace deposits on the lower desert floor in Horse, Sage, and Cow Haven canyons; these are generalized as non-marine (continental) sediments, and Pleistocene in age (CDC 2010).

Climate

The southern Sierra Nevada experiences a wide range of temperatures, minimal precipitation, and strong winds. Temperature and precipitation are strongly influenced by elevation. According to the Köppen climate classification system, the Kiavah Wilderness experiences a Mediterranean and arid mid-latitude desert climate (Kauffman 2013). Summers are hot and dry, winters are brief and relatively warm, and precipitation is in the form of rain and snow (Twisselmann 1967). In the southern Sierra Nevada, snow typically falls from November through March. At elevations above 2000 m (6561 ft), snow can persist on the ground for several months. The average annual precipitation in the Kiavah Wilderness is about 35 cm (14 in.), although drought conditions have been known to last up to six years in this area (BLM 2017). During the study, from 2013 to 2015, there was no substantial snowfall nor snowpack in the Wilderness.

Weather data were taken from private weather stations located at Bird Spring Pass (MBIJC1, 1500 m [5000 ft]; RAWS 2013) and Walker Pass (MONYC1, 1600 m [5200 ft]; NOAA 2014). Table 1 shows that average annual temperatures and precipitation in the Kiavah Wilderness for years 2013–2015 (duration

Table 1. Weather data for stations proximate to the Kiavah Wilderness, 2013–2015 (RAWS 2013; NOAA 2014).

	2013	2014	2015	Average (2013–2015)
<u>Walker Pass (MONYC1)</u>				
Average Temperature °C (F)	14 (57)	15 (59)	14 (57)	14 (57)
Maximum Temp °C (F)	40 (104)	39 (103)	38 (101)	39 (102)
Minimum Temp °C (F)	−10 (14)	−6 (20)	−7 (19)	−8 (18)
Total Precipitation cm (in.)	12.9 (5.11)	20.4 (7.89)	7.95 (3.13)	13.7 (5.37)
<u>Bird Spring Pass (MBIJC1)</u>				
Average Temperature °C (F)	11 (53)	13 (56)	12 (54)	12 (54)
Maximum Temp °C (F)	35 (96)	36 (97)	33 (92)	34 (95)
Minimum Temp °C (F)	−11 (11)	−8 (18)	−8 (18)	−8 (15)
Total Precipitation cm (in.)	6.78 (2.67)	10.9 (4.30)	7.49 (2.95)	8.39 (3.30)
<u>Weather stations combined</u>				
Average Temperature °C (F)				13 (55)
Maximum Temp °C (F)				36 (98)
Minimum Temp °C (F)				7 (16)
Total Precipitation cm (in.)				11.0 (4.33)

of the study) was a scant 11.0 cm (4.33 in.), although higher and lower elevations likely received greater and lesser amounts, respectively. Long-term precipitation data, taken from the Inyokern weather station for 1940–2012, indicate that average annual rainfall was 10.59 cm (4.17 in.) (Fig. 4). However, this station is at only 760 m (2500 ft) elevation and lies deeper in the rain shadow of the Sierra Nevada.

From 2012 to 2015, California experienced severe to exceptional drought conditions (USDM 2016). Although periodic droughts are not uncommon in California, the 2012–2014

drought is considered a 10,000-year event in the state and the 2012–2015 drought has an incalculable return period (Roberson 2015).

HUMAN HISTORY AND IMPACTS

The native people of the Kiavah Wilderness were the Tübatulabal and Kawaiisu tribes (Kroeber 1925). Others believed to have visited the Scodie Mountain region include tribes from the east (e.g., the Owens Valley Paiute, Panamint Shoshone,

Fig. 4. Long-term average monthly precipitation at Inyokern, 1940–2012.

Table 2. Collectors of plants from the Kiavah Wilderness prior to the present study. Collector, number of specimens, year(s) active, and location are presented in chronological order.

Year(s)	Collector	Number of collections	Location(s)
1911	Museum of Vertebrate Zoology	1	Scodie Canyon
1911	Unknown	1	Scodie Canyon
1927	C. S. Robinson	3	Sage Canyon, plateau
1930	J. Farley	2	Scodie Mt
1941	Bell	1	Scodie Canyon
1963, 1966–1968	E. C. Twisselmann	61	Horse Canyon, Scodie Canyon, summit of Scodie Peak, Cholla Canyon
1964	J. Gillett	1	West of Walker Pass
1978	B. Orr	1	West of Walker Pass
1979–1982, 1984, 1986, 1987, 1992	J. R. Shevock	142	Pacific Crest Trail, McIver's Spring, Horse Canyon, microwave tower, Bird Spring Pass, along Kelso Creek Road, Canebrake Creek bridge, Skinner Peak, base of Pinyon Peak, ridge toward Pinyon Peak, Cap Canyon
1980	S. Lawson	14	Pacific Crest Trail, Horse Canyon, Sage Canyon
1980	L. Nagata	9	Pacific Crest Trail, Horse Canyon Road, Bird Spring Pass, Sage Canyon
1980	B. Schwartzman	7	NW of Pinyon Peak, Cane Canyon, Sage Canyon, Scodie Peak
1980	J. Hiebert	6	NW of Pinyon Peak, Cane Canyon, Sage Canyon, Horse Canyon
1980	C. Franz	4	Cane Canyon
1980	J. Janzen	3	Horse Canyon, Sage Canyon
1980	C. Bauernfeind	2	Pacific Crest Trail, Short Canyon
1980	Unknown	2	Short Canyon
1980	Anonymous	1	Bird Spring Pass on Pacific Crest Trail
1980	USDA	1	Pacific Crest Trail
1986–1988	B. Ertter	54	Canyon on the N side of Pinyon Peak, Pacific Crest Trail
1986	M. A. Henry	1	Sage Canyon
1989	J. Emmel	1	N end Scodie Mts
1995, 1996	M. Geber	2	N-facing slopes of Scodie Mountains
1996, 1999	D. York	24	Pacific Crest Trail, slopes of Pinyon Peak
2002	E. Laeger	1	N ridge of Pinyon Peak
2004	L. P. Janeway	11	Pinyon Creek
2005, 2006	L. Gross	88	Head of Horse Canyon, Yellow Jacket Spring, N of Skinner Peak, near radio tower, Pacific Crest Trail
2010	A. Howald	3	N end of Scodie Mts, Hwy 178
2011	N. Fraga	19	Base of Pinyon Peak

Chemehuevi; BLM 2017). However, human history in the southern Sierra Nevada can be traced back to ca. 4000 BCE [Before Common Era] during the Lamont Phase (Moratto et al. 1984). Around this time, pinyon-juniper woodlands expanded downslope in response to changing climatic conditions towards a Mediterranean climate, making the area attractive owing to the potential for increased harvesting of pinyon pine nuts (Moratto et al. 1984). From 1200 BCE to 600 CE, during the Canebrake Phase, Native Americans began to settle in pinyon-juniper woodland base camps (Moratto et al. 1984). The Sawtooth Phase (600–1300 CE) is characterized by the presence of obsidian, 'manos' and milling stones, bedrock mortars and many other artifacts. The final recorded phase for the history of Native Americans in the Sierra Nevada, the Chim-

ney Phase from 1300 to 1875 CE, saw unchanged settlement patterns and increases in artifact accumulation (Moratto et al. 1984). The Kiavah Wilderness was named after a Paiute chief from Panamint Canyon who took up residence in Sage Canyon (Gudde 1969).

During the late 1700s, Spanish explorers were sent to North America on religious expeditions. In 1776, Father Francisco Garcés was the first European to encounter Native Americans of the lower Kern River Valley (Heard 1987). After this encounter, for the next 50 years, trade between the Native Americans of the southern Sierra Nevada and Europeans ensued (Kern River Valley Specific Plan 2011). In 1834, Tübatulabal Indians led Joseph Walker and his trappers, the first white men to traverse the southern Sierra Nevada, through what is known today as

Walker Pass (Gilbert 1985). In 1844, John C. Frémont proposed that the pass be named after Walker (Gudde 1969).

During the mid-1800s, after the discovery of gold and other natural resources, Europeans and Americans from the east made their way to California. Early settlers of the South Fork Kern River Valley, near Canebrake Creek and Kelso Valley, irrigated the land to farm alfalfa (Morgan 1914). Around the early 1860s, William Scodie, a Prussian immigrant, founded a general store at the mouth of Scodie Canyon (Geographic Names Information System [GNIS] 2016; Beman 2001). Today the store is known as the Onyx Store. Scodie sold goods to the U.S. Cavalry stationed in California during the Civil War (Beman 2001). During this time, conflict between Natives and settlers began to escalate. Settlers in search of gold were taking over land that the Tübatulabal and Kawaiisu tribes inhabited. In 1863, American soldiers attacked the Tübatulabal tribe in retaliation for an attack by Tübatulabal and Paiute tribes on settlers in the Owens Valley the previous year (Heard 1987). Upon their defeat, the survivors of the Tübatulabal tribe relocated to the Tule River Indian Reservation (Tulare County) during the early 1900s.

On 1 July 1908, Sequoia National Forest was established and large areas of the southern Sierra Nevada, including the Scodie Mountains, went under SNF management (Davis 1983). In 1910, the SNF was transferred to the Kern National Forest, from which it returned to SNF in 1915 (Davis 1983). The Forest Service portion of the Wilderness has been managed by SNF since that time. As for the BLM portion, the eastern sections are managed by the Bakersfield Field Office and the southern sections are managed by the Ridgecrest Resource Area (California Desert District) (BLM 2017).

During the 1900s mining operations and cattle grazing continued in the southern Sierra Nevada, including the Scodie Mountains. In the late 1930s, upon completion of the Los Angeles Aqueduct across the Mojave Desert, Murdo George McIver moved a small cabin that had been used as a guard shack during the construction of the Los Angeles Aqueduct from the desert floor to the plateau in the Scodie Mountains (Geargrinders 2014). McIver and his wife had a small mining operation and strategically placed the cabin next to a spring, now called McIver's Spring. This is the only historical structure in the Wilderness and is a popular destination for OHV activity and PCT hikers. Descendants of the McIver's, their grandchildren and great-grandchildren, visit annually and maintain the cabin.

In the early 1940s, miners prospected for tungsten near Pinyon Peak (Valentine claims), but there is no record of production (Peterson and Capstick 1984). In the late 1950s miners prospected for quartz near Skinner Peak (Great White Way prospect), but likewise there is no record of production (Peterson and Capstick 1984). In the BLM portion of the Wilderness, many old mine tailings are visible on the slopes of the desert bajadas (Gardner, pers. obs.). Prospectors from the 1940s to 1960s carved their names and dates on boulders near old mining claims. In 1983, the USGS surveyed the Scodie Mountains and determined that mineral deposits within the area are small and lack resource potential (Harner et al. 1983). Under the California Desert Protection Act of 1994 all designated Wilderness areas were withdrawn from further mining operations, with existing claims active until the leasing agreements expire (BLM 2017).

In 1994, Congress designated a large portion of the Scodie Mountains as the Kiavah Wilderness under the California Desert Protection Act. There is only one modern structure in the Wilderness, a microwave tower along Horse Canyon Road, that is owned and operated by the Naval Air Weapons Station, China Lake. The PCT, well-traveled by hikers in the springtime, is the only maintained trail in the Wilderness. Horse Canyon Road and the PCT merge near the Microwave tower in the southwest section of the plateau and the road terminates at McIver's Spring/Cabin (USDA 2014; Fig. 2). Several other dirt roads provide minimal access to the Wilderness but are popular weekend destinations for OHV users and campers. Off-highway vehicle use is one of the greatest threats to the Wilderness. BLM and SNF signs are posted along the Wilderness boundaries to deter OHV users, but OHV trespassing was observed on many occasions during this study. In 2012, to further deter illegal OHV use, the Student Conservation Association began constructing barriers (fences and posts) along the southern BLM boundary. Cattle grazing continues on both BLM and SNF land, even after its designation as a Wilderness. Grazing allotments are located throughout the Wilderness (BLM 2017).

The Kiavah Wilderness is also a destination for target shooting and hunting. According to the Forest Service, visitors do not heavily impact the Wilderness because it does not have any outstanding features to draw many visitors or large crowds. The most harmful human activity, besides OHV use and human-mediated climate change, may be illegal marijuana farming. A remote marijuana farm was discovered by federal authorities in 2014 within the Wilderness. Damage done by these farmers included removal of the native understory vegetation, diversion of water from a nearby unmarked spring, and use of rodenticides. On 11 July 2014, the illegal farmers started a forest fire to destroy evidence of the farming operation, the Nicolls Fire, which burned ca. 1600 acres over 11 days (Incident Information System 2016). The fire cost the state of California an estimated \$5.6 million to extinguish (Associated Press 2015).

BOTANICAL HISTORY

There has been no previous focused effort to inventory the plants of the Kiavah Wilderness and Scodie Mountains. Inventories of nearby areas include that of Owens Peak eastern watershed (Fraga 2008) and Red Rock Canyon and the El Paso Range (Twisselmann 1970). The earliest known plant specimen from the Wilderness was collected in 1911 by members of the Museum of Vertebrate Zoology club at the University of California, Berkeley. Fewer than 10 specimens had been collected from the Scodie Mountains before the 1960s when Ernest Twisselmann made 61 collections. Upon completion of the PCT, Jim Shevock collected 142 specimens between 1979 and 1992. Others with significant numbers of collections are from LeRoy Gross (88) and Barbara Ertter (54). Table 2 is a list of all individuals and groups who made collections prior to my study.

According to records in the Consortium of California Herbaria (CCH) database (2013), ca. 630 specimens were collected from 1911 to 2011 (Fig. 5–6) documenting ca. 290 native and non-native vascular taxa in the Kiavah Wilderness prior to the study. Most of these specimens were collected in easily accessed areas, along roads and trails such as Horse Canyon Road, Highway 178, Kelso Valley Road, and the PCT.

Fig. 5–6. Maps of the total number of the collections from the Kiavah Wilderness (ArcGIS, vers. 10.4, ESRI, Redlands).—5. Total collections prior to the study.—6. Total collections at the conclusion of the study.

STUDY GOALS AND METHODS

The primary goal of the study was to document the vascular flora of the Kiavah Wilderness by surveying as much territory and as many habitats throughout the growing season as possible. This increases our botanical knowledge of the southern Sierra Nevada, adding to Fraga's (2008) study of the Owens Peak eastern watershed. Field surveys took place between March 2013 and May 2015, for a total of 68 days. All plant species that were encountered and identifiable (i.e., with reproductive parts) were documented via collection of ca. 1300 specimens. Special status taxa (endangered, threatened, sensitive, or watch-list; Table 5) were collected conservatively, taking into account population size and any previous documentation. Standard collection data were recorded, including GPS coordinates and descriptive habitat information. All recorded information was included on the herbarium specimen label. The first set of specimens was deposited at Rancho Santa Ana Botanic Garden (RSA) and duplicate sets were sent to the California Academy of Sciences (CAS) and the University of California, Riverside (UCR). All specimen information is accessible via the CCH database.

The ca. 630 specimens previously collected from the study area were located using the CCH database. These specimens, housed at CAS, UC/JEPS, RSA-POM and UCR, were examined to verify the determinations and update the nomenclature as needed; all were annotated.

Specimens were identified using *The Jepson Manual*, *Vascular Plants of California*, second edition (Baldwin et al. 2012); *A Flora of Kern County, California* (Twisselmann 1967) and *Cryptantha of Southern California* (Simpson and Hasenstab 2009). The taxonomy of *Eriastrum* (Polemoniaceae) is based on De Groot's treatment (2016). *Erythranthe* (Phrymaceae) is based on Naomi Fraga's revision (Fraga 2012). All specimens of *Gilia* (Polemoniaceae) were determined by Mark Porter. Identifications were verified through comparison with annotated specimens at RSA.

VEGETATION

Environmental variables such as climate, elevation, slope, and aspect all affect the distributions of plants and plant associations. The vegetation classification in this study is mainly based on *A Manual of California Vegetation*, second edition (Sawyer et al. 2009), and *A California Flora* (Munz 1959). Vegetation associations found in the Kiavah Wilderness are singleleaf pinyon woodland, Jeffrey pine forest, cup leaf ceanothus chaparral, ghost pine woodland, sagebrush scrub (Munz 1959), desert needlegrass grassland, Joshua tree woodland, and creosote bush scrub. The elevation range of each vegetation type is shown in Fig. 7. For the purpose of this study the vegetation associations are split into two sections, Sierra Nevada and Mojave

Fig. 7. Elevational ranges of the eight major vegetation types in the Kiavah Wilderness.

Desert, although the associations are not confined to one or the other (see overlap in Fig. 7).

Sierra Nevada Section

Single-Leaf Pinyon Woodland (Fig. 8).—The most common vegetation type in the Kiavah Wilderness is singleleaf pinyon woodland. It ranges in elevation from 1300 to 2200 m (4300–7200 ft) and occupies ridges, drainages, alluvial fans, level ground to steep slopes, and all aspects. It usually occurs on soils that are well drained. *Pinus monophylla* (singleleaf pinyon pine) is the dominant or co-dominant tree and the most common tree in the study area overall. The canopy is open or intermittent. Other trees that occur in this woodland include scattered *P. jeffreyi* (Jeffrey pine) and *Quercus chrysolepis* (canyon live-oak). Shrub species include *Artemisia tridentata* (big sagebrush) and *Ephedra viridis* (Mormon tea). The herbaceous layer consists of *Claytonia* spp. (miner's lettuce), *Microsteris gracilis* (slender phlox), *Phacelia humilis* var. *dudleyi* (Dudley's phacelia) and *Stipa* spp. (needle grass), among others.

The four consecutive years of exceptional drought led to widespread pine mortality, especially of *Pinus monophylla*, which was most severe from Mt. Pinos in the Emigdio Mountains through the Tehachapi Range into the southern Sierra Nevada (USDA 2015). I observed *P. monophylla* die-off in the Scodie Mountains over the course of the study. Figures 12–13 show two images of a slope in Horse Canyon taken exactly one year apart. Some individuals of *P. monophylla* appear brown and dead or dying in 2014, whereas their number had increased substantially one year later. This locality lies at the transition zone between the Desert Province and the Sierra Nevada of the California Floristic Province. At higher elevations, mortality appeared to be lower.

Cup leaf ceanothus chaparral (Fig. 9).—*Ceanothus vestitus* (cup leaf ceanothus) is dominant to co-dominant with *Freemontodendron californicum* (flannel bush). This is the second

most extensive vegetation type at higher elevations (1800–2000 m, 6000–6700 ft). Cup leaf ceanothus chaparral carpets the plateau atop the Kiavah Wilderness. *Ceanothus vestitus* produces seedlings in abundance following fire (Sawyer et al. 2009). As discussed below, the plateau is undergoing post-fire succession following a fire in 1997. Understory vegetation is sparse.

Jeffrey pine forest (Fig. 10).—Dense pockets of *Pinus jeffreyi* are found in the Kiavah Wilderness at the highest elevations (1889–2000 m, 6200–6600 ft) on the plateau, ridges, along dry stream benches, and slopes of all aspects. Trees are relatively large, many over 40 ft tall, and the canopy is often continuous. These trees have withstood the assault of wildfires. Scorched trunks of some dead individuals remain upright (Fig. 10), but many more lie scattered on the plateau. Additional evidence that the plateau was once a woodland or forest is the presence of *P. jeffreyi* seedlings and re-sprouting *Quercus chrysolepis*. The understory of Jeffrey pine forest is sparse; however, grasses can be prominent, including *Bromus* spp. (brome grass), *Poa secunda* (pine bluegrass) and *Stipa* spp.

Ghost pine woodland.—*Pinus sabiniana* (ghost pine, gray pine) stands occur on xeric sites at lower elevations (900–1500 m, 3000–5000 ft) in the Sierra Nevada (Sawyer et al. 2009). In the Kiavah Wilderness, prominent stands occur at the upper end of Sage Canyon and along the northwestern and northern boundaries of the Wilderness, but the vegetation type is less widespread than Jeffrey pine forest and single-leaf pinyon woodland. Associated trees include the desert species *P. monophylla* and *Yucca brevifolia* (Joshua tree). Understory vegetation is sparse and includes *Ephedra viridis*, *Eriogonum nudum* var. *westonii* (Weston's buckwheat) and *Opuntia basilaris* (beavertail cactus).

Sagebrush scrub.—This vegetation type is generally found in flatter, sandy areas at higher elevations atop the plateau (1900 m, 6300 ft) and at lower elevations in flat drainages such as Jack's Creek (1400 m, 4800 ft) near Walker Pass. *Artemisia tridentata* (big sagebrush) is often co-dominant with *Ephedra*

Fig. 8–11. Vegetation types in the Kiavah Wilderness.—8. Singleleaf pinyon pine woodland is the most common vegetation type.—9. Dense cup leaf ceanothus chaparral dominates the post-burn vegetation on the plateau. A fire-killed *Pinus jeffreyi* stand at left. —10. Jeffrey pine forest. A small stand of unburned *Pinus jeffreyi* on the plateau. —11. Joshua tree woodland forms dense stands at the lower desert elevations.

Fig. 12–13. Drought-stressed pinyon pine (*Pinus monophylla*): slope in Horse Canyon facing west (35.577000°, –118.114992°; 1600 m [5300 ft]). —12. Photo taken 16 Apr 2014: note the browning (dead or dying) trees.—13. Photo taken exactly one year later, 16 Apr 2015: most of the trees in the stand are dead or dying. These trees experienced extreme drought during 2012–2015. Pinyon pines throughout the Kiavah Wilderness showed signs of drought stress.

viridis and *Eriogonum fasciculatum* var. *polifolium* (California buckwheat). Herbaceous vegetation is sparse to lacking.

Mojave Desert Section

Desert needlegrass grassland.—Generally found on steep, exposed, south-facing slopes at elevations ranging from 1400 to 1600 m (4800–5200 ft), desert needlegrass grassland occurs throughout the Kiavah Wilderness. The dominant cover is *Stipa speciosa* (desert needlegrass), with some shrubs intermixed including *Artemisia tridentata*, *Ericameria linearifolia* (narrowleaf goldenbush), *Grayia spinosa* (hop sage) and *Krascheninnikovia lanata* (winter fat). Various annual *Eriogonum* (buckwheat) species can form dense patches within the grassland.

Joshua tree woodland (Fig. 11).—At lower elevations (1100–1600 m, 3700–5200 ft) on slopes and the desert floor, dense stands of *Yucca brevifolia* dominate. Species that often co-occur and can co-dominate are *Artemisia tridentata*, *Ephedra viridis* and *Eriogonum fasciculatum* var. *polifolium*. The herbaceous understory includes grasses such as *Bromus tectorum* (cheat grass), an invasive non-native, and a native, *Poa secunda*. Annual herbs include *Camissonia kernensis* subsp. *kernensis* (Kern County evening primrose) and *Phacelia fremontii* (Fremont's phacelia). Despite the drought, spring 2013 was a record bloom year for *Y. brevifolia* (James 2013) and almost all mature individuals were in full bloom (Fig. 11).

Creosote bush scrub.—In the Mojave Desert-influenced areas at lower elevations (1000–1300 m, 3500–4500 ft), *Larrea tridentata* (creosote bush) is the dominant to co-dominant shrub. The soil is typical of a desert bajada, sandy and loose. Co-dominant shrubs include *Ambrosia dumosa* (burro weed), *A. salsola* (burrobush), *Encelia actoni* (Acton encelia) and *Lycium andersonii* (Anderson thornbush). The many desert annuals include *Camissonia campestris* subsp. *campestris* (Mojave suncup), *Festuca octoflora* (sixweeks grass), *Lasthenia gracilis* (needle gold-

fields), *Linanthus dichotomus* (evening snow), *Linanthus parryae* (sand blossoms) and *Phacelia distans* (common phacelia).

HABITAT TYPES

Intermittent Streams (Fig. 14)

Most of the watercourses in the study area are seasonally wet, usually in the winter months. Small stands of *Quercus chrysolepis*, *Salix lasiolepis* (arroyo willow), *Populus fremontii* (Fremont's cottonwood) and *Pinus sabiniana* (gray pine) are infrequent along these seasonally wet streams. Diversity here is much greater than on adjacent exposed arid slopes.

Springs (Fig. 15)

Usually occurring in depressions on the plateau, springs are formed where water from below ground rises to the surface. Springs marked on topographic maps include Boulder Spring, McIver's Spring, Scodie Spring and Yellow Jacket Spring (Fig. 2). During the study, many of the springs were completely dry due to drought conditions. The graminoids *Carex* spp. (sedges), *Juncus* spp. (rushes), and grasses dominate these habitats. Non-native taxa are abundant at all these sites, especially invasive grasses such as *Festuca arundinacea* (tall fescue) and *Poa pratensis* subsp. *pratensis* (Kentucky bluegrass). Wildlife as well as cattle and PCT hikers frequently visit these springs; the latter especially heavily impact McIver's and Yellow Jacket springs.

Granite Rock Outcrops (Fig. 16)

Eroding granitic outcrops often harbor unique plant diversity compared to surrounding habitats. Shrubs common on granite outcrops include *Ericameria cuneata* (desert rock goldenbush), *Ivesia* spp. (mousetail), *Penstemon newberryi* (mountain pride), *Holodiscus microphyllus* (oceanspray), and *Eriogonum* spp. These plants grow in rock cracks and at the base of large boulders. Very large outcrops are often devoid of canopy cover and have little vegetation. Annuals can be found in abundance

Fig. 14–17. Habitat types in the Kiavah Wilderness.—14. Intermittent stream in upper, narrow Sage Canyon.—15. Spring with dense cover of graminoids.—16. Rock outcrops provide habitat for a number of species including annuals.—17. Site of the 1997 burn on the plateau.

around the base of outcrops in sandy decomposed granite. High rock walls provide protection, shade, and moisture for annuals.

POST-FIRE SUCCESSION

The earliest recorded fire in the Wilderness occurred in August 1997. Started by lightning, it burned ca. 5700 acres mostly on the plateau (Schiffrin et al. 2003). It consumed Jeffrey pine forest and single-leaf pinyon woodland. The only published observations of post-fire succession are in *Southern California, Pacific Crest Trail*, a hiking guide by Schiffrin et al. (2003) that mentions that hikers should watch out for dermatitis-causing *Eriodictyon parryi* (poodle-dog bush) in the burn area. I encountered only two old plants of *Eriodictyon parryi*. Since the fire, *Ceanothus vestitus* and *Fremontodendron californicum* have grown into dense stands that are almost impassable except via deer trails that weave among the shrubs (Fig. 9). Understory plants are sparse except for *Bromus tectorum*, which invaded the post-burn site successfully. Around an unnamed spring at the headwaters of Scodie Canyon, hundreds if not thousands of *Pinus jeffreyi* saplings were observed in June 2014 (Fig. 17), indicating that the site has the seed bank and potential for Jeffrey pine forest to regrow. It has taken up to 17 years for these *P. jeffreyi* plants to reach the sapling stage. *Pinus monophylla* recruitment was not observed in the post-burn site; however, *Quercus chrysolepis* was observed re-sprouting from trunk bases.

A more recent fire occurred during the study on 11 July 2014 in the northwestern part of the Wilderness in Smith Canyon when marijuana farmers set a fire to destroy evidence of their growing operation. The Nicolls Fire burned ca. 1600 acres on slopes that were predominantly single-leaf pinyon woodland (Incident Information System 2016). In 2015, when I visited the burn site, drought conditions prevailed and plants were sparse but I documented *Claytonia rubra* (red stemmed spring beauty), *Galium aparine* (common bedstraw), *Microsteris gracilis* (slender phlox) and *Dichelostemma capitatum* subsp. *capitatum* (blue dicks). A few individuals of *Quercus chrysolepis* and *Fremontodendron californicum* were starting to re-sprout from their bases. Future surveys to document post-fire succession, including fire followers from the seed bank, would be informative.

FLORA

A total of 477 minimum-rank vascular plant taxa (including 457 species, 73 subspecies and 84 varieties) occur in the Kiavah Wilderness based on specimens collected prior to and during the study (Appendix A). Seventy families and 240 genera are represented. The largest families are Asteraceae (73 minimum-rank taxa), Poaceae (36), Polemoniaceae (35), Polygonaceae (25) and Fabaceae (24). Family rankings are comparable to those of the Kern County floristic surveys (Twisselmann 1967; Moe 2016), with Asteraceae and Poaceae also having the greatest number of minimum-rank taxa, but in the county floras Fabaceae, Polygonaceae and Polemoniaceae ranked fourth, fifth and sixth, respectively. The largest genera in the Kiavah Wilderness are *Gilia* (18), *Eriogonum* (17), *Phacelia* (13), *Cryptantha* (12) and *Lupinus* (8), whereas in the Kern County flora by Twisselmann (1967) the top five genera were, in descending order, *Eriogonum*, *Gilia*, *Carex*, *Mimulus*, and *Lupinus*. Annual plants account for 45.6% of the total flora, followed by perennial herbs (28.1%) and large

Table 3. Summary of the documented flora of the Kiavah Wilderness, including numbers of taxa characterized as native or non-native, and life forms.

	Taxa	Genera
Flora		
Families	70	
Genera	240	
Species	457	
Minimum-rank taxa (species, named hybrids, subspecies, varieties)	477	
Native/Non-Native		
Native	429 (89.9%)	220 (91.7%)
Non-native	28 (5.9%)	20 (8.3%)
Largest Families		
Asteraceae	73	44
Poaceae	36	13
Polemoniaceae	35	8
Polygonaceae	25	6
Fabaceae	24	6
Boraginaceae	22	6
Hydrophyllaceae	21	7
Brassicaceae	21	13
Largest Genera		
<i>Gilia</i>	18	
<i>Eriogonum</i>	17	
<i>Phacelia</i>	13	
<i>Cryptantha</i>	12	
<i>Lupinus</i>	8	
Life Forms		
Annual	219 (45.6%)	
Perennial herb	135 (28.1%)	
Large shrub	60 (12.3%)	
Geophyte	27 (6.3%)	
Tree	13 (3.1%)	
Parasitic perennial herb	10 (2.3%)	
Small shrub	5 (1.0%)	
Succulent perennial herb	2 (0.4%)	
Succulent shrub	2 (0.4%)	
Parasitic annual	1 (0.2%)	
Succulent annual	1	
Parasitic annual vine	1	
Liana	1	
Perennial vine	1	

shrubs (12.3%). Life forms are based on species descriptions in Baldwin et al. (2012). Table 3 provides a summary of the flora.

Non-Native Taxa

A total of 28 non-native minimum-rank taxa were documented from 20 genera (Table 4), representing 5.9% of the total flora. Most non-native taxa are in Poaceae (13), Asteraceae (4) and Brassicaceae (3). Introduced grasses were observed in every vegetation type in the Kiavah Wilderness. These grasses can be ecological generalists and can outcompete native species (Brooks 2000). Moreover, dense stands of dead *Bromus tectorum* and *B. madritensis* subsp. *rubens* can carry wildfires that negatively impact native species (Brooks and Pyke 2000). Both grass species occur in abundance in the Kiavah Wilderness and, according to the California Invasive Plant Council (Cal-IPC

Table 4. Non-native taxa documented in the Kiavah Wilderness. California Invasive Plant Council (2016) impact rank is given for those taxa that are ranked.

Family	Taxon	Cal-IPC
Amaranthaceae	<i>Amaranthus albus</i>	
Asteraceae	<i>Cirsium vulgare</i>	Moderate
Asteraceae	<i>Lactuca serriola</i>	
Asteraceae	<i>Sonchus asper</i> subsp. <i>asper</i>	
Asteraceae	<i>Taraxacum officinale</i>	
Brassicaceae	<i>Hornungia procumbens</i>	
Brassicaceae	<i>Sisymbrium altissimum</i>	
Brassicaceae	<i>Sisymbrium orientale</i>	
Chenopodiaceae	<i>Salsola tragus</i>	Limited
Euphorbiaceae	<i>Euphorbia peplus</i>	
Fabaceae	<i>Lotus corniculatus</i>	
Geraniaceae	<i>Erodium cicutarium</i>	Limited
Iridaceae	<i>Iris pseudacorus</i>	Limited
Lamiaceae	<i>Marrubium vulgare</i>	Limited
Poaceae	<i>Avena fatua</i>	Moderate
Poaceae	<i>Bromus madritensis</i> subsp. <i>rubens</i>	High
Poaceae	<i>Bromus tectorum</i>	High
Poaceae	<i>Festuca arundinacea</i>	Moderate
Poaceae	<i>Festuca myuros</i>	Moderate
Poaceae	<i>Hordeum murinum</i> subsp. <i>glaucum</i>	
Poaceae	<i>Hordeum murinum</i> subsp. <i>murinum</i>	
Poaceae	<i>Poa annua</i>	
Poaceae	<i>Polypogon interruptus</i>	
Poaceae	<i>Polypogon monspeliensis</i>	
Poaceae	<i>Polypogon viridis</i>	
Poaceae	<i>Schismus arabicus</i>	Limited
Poaceae	<i>Schismus barbatus</i>	Limited
Polygonaceae	<i>Polygonum aviculare</i> subsp. <i>aviculare</i>	

2016), each is ranked as high impact, which means a species has “severe ecological impacts on physical processes, plant and animal communities and vegetation structure.” Another generalist species that was found in almost every habitat is *Erodium cicutarium*, which is ranked by Cal-IPC (2016) as having limited impact. Most of the non-native taxa were found around water sources, such as springs and cattle troughs, especially *Cirsium vulgare*, *Festuca arundinacea* and *Taraxacum officinale*. Riparian areas are frequented by wildlife, cattle and hikers and are thus dispersal sources and sinks for non-native plants that are adapted to these disturbed habitats.

Special Status Taxa

Collections made prior to the study documented 19 minimum-rank taxa in the Kiavah Wilderness that are listed in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (2013). My study added seven taxa for a total of 26 (5.4% of the total flora) (Table 5). Of the seven additions, *Camissonia integrifolia* (Onagraceae) was last documented in 1964 just west of the Wilderness in Kelso Valley. Three occurrences of *Eriophyllum mohavense* (Asteraceae) discovered near the southern boundary of the Wilderness are disjunct by ca. 90

Table 5. Taxa documented in the Kiavah Wilderness that are listed in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2013) or as rare, threatened or endangered in California by the CNDDB (2013).

Taxon	CNPS Rare Plant Rank ¹	California State Rank ²
<i>Androsace elongata</i> subsp. <i>acuta</i>	4.2	S3S4
<i>Astragalus ertterae</i>	1B.3	S2
<i>Camissonia integrifolia</i>	1B.3	S2
<i>Camissonia kernensis</i> subsp. <i>kernensis</i>	4.3	S3
<i>Canbya candida</i>	4.2	S3S4
<i>Chamaesyce vallis-mortae</i>	4.2	S3
<i>Clarkia xantiana</i> subsp. <i>parviflora</i>	4.2	S3S4
<i>Cordylanthus rigidus</i> subsp. <i>brevibracteatus</i>	4.3	S4
<i>Delphinium purpusii</i>	1B.3	S3
<i>Dudleya abramsii</i> subsp. <i>calicicola</i>	4.3	S4
<i>Eriogonum breedlovei</i> var. <i>shevockii</i>	4.3	S3
<i>Eriophyllum mohavense</i>	1B.2	S2
<i>Fritillaria pinetorum</i>	4.3	S4
<i>Galium angustifolium</i> subsp. <i>onycense</i>	1B.3	S3
<i>Gilia interior</i>	4.3	S4
<i>Gilia latiflora</i> subsp. <i>cuyamensis</i>	4.3	S4
<i>Gilia leptantha</i> subsp. <i>pinetorum</i>	4.3	S4
<i>Lewisia disepala</i>	1B.2	S2
<i>Monardella linoides</i> subsp. <i>oblonga</i>	1B.3	S2
<i>Muilla coronata</i>	4.2	S3
<i>Nemacladus calcaratus</i>	1B.2	S1
<i>Oreonana vestita</i>	1B.3	S3
<i>Perideridia pringlei</i>	4.3	S4
<i>Phacelia exilis</i>	4.3	S4
<i>Phacelia nashiana</i>	1B.2	S3
<i>Phacelia novemmillensis</i>	1B.2	S2S3

¹ CNPS Rare Plant Rank: 1B.2: rare, threatened, or endangered in California or elsewhere; moderately threatened.—1B.3: rare, threatened, or endangered in California or elsewhere; not very threatened.—4.2: limited distribution watch list; moderately threatened.—4.3: limited distribution watch list; not very threatened.

² California State Rank: S1: critically imperiled because of extreme rarity.—S2: imperiled due to restricted range.—S2S3: rank is between S2 and S3.—S3: vulnerable due to restricted range.—S3S4: rank is between S3 and S4.—S4: apparently secure; uncommon but not rare.

km (55 mi) northwest of the closest known populations near Pilot Knob (24 Apr 1988, *Henry s.n.*, CAS).

Three of the 26 special status taxa were not relocated during the study. Numerous attempts were made to find *Lewisia disepala* (Montiaceae), which was documented in 1984 (*Shevock 9488*, CAS). Shevock (1988) noted that *L. disepala* can be found in wet years and tends to flower soon after the snowpack melts. A late-flowering taxon (Sep 1979, *Shevock 6550*, CAS), *Cordylanthus rigidus* subsp. *brevibracteatus* (Orobanchaceae) was not re-

located either. Another species not encountered was *Delphinium purpusii* (Ranunculaceae), which had been collected exclusively along Highway 178 near the town of Onyx (May 2010, *Howald s.n.*, UCR). Drought conditions concurrent with the study may explain the failure to find these species, and they should be targets of future surveys.

Another special status species, *Oreonana vestita* (Apiaceae), was first documented in 2002 (*Laeger & Bogan 1403*, CAS). This species is only known from two small occurrences in the Kiavah Wilderness that are disjunct from the only other known populations in the San Gabriel and San Bernardino mountains. Plants from the Wilderness differ from those in San Gabriel Mountains populations and may be described as a new subspecies (Jane Tirrell, pers. comm. 2015).

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APPENDIX 1

ANNOTATED CATALOG OF THE VASCULAR FLORA

The following list includes all taxa collected during this study; vouchers are deposited at RSA, CAS, UC/JEPS and UCR. Existing specimens at these institutions from the study area were annotated and included in this checklist. Family classification adheres to FNA (2016), whereas genera and species

follow Baldwin et al. (2012), except for the following genera: *Eriastrum* (De Groot 2016), *Erythranthe* (Fraga 2012) and *Cryptantha* (Simpson and Hasenstab 2009). Non-native taxa are designated by (*) and special status taxa are designated by (#). Life forms are included with each taxon, following descriptions in Baldwin et al. (2012). Habitat information is based on field observations in the Kiavah Wilderness.

LYCOPHYTES

SELAGINELLACEAE

SELAGINELLA WATSONII L. Underw. Perennial. Occasional on boulders in pinyon woodlands, 1500 m (4900 ft). *Shevock 10797* (CAS).

FERNS

EQUISETACEAE

EQUISETUM LAEVIGATUM A. Braun. Perennial herb. Uncommon in wet seeps. Occasional in dry pine duff, 2000 m (6600 ft). *Gardner & Nazaire 1005*.

PTERIDACEAE

CHEILANTHES COVILLEI Maxon. Perennial herb. Common on rock outcrops on desert slopes, 1200–2000 m (4000–6600 ft). *Gardner & Columbus 273*.

PENTAGRAMMA PALLIDA (Weath.) Yatsk., Windham, & Wollenw. Perennial herb. Uncommon on rock outcrops on exposed desert slopes, 900 m (3000 ft). *Gardner & De Groot 671*.

PENTAGRAMMA TRIANGULARIS (Kaulf.) Yatsk., Windham, & E. Wollenw. subsp. TRIANGULARIS. Perennial herb. Common on rock outcrops on desert slopes and in pinyon woodlands, 900–1600 m (3000–5300 ft). *Gardner & Stoughton 543*.

GYMNOSPERMS

CUPRESSACEAE

JUNIPERUS CALIFORNICA Carrière. Shrub. Common on desert slopes and in canyons, 1500–1600 m (4900–5300 ft). *Gardner & Fraga 263*.

JUNIPERUS GRANDIS R.P. Adams. Tree. Rare on top of mountain plateau. Only one tree found, 2000 m (6600 ft). *Gardner & Fraga 247*.

EPHEDRACEAE

EPHEDRA NEVADENSIS S. Watson. Shrub. Common on desert bajadas and drainages, 1100–1700 m (3600–5600 ft). *Gardner & Gardner 137b*.

EPHEDRA VIRIDIS Coville. Shrub. Common on rocky slopes and pinyon woodlands, 1100–2100 m (3600–6900 ft). *Gross 2330*.

PINACEAE

ABIES CONCOLOR (Gordon & Glend.) Hildebr. Tree. Uncommon, reported in Cap Canyon by Jim Shevock, 1800–2000 m (5900–6600 ft). *Shevock Backlog* (CAS).

PINUS JEFFREYI Grev. & Balf. Tree. Common at higher elevations in patches along intermittent streams and on the plateau, 2000–2100 m (6600–6900 ft). *Gardner & Fraga 264*.

PINUS MONOPHYLLA Torr. & Frém. Tree. Common throughout the entire wilderness, 1500–2200 m (4900–7200 ft). *Gardner & Paik 114*.

PINUS SABINIANA D. Don. Tree. Occasional in canyons and on rocky desert slopes, 1500 m (4900 ft). *Gardner & Paik 93*.

ANGIOSPERMAE—MAGNOLIIDS

SAURURACEAE

ANEMOPSIS CALIFORNICA (Nutt.) Hook. & Arn. Perennial herb. Common in wet seeps and springs, 1400–1500 m (4600–4900 ft). *Gardner & Forgrave 422*.

ANGIOSPERMAE—EUDICOTS

ADOXACEAE

SAMBUCUS NIGRA L. subsp. CAERULEA (Raf.) Bolli. Large shrub. Uncommon along streambanks in exposed open canyons. Scodie Canyon, 1200 m (4000 ft). *Gardner & Paik 1430*.

AMARANTHACEAE

- * *AMARANTHUS ALBUS* L. Annual. Disturbed areas, roadside in mud-flat, 1500 m (4900 ft). *Gardner & Pilapil* 469.

APIACEAE

- LOMATIUM DISSECTUM* var. *MULTIFIDUM* (Nutt.) Mathias & Constance. Geophyte. Common in pinyon pine woodland on rocky soils, 1800–2000 m (5900–6600 ft). *Gardner & Fraga* 231.
- LOMATIUM MOHAVENSE* (J.M. Coult. & Rose) J.M. Coult. & Rose. Geophyte. Common on alluvial soils and eroding slopes, 1100–1800 m (3700–5900 ft). *Gross* 2485.
- LOMATIUM NEVADENSE* (S. Watson) J.M. Coult. & Rose var. *NEVADENSE*. Geophyte. Occasional on alluvial soils and mountain slopes, 1600–2100 m (5300–6900 ft). *Gross* 2324.
- LOMATIUM NEVADENSE* var. *PARISHII* (J.M. Coult. & Rose) Jeps. Geophyte. Common on alluvial slopes and in washes in pinyon pine woodlands, 1600–2100 m (5300–6900 ft). *Gardner & Fraga* 175.
- # *OREONANA VESTITA* (S. Watson) Jeps. Geophyte. Rare on steep sandy N-facing slope, 1600–1700 m (5300–5600 ft). *Laeger & Bogan* 1403 (CAS).
- # *PERIDERIDIA PRINGLEI* (J.M. Coult. & Rose) A. Nelson & J.F. Macbr. Geophyte. Rare on exposed compact clay soils in Horse Canyon, 1400 (4600 ft). *Janzen* 190 (CAS).
- TAUSCHIA PARISHII* (J.M. Coult. & Rose) J.F. Macbr. Geophyte. Common on steep slopes and intermittent streams, 1600–2200 m (5300–7200 ft). *Gardner & Fraga* 250.

APOCYNACEAE

- ASCLEPIAS CALIFORNICA* Greene. Perennial herb. Occasional in canyons, intermittent streams and on rocky slopes, 1500 m (4900 ft). *Gardner & Forgrave* 425.
- ASCLEPIAS FASCICULARIS* Decne. Perennial herb. Occasional in shaded canyons, washes and under oaks, 1300–1500 m (4300–5000 ft). *Gardner & Forgrave* 421b.

ASTERACEAE

- ACAMPTOPAPPUS SPHAEROCEPHALUS* (Harv. & A. Gray) A. Gray. Small shrub. Occasional on desert bajadas in compact exposed soil, 1300 m (4300 ft). *Gardner* 1385.
- AGOSERIS GLAUCA* (Pursh) Raf. var. *GLAUCA*. Annual. Uncommon in Jeffrey pine forest, along Pacific Crest Trail, 2100 m (6900 ft). *Gardner & Columbus* 989.
- AGOSERIS HETEROPHYLLA* (Nutt.) Greene var. *CRYPTOPLEURA* Greene. Annual. Uncommon in seasonally wet “dry” meadow, 1900 m (6300 ft). *Gardner & Fraga* 242.
- AGOSERIS RETRORSA* (Benth.) Greene. Annual. Common in pinyon pine woodland in pine duff and shade, 1700–2000 m (5600–6600 ft). *Gardner & Fraga* 240.
- AMBROSIA ACANTHICARPA* Hook. Annual. Occasional on roadside and disturbed soil, 1600–1700 m (5300–5600 ft). *Gardner & Pilapil* 466.
- AMBROSIA DUMOSA* (A. Gray) W.W. Payne. Small shrub. Common on alluvial soil, desert bajadas and floor, 800–1200 m (2600–4000 ft). *Gardner & Sutton* 1226.
- AMBROSIA SALSOLA* (Torr. & A. Gray) Strother & B.G. Baldwin var. *SALSOLA*. Small shrub. Common on desert bajadas and floor, 900–1400 m (3000–4600 ft). *Gardner & De Groot* 675.
- ANISOCOMA ACAULIS* Torr. & A. Gray. Annual. Common on desert floor up to pinyon woodlands, 1200–2000 m (4100–6600 ft). *Gardner & Paik* 115.
- ANTENNARIA DIMORPHA* (Nutt.) Torr. & A. Gray. Annual. Uncommon on flat level ground in compact soil, 1900–2100 m (6300–6900 ft). *Gardner & Fraga* 173.
- ARTEMISIA DOUGLASIANA* Besser. Perennial herb. Uncommon along banks of washes, 1200 m (4000 ft). *Gardner & Paik* 1431.
- ARTEMISIA DRACUNCULUS* L. Perennial herb. Occasional along banks of washes and in rocky washes, 1300 m (4300 ft). *Gardner & Nazaire* 1044.
- ARTEMISIA LUDOVICIANA* Nutt. subsp. *LUDOVICIANA*. Perennial herb. Common in canyons and along banks of washes, 1500 m (4900 ft). *Gardner & Forgrave* 418.

- ARTEMISIA TRIDENTATA* Nutt. Small shrub. Common in open exposed sites on level ground and on mountain slopes, 2000 m (6600 ft). *Gardner & Pilapil* 458.
- BACCHARIS SALICIFOLIA* (Ruiz & Pav.) Pers. subsp. *SALICIFOLIA*. Shrub. Occasional around springs and cattle troughs, 1400–1500 m (4600–4900 ft). *Gardner & Paik* 96.
- BACCHARIS SERGILOIDES* A. Gray. Shrub. Occasional around springs and cattle troughs, 1200 m (4000 ft). *Gardner & Paik* 100.
- BALSAMORHIZA DELTOIDEA* Nutt. Perennial herb. Common in pinyon woodlands on northern exposures, 1500–1900 m (4900–6300 ft). *Gardner & Fraga* 245.
- CHAENACTIS FREMONTII* A. Gray. Annual. Common on desert floor and bajadas, 1100–1700 m (3600–5600 ft). *Gardner & De Groot* 695.
- CHAENACTIS SANTOLINOIDEA* Greene. Perennial herb. Uncommon in pinyon woodlands on N slopes and shade of mountain, 1500–2100 m (4900–6900 ft). *Gardner & Fraga* 229.
- CHAENACTIS STEVIOIDES* Hook. & Arn. Annual. Common on steep exposed sandy slopes in the desert, 1200–1600 m (4000–5300 ft). *Gardner, Poutasse, & Maldonado* 562.
- CHAENACTIS XANTIANA* A. Gray. Annual. Common in pinyon woodlands and desert slopes, 1600–1700 m (5300–5600 ft). *Gardner & De Groot* 715.
- CHRYSOTHAMNUS VISCIDIFLORUS* (Hook.) Nutt. subsp. *VISCIDIFLORUS*. Shrub. Uncommon on the plateau and along the Pacific Crest Trail, 1900 m (6300 ft). *Twisselmann* 13713 (CAS).
- CIRSIIUM OCCIDENTALE* (Nutt.) Jeps. var. *VENUSTUM* (Greene) Jeps. Perennial herb. Uncommon around bases of large boulders of rock outcrops, 1000–1800 m (3400–5900 ft). *Gardner & Gardner* 157.
- * *CIRSIIUM VULGARE* (Savi) Ten. Perennial herb. Occasional along edges of springs and sites frequented by cattle, 2000 m (6600 ft). *Gardner & Pilapil* 451.
- CORETHROGYNE FILAGINIFOLIA* (Hook. & Arn.) Nutt. Perennial herb. Common on desert slopes and in pinyon woodlands, 1500–2000 m (4900–6600 ft). *Gardner & Forgrave* 435.
- DIETERIA CANESCENS* (Pursh) Nutt. Perennial herb. Uncommon along the Pacific Crest Trail in pinyon woodlands, 2000 m (6600 ft). *Gardner, Elam, & Nico* 406.
- ENCELIA ACTONI* Elmer. Shrub. Common on desert bajadas and floor, 1200–1500 m (4100–4900 ft). *Gardner & Poutasse* 831.
- ERICAMERIA COOPERI* (A. Gray) H.M. Hall var. *COOPERI*. Shrub. Common on desert bajadas and floor, 1100 m (3600 ft). *Gardner & De Groot* 710.
- ERICAMERIA CUNEATA* (A. Gray) McClatchie. Shrub. Common around base of boulders and in cracks of boulders, 1900 m (6300 ft). *Gardner & Gardner* 474.
- ERICAMERIA LINEARIFOLIA* (DC.) Urbatsch & Wussow. Shrub. Common on desert slopes and canyons, 1200–2100 m (4400–6900 ft). *Gardner & Paik* 106.
- ERICAMERIA NAUSEOSA* (Pall. ex Pursh) G.L. Nesom & G.I. Baird var. *MOHAVENSIS* (Greene) G.L. Nesom & G.I. Baird. Shrub. Uncommon on desert slopes and canyon floors, 1800 m (5900 ft). *Twisselmann* 14042 (CAS).
- ERICAMERIA NAUSEOSA* var. *SPECIOSA* (Nutt.) G.L. Nesom & G.I. Baird. Shrub. Common on plateau in post-fire site and around Jeffrey pine grove, 2000 m (6600 ft). *Gardner & Pilapil* 459.
- ERIGERON DIVERGENS* Torr. & A. Gray. Perennial herb. Occasional on plateau in ephemeral grassy washes, 2000 m (6600 ft). *Gardner & Columbus* 336.
- ERIGERON FOLIOSUS* Nutt. var. *FOLIOSUS*. Perennial herb. Common on desert slopes and in pinyon woodlands, 1500–1800 m (4900–5900 ft). *Gardner & Columbus* 283.
- ERIOPHYLLUM AMBIGUUM* (A. Gray) A. Gray var. *PALEACEUM* (Brandege) Ferris. Annual. Common on desert floor and slopes and along washes, 1200–2100 m (4000–6900 ft). *Gardner & Fraga* 256.
- ERIOPHYLLUM CONFERTIFLORUM* (DC.) A. Gray var. *CONFERTIFLORUM*. Small shrub. Common on ridges and mountain slopes in rocky soil, 2000–2100 m (6600–6900 ft). *Gardner & Fraga* 248.
- # *ERIOPHYLLUM MOHAVENSE* (I.M. Johnston) Jeps. Annual. Rare on compacted conglomerate clay soils on desert floor and bajadas, 1100–1300 m (3600–4300 ft). *Gardner, Poutasse, & Chumchim* 1185.

ERIOPHYLLUM PRINGLEI A. Gray. Annual. Common on sandy soils and slopes, 1100–2000 m (3600–6600 ft). *Gardner & Gardner 143*.

ERIOPHYLLUM WALLACEI (A. Gray) A. Gray. Annual. Common in sandy washes and desert floor, 1100–2100 m (3600–6900 ft). *Gardner & De Groot 686*.

HELIUM PUBERULUM DC. Perennial herb. Uncommon in desert riparian area of Sage Canyon, 1200 m (4000 ft). *Gardner & Nazaire 1055*.

HEMIZONELLA MINIMA (A. Gray) A. Gray. Annual. Common in disturbed areas in exposed sandy washes, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 167*.

HULSEA HETEROCHROMA A. Gray. Perennial herb. Uncommon in Jeffrey pine forest in shade, growing from around downed logs, 2000 m (6600 ft). *Gardner & Paik 1455*.

* LACTUCA SERRIOLA L. Annual. Uncommon in intermittent stream site disturbed by cattle, 2000 m (6600 ft). *Gardner & Pilapil 444*.

LASTHENIA GRACILIS (DC.) Greene. Annual. Common on desert bajadas and desert floor, 1100–1400 m (3600–4600 ft). *Gardner & Paik 76*.

LASTHENIA MICROGLOSSA (DC.) E. Greene. Annual. Uncommon along highway 178 in shade of mountain slopes, wet site, 900 m (3000 ft). *Howald 2497* (UCR).

LAYA GLANDULOSA (Hook.) Hook. & Arn. Annual. Common on desert slopes and in pinyon woodlands, 1200–2000 m (4000–6600 ft). *Gardner, Alba, & Alba 130*.

LEPIDOSPARTUM SQUAMATUM (A. Gray) A. Gray. Shrub. Occasional on bajadas and Joshua tree woodland, 1100 m (3600 ft). *Gardner & Pilapil 473*.

LEPTOSYNE BIGELOVII (A. Gray) A. Gray. Annual. Common on desert slopes in sandy soil, 1100–2000 m (3600–6500 ft). *Gardner, Paik, & Lee 71*.

LEPTOSYNE CALIFORNICA Nutt. Annual. Uncommon on sandy bajadas, 1100 m (3600 ft). *Gardner & Paik 1118*.

LESSINGIA GLANDULIFERA A. Gray var. PEIRSONII (J.T. Howell) Markos. Annual. Occasional along roadsides in sandy disturbed soil and alluvial slopes, 1200–1700 m (4000–5600 ft). *Gardner & Pilapil 468*.

LOGFIA DEPRESSA (A. Gray) Holub. Annual. Common on sandy flat desert floor and washes, 1200 m (4000 ft). *Gardner, Poutasse, & Chumchim 1168*.

MADIA ELEGANS D. Don. Annual. Uncommon on sandy steep loose alluvial desert slopes, 1700 m (5600 ft). *Gardner & England 733*.

MADIA GLOMERATA Hook. Annual. Occasional in coarse flat soils and intermittent drainages, 2000 m (6600 ft). *Shevock 10933* (CAS).

MADIA GRACILIS (Sm.) Applegate. Annual. Occasional under Jeffrey pines in drainages, 2000 m (6600 ft). *Gardner & Columbus 355*.

MALACOTHRIX COULTERI Harv. & A. Gray. Annual. Uncommon on desert bajadas and floor growing from base of shrubs, 1300 m (4300 ft). *Gardner & Sutton 1250*.

MALACOTHRIX GLABRATA (D.C. Eaton) A. Gray. Annual. Common on alluvial soil, desert bajadas and floor, 1000–2000 m (3300–6600 ft). *Gardner & De Groot 687*.

MONOPTILON BELLIDIFORME Torr. & A. Gray. Annual. Uncommon on desert bajadas and floor, 1100 m (3600 ft). *Twisselmann 8191* (CAS).

OROCOAENACTIS THYSANOCARPHA (A. Gray) Coville. Annual. Occasional on plateau in drainages and along the Pacific Crest Trail, 1800–2000 m (5900–6600 ft). *Gardner & Fraga 186*.

PSEUDOGNAPHALIUM STRAMINEUM (Kunth) Anderb. Annual. Uncommon near drainages and edges of spring, 1500–2000 m (4900–6600 ft). *Gardner & Forgrave 415*.

RAFINESQUIA NEOMEXICANA A. Gray. Annual. Occasional on desert bajadas growing from base of shrubs, 1200–1300 m (4000–4200 ft). *Gardner, Poutasse, & Chumchim 1144*.

RIGIOPAPPUS LEPTOCLADUS A. Gray. Annual. Uncommon on exposed flat compacted soil, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 164*.

SENECIO FLACIDUS Less. var. DOUGLASHII (DC.) B.L. Turner & T.M. Barkley. Shrub. Occasional in sandy and rocky soil and drainages, 1300–2100 m (4300–6900 ft). *Gardner & Forgrave 431*.

SOLIDAGO ELONGATA Nutt. Perennial herb. Uncommon in moist drainages in canyons, 1500 m (4900 ft). *Gardner & Roland 1068*.

SOLIDAGO VELUTINA DC. subsp. CALIFORNICA (Nutt.) Semp. Perennial herb. Uncommon in moist drainages in canyons, 1500 m (4900 ft). *Gardner & Forgrave 426*.

* SONCHUS ASPER (L.) Hill subsp. ASPER. Annual. Uncommon in moist drainages in canyons and rocky soil, 1500 m (4900 ft). *Gross 2489*.

STEPHANOMERIA PAUCIFLORA (Torr.) A. Nelson. Perennial herb. Occasional in drainages and sandy disturbed soils, 1300–1800 m (4300–5900 ft). *Twisselmann 13729* (CAS).

STYLOCLINE PSILOCARPHOIDES M. Peck. Annual. Occasional in sandy and rocky soil and rock outcrops, 1200 m (4000 ft). *Gardner & De Groot 692*.

SYNTRICHOPAPPUS FREMONTII A. Gray. Annual. Common along sandy banks in drainages and rocky soils, 1200–1800 m (4000–5900 ft). *Shevock 9231* (CAS).

* TARAXACUM OFFICINALE F.H. Wigg. Perennial herb. Common in moist wet soil, in springs and sites disturbed by cattle, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 244*.

TETRADYMIA AXILLARIS A. Nelson var. LONGISPINA (M.E. Jones) Strother. Shrub. Occasional in drainages, desert bajadas and compact exposed soil, 1000–1300 m (3500–4300 ft). *Abrams 11939*.

TETRADYMIA CANESCENS DC. Shrub. Occasional in rock outcrops and drainages, 2000 m (6600 ft). *Gardner, Elam, & Nico 404*.

TETRADYMIA SPINOSA Hook. & Arn. Shrub. Uncommon on alluvial soils near the town of Onyx and Scodie Canyon, 800 m (2600 ft). *Museum Vertebrate Zoology, s.n.* (UC).

UROPAPPUS LINDLEYI (DC.) Nutt. Annual. Common from base of boulders in sandy soils and on mountain slopes, 1100–1600 m (3600–5300 ft). *Gardner & De Groot 588*.

XYLORHIZA TORTIFOLIA (Torr. & A. Gray) Greene var. TORTIFOLIA. Perennial herb. Occasional on desert bajadas in compact exposed soil, 1100–1200 m (3800–4000 ft). *Gardner & De Groot 708*.

BORAGINACEAE

AMSINCKIA TESSELLATA A. Gray var. TESSELLATA. Annual. Common on sandy soils and desert slopes, 1100–1900 m (3600–6200 ft). *Gardner, Paik, & Lee 72*.

CRYPTANTHA ANGUSTIFOLIA (Torr.) Greene. Annual. Occasional on desert slopes and rock outcrops, 1000 m (3300 ft). *Gardner & De Groot 640*.

CRYPTANTHA BARBIGERA (A. Gray) Greene var. FERGUSONIAE J.F. Macbr. Annual. Occasional on desert bajadas in compact exposed soil, 1200 m (4000 ft). *Gardner & Sutton 1224*.

CRYPTANTHA CIRCUMSCISSA (Hook. & Arn.) I.M. Johnst. var. CIRCUMSCISSA. Annual. Common on desert bajadas and in pinyon woodlands, 1100–2100 m (3600–6900 ft). *Gardner, Alba, & Alba 123*.

CRYPTANTHA DUMETORUM (A. Gray) Greene. Annual. Occasional in shade of large boulders and under shrubs, 1100–1200 m (3600–4000 ft). *Gardner & De Groot 705*.

CRYPTANTHA MARITIMA (Greene) Greene. Annual. Uncommon along bank of drainage and in wash, 1500 m (4900 ft). *Gardner & Poutasse 821*.

CRYPTANTHA MICRANTHA (Torr.) I.M. Johnst. Annual. Common on bajadas and desert floor, 1100–1600 m (3600–5300 ft). *Gardner & Gardner 141*.

CRYPTANTHA MOHAVENSIS (Greene) Greene. Annual. Common in unburned sites on rocky desert slopes and under pinyons and oaks, 1600–1800 m (5300–5900 ft). *Gardner & Fraga 254*.

CRYPTANTHA NEVADENSIS A. Nelson & P.B. Kenn. var. RIGIDA I.M. Johnst. Annual. Common on bajadas, desert floor and rock outcrops, 1100–1300 m (3600–4300 ft). *Gardner & De Groot 704*.

CRYPTANTHA OXYGONA (A. Gray) Greene. Annual. Occasional on rocky steep slopes and outcrops, 2000 m (6600 ft). *Gardner & Columbus 321*.

CRYPTANTHA PTEROCARYA (Torr.) Greene var. CYCLOPTERA (Greene) J.F. Macbr. Annual. Common desert bajada, sandy soil and washes, 1100–1200 m (3600–4000 ft). *Gardner & De Groot 702*.

CRYPTANTHA PTEROCARYA (Torr.) Greene var. PTEROCARYA. Annual. Common desert bajada, sandy soil and washes, 1200–1300 m (4000–4300 ft). *Gardner & Paik 1111*.

CRYPTANTHA PTEROCARYA (Torr.) Greene var. PURPUSII Jeps. Annual. Common on rocky sandy soil and in washes, 1200–1700 m (4000–5600 ft). *Gardner & Gardner 147*.

EUCRYPTA CHRYSANTHEMIFOLIA (Benth.) Greene var. BIPINNATIFIDA (Torr.) Constance. Annual. Occasional on bajadas and Joshua tree woodland, 1400 m (4600 ft). *Gardner & Sutton 1268*.

HELIOTROPIMUM CURASSAVICUM L. var. OCULATUM (A. Heller) Tidestr. Perennial herb. Occasional in disturbed soils around water sources, 1400 m (4600 ft). *Gardner & Forgrave 414*.

PECTOCARYA ANISOCARPA Veno. Annual. Common in Joshua tree woodlands on flat sandy soil and disturbed soils, 1100–1400 m (3600–4600 ft). *Gardner & Stoughton 531*.

PECTOCARYA LINEARIS (Ruiz & Pav.) DC. subsp. FEROCULA (I.M. Johnston.) Thorne. Annual. Occasional in rock outcrops and desert bajada, 1200 m (4000 ft). *Gardner & De Groot 625*.

PECTOCARYA PENICILLATA (Hook. & Arn.) A. DC. Annual. Common in sandy soils, slopes and banks of washes, 1000–1300 m (3300–4300 ft). *Gardner & De Groot 611*.

PECTOCARYA SETOSA A. Gray. Annual. Common in sandy soils, rocky slopes and banks of washes, 1100–2100 m (3600–6900 ft). *Gardner & Columbus 360*.

PLAGIOBOTHRYS ARIZONICUS (A. Gray) A. Gray. Annual. Common on bajadas, rock outcrops and washes, 900–1300 m (3000–4300 ft). *Gardner & De Groot 626*.

PLAGIOBOTHRYS CANESCENS Benth. var. CATALINENSIS (A. Gray) Jeps. Annual. Occasional on rocky sandy slopes and bajadas, 1000–2000 m (3300–6600 ft). *Gardner & De Groot 665b*.

PLAGIOBOTHRYS TENELLUS (Hook.) A. Gray. Annual. Occasional in pinyon pine and Jeffrey pine forest in unburned areas, 2000 m (6600 ft). *Gardner & Fraga 211*.

BRASSICACEAE

ATHYSANUS PUSILLUS (Hook.) Greene. Annual. Common in pinyon woodlands, desert slopes, rock outcrops and drainages, 1200–1300 m (4000–4300 ft). *Gardner & De Groot 659*.

BOECHERA DAVIDSONII (Greene) N.H. Holmgren. Perennial herb. Rare in cracks of boulders with moss, 2000 m (6600 ft). *Gardner & Columbus 970*.

BOECHERA INYOENSIS (Rollins) Al-Shehbaz. Perennial herb. Uncommon on rocky slopes and outcrops, 1300 m (4300 ft). *Gardner & Nazaire 1020*.

BOECHERA PULCHRA (S. Watson) W.A. Weber. Perennial herb. Common in rock outcrops, sandy soils and on mountain slopes, 1000–2000 m (3300–6600 ft). *Gardner & Gardner 138*.

CAULANTHUS COOPERI (S. Watson) Payson. Annual. Occasional in desert canyons, drainages and on rocky slopes, 1100–1600 m (3600–5300 ft). *Gardner & Paik 1090*.

CAULANTHUS COULTERI S. Watson. Annual. Common on rocky desert slopes and exposed mountain slopes, 1100–2000 m (3600–6600 ft). *Gardner & Gardner 152*.

CAULANTHUS LASIOPHYLLUS (Hook. & Arn.) Payson. Annual. Common on desert slopes in sandy soil, growing from base of shrubs, 1100–1500 m (3600–4900 ft). *Gardner & De Groot 619*.

DESCURAINIA PINNATA (Walter) Britton subsp. BRACHYCARPA (Richardson) Detling. Annual. Common in disturbed sandy soil, usually around primitive campsites and along roadcuts and trails, 1100–2000 m (3600–6600 ft). *Gardner & Fraga 214*.

DESCURAINIA PINNATA (Walter) Britton subsp. PINNATA. Annual. Uncommon in pinyon woodlands and drainages, 1800 m (5900 ft). *Gross 2495*.

DRABA VERNA L. Annual. Occasional in disturbed soils and around water sources, 1200–2000 m (4000–6600 ft). *Gardner & Fraga 243*.

ERYSIMUM CAPITATUM (Hook.) Greene var. CAPITATUM. Perennial herb. Occasional in shade of pinyons and along roads/trails, 1800–2000 m (5900–6600 ft). *Gardner & Fraga 228*.

* HORNUNGIA PROCUMBENS (L.) Hayek. Annual. Uncommon in desert seeps and moist soils, 1300 m (4300 ft). *Gardner & Fraga 1333*.

LEPIDIUM FREMONTII S. Watson. Perennial herb. Occasional in sandy and rocky soil and drainages, 1200–1300 m (4000–4300 ft). *Gardner & De Groot 709*.

LEPIDIUM NITIDUM Nutt. Annual. Common on compact rocky soil, rock outcrops and drainages, 900–1400 m (3000–4600 ft). *Gardner & Paik 86*.

NASTURTIUM OFFICINALE W.T. Aiton. Perennial herb. Common in seeps and springs, 2000 m (6600 ft). *Gardner & Columbus 345a*.

* SISYMBRIUM ALTISSIMUM L. Annual. Occasional in post burn sites and areas disturbed by hikers (along the Pacific Crest Trail) and cattle, 900–2100 m (3000–6900 ft). *Gardner & Columbus 324*.

* SISYMBRIUM ORIENTALE L. Annual. Uncommon along trails, roadside and drainages, 2000 m (6600 ft). *Gardner & Pilapil 461*.

STREPTANTHUS CORDATUS Nutt. var. CORDATUS. Perennial herb. Rare on steep sandy N-facing slopes growing from base of rocks, 1800–2200 m (5900–7200 ft). *Gardner & Nazaire 1031*.

THYSANOCARPUS CURVIPES Hook subsp. CURVIPES. Annual. Common on steep exposed rocky desert slopes, 1200–1800 m (4000–5900 ft). *Gardner & Fraga 258*.

THYSANOCARPUS LACINIATUS Nutt. var. LACINIATUS. Annual. Occasional on steep sandy slopes and in pinyon woodlands, 1600 m (5300 ft). *Gardner & Stoughton 545*.

TROPIDOCARPUM GRACILE Hook. Annual. Common in rock outcrops, sandy soils and drainages, 900–1700 m (3000–5600 ft). *Gardner, Paik, & Lee 69*.

CACTACEAE

CYLINDROPUNTIA ECHINOCARPA (Engelm. & J.M. Bigelow) F.M. Knuth. Shrub (succulent). Occasional in desert canyons, exposed soils, 1300 m (4300 ft). *Gardner & Columbus 1003*.

OPUNTIA BASILARIS Engelm. & J.M. Bigelow. Shrub (succulent). Occasional on bajadas, in Joshua tree woodland and under pinyon pines, 1300–1600 m (4300–5300 ft). *Gardner & Gardner 137a*.

CAMPANULACEAE

NEMACLADUS CALCARATUS Morin. Annual. Rare on coarse steep sandy slope, 1800–2000 m (5900–6600 ft). *Gardner & Fraga 236*.

NEMACLADUS LONGIFLORUS A. Gray var. BREVIFLORUS McVaugh. Annual. Occasional in soft sandy soil along trails and roadside, 1400–1600 m (4600–5300 ft). *Gardner & Poutasse 833*.

NEMACLADUS SIGMOIDEUS G.T. Robbins. Annual. Uncommon in soft sandy soil along trail, 1800 m (5900 ft). *York 732 (CAS)*.

CAPRIFOLIACEAE

LONICERA INTERRUPTA Benth. Liana, sometimes a scandent shrub. Uncommon in shaded canyon under pinyon pines, 1200 m (4000 ft). *Shevock 12151 (CAS)*.

SYMPHORICARPOS ROTUNDIFOLIUS A. Gray var. PARISHII (Rydb.) Dempster. Shrub. Occasional in shaded canyons of pinyons and along Pacific Crest trail, 1800–2000 m (5900–6600 ft). *Gardner & Poutasse 861*.

CARYOPHYLLACEAE

EREMOGONE FERRISIAE (Abrams) R.L. Hartm. & Rabeler. Perennial herb. Common on steep exposed rocky slopes and in pinyon woodlands, 2100 m (6900 ft). *Shevock 9820 (CAS)*.

EREMOGONE MACRADENIA (S. Watson) Ikonn. var. MACRADENIA. Perennial herb. Common on steep exposed rocky slopes and in pinyon woodlands, 1700–2200 m (5600–7200 ft). *Gross 2511*.

LOEFLINGIA SQUARROSA Nutt. Annual. Occasional on flat level exposed sandy disturbed soil and shade of pinyon pines, 1100–1300 m (3600–4300 ft). *Gardner & Poutasse 840*.

MINUARTIA DOUGLASII (Torr. & A. Gray) Mattf. Annual. Uncommon in pinyon woodlands on N slopes and shade of mountain, 1600 m (5300 ft). *Gardner & Fraga 213*.

MINUARTIA PUSILLA (S. Watson) Mattf. Annual. Uncommon on flat exposed bajadas, 900–1200 m (3000–4000 ft). *Gardner & Sutton 1233*.

SILENE VERECUNDA S. Watson. Perennial herb. Uncommon on rocky exposed slopes and shaded slopes under Jeffrey pines, 2000 m (6600 ft). *Gross 2528*.

CHENOPODIACEAE

- ATRIplex CANESCENS (Pursh) Nutt. var. CANESCENS. Shrub. Occasional in desert washes and on sandy slopes, 2000 m (6600 ft). *Gross* 2526.
- ATRIplex POLYCARPA (Torr.) S. Watson. Shrub. Uncommon in bajadas, rock outcrops and rocky slopes, 1100–1200 m (3600–4000 ft). *Gardner & Pilapil* 472.
- CHENOPODIUM CALIFORNICUM (S. Watson) S. Watson. Perennial herb. Occasional on steep sandy slopes growing from the base of large boulders, 1000 m (3300 ft). *Gardner & De Groot* 635.
- CHENOPODIUM FREMONTII S. Watson. Annual. Occasional on steep exposed rocky slopes, 1500–1800 m (4900–5900 ft). *Gardner & Columbus* 268.
- GRAYIA SPINOSA (Hook.) Moq. Shrub. Common on bajadas, desert floor and banks of drainages, 1200–1700 m (4000–5600 ft). *Gardner & Gardner* 150.
- KRASCHENINNIKOVIA LANATA (Pursh) A. Meeuse & A. Smit. Shrub. Common on bajadas and desert floor, 1100–1200 m (3600–4000 ft). *Gardner & De Groot* 712.
- * SALSOLA TRAGUS L. Annual. Uncommon in disturbed sites along roadsides and campsites, 1200–1400 m (4000–4600 ft). *Gardner & Pilapil* 471.

CONVOLVULACEAE

- CALYSTEGIA LONGIPES (S. Watson) Brummitt. Perennial herb. Occasional in drainages and sandy disturbed soils, 1300–1900 m (4300–6200 ft). *Gardner & Columbus* 293.
- CUSCUTA CALIFORNICA Hook. & Arn. var. CALIFORNICA. Annual vine (parasitic). Uncommon on annual herbs on desert bajadas, 1200 m (4000 ft). *Gardner & Paik* 1438.

CRASSULACEAE

- # DUDLEYA ABRAMSII Rose subsp. CALCICOLA (Bartel & Shevock) K.M. Nakai. Perennial herb (Succulent). Uncommon in rock outcrops in pinyon woodlands, 2000 m (6600 ft). *Gardner & Columbus* 975.
- DUDLEYA SAXOSA (M.E. Jones) Britton & Rose subsp. ALOIDES (Rose) Moran. Perennial herb (Succulent). Uncommon in rock outcrops on exposed desert slopes, 1500 m (4900 ft). *Gardner & Gardner* 156.
- CRASSULA CONNATA (Ruiz & Pav.) A. Berger. Annual (Succulent). Rare on special moist shallow soil on large granite boulder near desert riparian spring, 1400 m (4600 ft). *Gardner & England* 753a.

CUCURBITACEAE

- CUCURBITA FOETIDISSIMA Kunth. Geophyte. Uncommon on desert slopes and canyon floors, 1500 m (4900 ft). *Gardner & Forgrave* 434.
- CUCURBITA PALMATA S. Watson. Geophyte. Uncommon on bajadas in rock outcrops, 1000 m (3300 ft). *Gardner & De Groot* 642.
- MARAH FABACEA (Naudin) Greene. Geophyte. Uncommon on flat level ground in compact soil, 1000 m (3300 ft). *Gardner & Fraga* 1365b.
- MARAH HORRIDA (Congdon) Dunn. Geophyte. Uncommon on rocky steep mountain slopes, 900 m (3000 ft). *Gardner & De Groot* 678.

ERICACEAE

- ARCTOSTAPHYLOS PATULA Greene. Shrub. Occasional in pinyon woodlands on protected slopes, 2000–2100 m (6600–6900 ft). *Shevock* 10801 (CAS).
- ARCTOSTAPHYLOS VISCIDA Parry. Shrub. Occasional on rocky steep slopes and along the Pacific Crest Trail near Skinner Peak, 2000–2100 m (6600–6900 ft). *Shevock* 9813 (CAS).

EUPHORBIACEAE

- CHAMAESYCE ALBOMARGINATA (Torr. & A. Gray) Small. Perennial herb. Common almost weedy in disturbed sandy roadsides and rock outcrops, 1300–1700 m (4300–5600 ft). *Gardner* 37.
- # CHAMAESYCE VALLIS-MORTAE Millsp. Perennial herb. Occasional in soft sandy soil along disturbed roadsides, 1300–1700 m (4300–5600 ft). *Gardner & Forgrave* 437.
- * EUPHORBIA PEPLUS L. Annual. Rare in drainage of canyon bottom under oaks, 1500 m (4900 ft). *Gardner & Roland* 1073.

FABACEAE

- ACMISPON AMERICANUS (Nutt.) Rydb. var. AMERICANUS. Annual. Occasional on exposed rocky soil, drainages and near springs in sites disturbed by cattle, 1500–2000 m (4900–6600 ft). *Gardner & Fraga* 1366.
- ACMISPON ARGOPHYLLUS (A. Gray) Brouillet var. ARGOPHYLLUS. Perennial herb. Occasional on exposed steep sandy slopes and around rock outcrops, 1500–2100 m (4900–6900 ft). *Gardner, Elam, & Nico* 392.
- ACMISPON GRANDIFLORUS (Benth.) Brouillet var. GRANDIFLORUS. Perennial herb. Uncommon in rocky drainages in canyons, 2000 m (6600 ft). *Gardner & Columbus* 371.
- ACMISPON PROCUMBENS (Greene) Brouillet var. JEPSONII (Ottley) Brouillet. Perennial herb. Uncommon in disturbed sandy soil around pinyon pines, 2000 m (6600 ft). *Shevock* 9819 (CAS).
- ACMISPON STRIGOSUS (Nutt.) Brouillet. Annual. Common on bajadas, rock outcrops and steep slopes, 1100–1700 m (3600–5600 ft). *Gardner & Paik* 108.
- ASTRAGALUS DIDYMOCARPUS Hook. & Arn. Annual. Uncommon on exposed sandy slopes and exposed flat level ground in the desert, 1000–1600 m (3300–5300 ft). *Gardner & De Groot* 649.
- # ASTRAGALUS ERITERAE Barneby & Shevock. Perennial herb. Rare on steep shady N-facing slope along the Pacific Crest Trail, 1800 m (5900 ft). *Gardner & LaShure* 869.
- ASTRAGALUS LENTIGINOSUS Douglas var. VARIABILIS Barneby. Perennial herb. Common on exposed sandy soils and slopes, 1300–2100 m (4300–6900 ft). *Gardner & Nazaire* 1036.
- ASTRAGALUS PURSHII Douglas var. TINCTUS M.E. Jones. Perennial herb. Occasional on exposed slopes and eroding banks of washes, 1200–2100 m (4000–6900 ft). *Gardner & Fraga* 1343.
- HOSACKIA CRASSIFOLIA Benth. var. CRASSIFOLIA. Perennial herb. Uncommon under Jeffrey pines and exposed rock outcrop, 2100 m (6900 ft). *Gardner, Elam, & Nico* 391.
- HOSACKIA OBLONGIFOLIA Benth. var. OBLONGIFOLIA. Perennial herb. Common around springs and seeps, 1200–2000 m (4000–6600 ft). *Gross* 2488.
- * LOTUS CORNICULATUS L. Perennial herb. Uncommon in Sage Canyon near parking area, 1200 m (4000 ft). *Schappe* CA650-44.
- LUPINUS BENTHAMII A. Heller. Annual. Uncommon on exposed sandy slopes and rock outcrops, 1200–1300 m (4000–4300 ft). *Gardner & De Groot* 646.
- LUPINUS BICOLOR Lindl. Annual. Common on bajadas, rock outcrops, steep slopes and pinyon woodlands, 1100–1900 m (3600–6200 ft). *Gardner, Paik, & Lee* 73.
- LUPINUS CONCINUS J. Agardh. Annual. Common on bajadas, rock outcrops and washes, 900–1700 m (3000–5600 ft). *Gardner & De Groot* 598.
- LUPINUS EXCUBITUS M.E. Jones var. AUSTROMONTANUS (A. Heller) C.P. Sm. Shrub. Occasional in pinyon woodlands on protected slopes, 1900 m (6300 ft). *Gross* 2336.
- LUPINUS EXCUBITUS M.E. Jones var. EXCUBITUS. Shrub. Common in washes and exposed sandy and rocky slopes, 1200–1700 m (4000–5600 ft). *Gardner & Paik* 75.
- LUPINUS FORMOSUS Greene var. FORMOSUS. Perennial herb. Uncommon in pinyon woodlands and in pine duff, 2000 m (6600 ft). *Gardner & Fraga* 208.
- LUPINUS GRAYI S. Watson. Perennial herb. Uncommon in pinyon woodlands and exposed slopes, 1600–2000 m (5300–6600 ft). *Gross* 2325.
- LUPINUS ODORATUS A. Heller. Annual. Uncommon on bajadas and open exposed sandy flat level surfaces, 1300 m (4300 ft). *Gardner & Fisher* 1284.
- TRIFOLIUM MICROCEPHALUM Pursh. Annual. Common in drainages and alkaline soils, 2000 m (6600 ft). *Gardner & Nazaire* 1016.
- TRIFOLIUM OLIGANTHUM Steud. Annual. Common in and around springs, 2000 m (6600 ft). *Gardner & Columbus* 349.
- TRIFOLIUM VARIEGATUM Nutt. Perennial herb. Common in and around springs, 2000 m (6600 ft). *Gardner & Sutton* 1222.
- TRIFOLIUM WORMSKIOLDII Lehm. Perennial herb. Common in and around springs, 2000 m (6600 ft). *Gardner & Columbus* 334.

FAGACEAE

- QUERCUS CHRYSOLEPIS Liebm. Tree. Common with pinyon pines on mountain slopes and plateau, 1600–2100 m (5300–6900 ft). *Gardner & Fraga 205*.
- QUERCUS KELLOGGII Newb. Tree. Uncommon mixed with pinyons and Jeffrey pines in rocky soils, 2000–2100 m (6600–6900 ft). *Gardner & Fraga 203*.
- QUERCUS WISLIZENI DC. Tree. Uncommon on N rocky mountain slopes, 1700 m (5600 ft). *Gardner & Tirrell 1401*.

GARRYACEAE

- GARRYA FLAVESCENS S. Watson. Shrub. Occasional in pinyon woodlands and along the Pacific Crest Trail, 1100 m (3600 ft). *Gardner & Fraga 218*.

GENTIANACEAE

- FRASERA TUBULOSA Coville. Perennial herb. Rare along the Pacific Crest Trail in shade of pinyon and oaks, 2100 m (6900 ft). *Gardner & Nazaire 1041*.

GERANIACEAE

- * ERODIUM CICUTARIUM (L.) Aiton. Annual. Common on bajadas, desert floor, drainages and rock outcrops, 1100–1700 m (3600–5600 ft). *Gardner & Paik 79*.

GROSSULARIACEAE

- RIBES LASIANTHUM Greene. Shrub. Uncommon on rocky exposed slopes, 2100 m (6900 ft). *Shevock 9518* (CAS).
- RIBES QUERCETORUM Greene. Shrub. Common on rocky exposed slopes and banks of riparian seeps, 1200–2100 m (4000–6900 ft). *Gross 2530*.
- RIBES ROEZLII Regel. Shrub. Uncommon in canyons and on mountain ridges, 1700 m (5600 ft). *Shevock 11418* (CAS).

HYDROPHYLLACEAE

- EMMENANTHE PENDULIFLORA Benth. var. PENDULIFLORA. Annual. Common in rock outcrops and sites recovering from fire, 1100–1800 m (3600–5900 ft). *Gardner 44*.
- ERIODICTYON PARRYI (A. Gray) Greene. Perennial herb. Uncommon on plateau in rock outcrops, remnants from post-fire, 2000 m (6600 ft). *Gardner & Pilapil 447*.
- NAMA CALIFORNICUM (A. Gray) J.D. Bacon. Annual. Occasional along the Pacific Crest Trail and in sandy soil, 1200–1600 m (4000–5300 ft). *Gardner & Paik 1428*.
- NAMA DEMISSA A. Gray var. DEMISSA. Annual. Common on desert slopes in sandy soil, 1200–1800 m (4000–5900 ft). *Gardner & Gardner 144*.
- NEMOPHILA MENZIESII Hook. & Arn. var. MENZIESII. Annual. Occasional on rocky desert slopes and banks of washes, 1000–1200 m (3300–4000 ft). *Gardner & Poutasse 855*.
- NEMOPHILA SPATULATA Coville. Annual. Occasional in sandy and rocky soil and drainages in mixed conifer forests, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 198*.
- PHACELIA AUSTRUMONTANA J.T. Howell. Annual. Common under pinyon-oak understory along the Pacific Crest Trail, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 195*.
- PHACELIA CICUTARIA Greene var. CICUTARIA. Annual. Occasional in rock outcrops and desert bajada, 1200 m (4000 ft). *Gardner & Paik 1098*.
- PHACELIA CURVIPES S. Watson. Annual. Common in rock outcrops and desert bajadas, 1500–2000 m (4900–6600 ft). *Shevock 10153* (CAS).
- PHACELIA DISTANS Benth. Annual. Common on bajadas, rock outcrops, steep slopes and pinyon woodlands, 1100–2100 m (3600–6900 ft). *Shevock 9821* (CAS).
- PHACELIA EGENA (Brand) J.T. Howell. Perennial herb. Occasional from base of rocks on slopes, 2000–2100 m (6600–6900 ft). *Shevock 9823* (CAS).

- # PHACELIA EXILIS (A. Gray) G.J. Lee. Annual. Occasional in exposed drainages and disturbed soils, 1900–2000 m (6300–6600 ft). *Shevock 10930* (CAS).

- PHACELIA FREMONTII Torr. Annual. Common on bajadas, desert floor and slopes. In disturbed soils, post-fire sites, 1000–2100 m (3300–6900 ft). *Shevock 9224* (CAS).

- PHACELIA HUMILIS var. DUDLEYI J.T. Howell. Annual. Common in pinyon woodlands and along the Pacific Crest Trail, 1800–2000 m (5900–6600 ft). *Gross 2340*.

- PHACELIA IMBRICATA Greene. Perennial herb. Occasional along the Pacific Crest Trail and in rocky soils, 2000 m (6600 ft). *Gardner & Fraga 196*.

- # PHACELIA NASHIANA Jeps. Annual. Uncommon on steep exposed sandy slopes, 1500–1900 m (4900–6300 ft). *Gardner & England 819*.

- # PHACELIA NOVENMILLENSIS Munz. Annual. Uncommon along the Pacific Crest Trail in pinyon woodlands, 1900 m (6300 ft). *Shevock 12167* (CAS).

- PHACELIA RAMOSISSIMA Lehm. Perennial herb. Occasional along the Pacific Crest Trail and in pinyon woodlands, 1800 m (5900 ft). *Shevock 11546* (CAS).

- PHACELIA TANACETIFOLIA Benth. Annual. Common on desert bajadas, rock outcrops and bank of drainages, 1100–1300 m (3600–4300 ft). *Gardner & De Groot 616*.

- PHOLISTOMA MEMBRANACEUM (Benth.) Constance. Annual. Common on desert slopes and in rock outcrops, 1000–1300 m (3300–4300 ft). *Gardner & Fraga 1359*.

- TRICARDIA WATSONII S. Watson. Perennial herb. Uncommon on bajadas and rocky desert slopes under downed Joshua trees, 1200–1400 m (4000–4600 ft). *Gardner, Poutasse, & Chumchim 1167*.

LAMIACEAE

- * MARRUBIUM VULGARE L. Perennial herb. Rare in disturbed sandy soil and on desert slopes in rock outcrops, 1000–1400 m (3300–4600 ft). *Gardner & Forgrave 439*.

- # MONARDELLA LINOIDES A. Gray subsp. OBLONGA (Greene) Abrams. Perennial herb. Occasional on rocky slopes and along the Pacific Crest Trail near Skinner Peak, 1900–2100 m (6300–6900 ft). *Gardner & Columbus 285*.

- MONARDELLA LINOIDES A. Gray subsp. SIERRAE Elvin & A.C. Sanders. Perennial herb. Uncommon on steep sandy mountain ridges, 1900 m (6300 ft). *Gardner & Fraga 232*.

- MONARDELLA ODORATISSIMA Benth. Perennial herb. Uncommon on rocky exposed desert slopes, 1900 m (6300 ft). *Gross 2535*.

- SALVIA CARDUACEA Benth. Annual. Uncommon on desert slopes and bank of wash, 1300 m (4300 ft). *Gardner & De Groot 654*.

- SALVIA COLUMBARIAE Benth. Annual. Common on bajadas, desert floor, drainages and rock outcrops, 1000–2000 m (3300–6600 ft). *Gardner & Gardner 145b*.

- SALVIA DORRII (Kellogg) Abrams var. DORRII. Shrub. Occasional in pinyon woodlands on protected slopes, 1500–1800 m (4900–5900 ft). *Gardner & Tirrell 1399*.

- SALVIA DORRII (Kellogg) Abrams var. PILOSA (A. Gray) Strachan & Reveal. Shrub. Common on banks of washes and in pinyon woodlands and along the Pacific Crest Trail, 1000–1600 m (3300–5300 ft). *Gardner & Gardner 154*.

- SALVIA PACHYPHYLLA Munz. Shrub. Occasional along the Pacific Crest Trail on steep rocky slopes, 1700–2100 m (5600–6900 ft). *Gardner & Roland 1062*.

- SCUTELLARIA MEXICANA (Torr.) A.J. Paton. Shrub. Common on bajadas, desert floor and rock outcrops, 1200–1300 m (4000–4300 ft). *Gardner & Paik 1104*.

- SCUTELLARIA SIPHOCAMPYLOIDES Vatke. Perennial herb. Occasional under Jeffrey pines in drainages, 2000 m (6600 ft). *Gardner & Columbus 354*.

- STACHYS ALBENS A. Gray. Perennial herb. Common in wet sites around springs, 2000 m (6600 ft). *Gardner & Columbus 288*.

LENNOACEAE

PHOLISMA ARENARIUM Hook. Perennial herb (parasitic). Uncommon on desert bajadas, washes and disturbed soils, 1200 m (4000 ft). *Gardner 1454*.

LOASACEAE

MENTZELIA ALBICAULIS (Hook.) Torr. & A. Gray. Annual. Common on exposed sandy soils and slopes, 1100–1800 m (3600–5900 ft). *Gardner; Alba, Alba, & Alba 134*.

MENTZELIA CONGESTA Torr. & A. Gray. Annual. Common on sandy slopes and banks of washes, 1600–1900 m (5300–6300 ft). *Gardner & Fraga 210*.

MENTZELIA MONTANA Davidson. Annual. Occasional on bajadas and desert slopes, 1200–2000 m (4000–6600 ft). *Ertter 6042* (UC).

MENTZELIA VEATCHIANA Kellogg. Annual. Common on bajadas, exposed slopes and washes, 1200–1700 m (4000–5600 ft). *Gardner & Paik 77*.

LYTHRACEAE

LYTHRUM CALIFORNICUM Torr. & A. Gray. Perennial herb. Uncommon in rich moist soil in canyon bottom drainage, 1500 m (4900 ft). *Gardner & Forgrave 423*.

MALVACEAE

EREMALCHE EXILIS (A. Gray) Greene. Annual. Common on bajadas and desert floor, 1200 m (4000 ft). *Gardner & De Groot 703*.

FREMONTODENDRON CALIFORNICUM (Torr.) Coville. Shrub. Common on plateau in post-fire site and mountain slopes, 1100–1700 m (3600–5600 ft). *Gardner & Fraga 259*.

MALACOTHAMNUS FREMONTII (A. Gray) Greene. Shrub. Uncommon on exposed rocky outcrops, 1800 m (5900 ft). *Gardner; Elam, & Nico 405*.

SPHAERALCEA AMBIGUA A. Gray var. AMBIGUA. Perennial herb. Uncommon on bajadas, desert slopes and washes, 1100–1400 m (3600–4600 ft). *Gardner & De Groot 725*.

MONTIACEAE

CALANDRINIA MENZIESII (Hook.) Torr. & A. Gray. Annual. Common on bajadas and desert slopes, 1200–1500 m (4000–4900 ft). *Gardner & Paik 85*.

CALYPTRIDUM MONANDRUM Nutt. Annual. Common on bajadas and desert slopes, 1000–1600 m (3300–5300 ft). *Gardner & Paik 113*.

CALYPTRIDUM ROSEUM S. Watson. Annual. Uncommon in sandy drainages in shade of Jeffrey pines, 2000 m (6600 ft). *Gardner & Columbus 937*.

CLAYTONIA EXIGUA Torr. & A. Gray subsp. EXIGUA. Annual. Common in sandy soils and drainages, 1900–2000 m (6300–6600 ft). *Gardner & Columbus 329b*.

CLAYTONIA PARVIFLORA Hook. subsp. PARVIFLORA. Annual. Common in sandy desert washes and in pinyon woodlands, 1000–1900 m (3300–6200 ft). *Gardner & Paik 99*.

CLAYTONIA PARVIFLORA Hook. subsp. UTAHENSIS (Rydb.) John M. Mill. & K.L. Chambers. Annual. Uncommon in rock outcrops on exposed desert slopes, 1200 m (4000 ft). *Ertter 6061* (UC).

CLAYTONIA PARVIFLORA Hook. subsp. VIRIDIS (Davidson) John M. Mill. & K.L. Chambers. Annual. Occasional in pinyon woodlands on protected slopes, 1900 m (6300 ft). *Gardner; Alba, Alba, & Alba 127*.

CLAYTONIA PERFOLIATA Willd. Annual. Occasional on sandy slopes in pinyon woodlands, 2100 m (6900 ft). *Shevock 9491* (CAS).

CLAYTONIA RUBRA (Howell) Tidestr. subsp. RUBRA. Annual. Common along the Pacific Crest Trail and in post-burn site, 1700–2000 m (5600–6600 ft). *Gardner & Columbus 329a*.

#LEWISIA DISEPALA Rydb. Geophyte. Rare in exposed rolling compacted conglomerate soil. Was not found during this study, 1900–2100 m (6300–6900 ft). *Shevock 9488* (CAS).

LEWISIA REDIVIVA Pursh var. REDIVIVA. Geophyte. Common on rocky exposed soils surrounded by pinyon pines and in quartz outcrops, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 162*.

NYCTAGINACEAE

ABRONIA POGONANTHA Heimerl. Annual. Rare on steep sandy desert slopes, 1200–1600 m (4000–5300 ft). *Gardner & England 735*.

MIRABILIS LAEVIS (Benth.) Curran var. RETRORSA (A. Heller) Jeps. Perennial herb. Common on bajadas, rock outcrops and washes, 1300–1500 m (4300–4900 ft). *Gardner & Poutasse 834*.

OLEACEAE

FORESTIERA PUBESCENS Nutt. Shrub. Uncommon in canyons near water sources, 1100–1300 m (3600–4300 ft). *Gardner & Poutasse 858*.

ONAGRACEAE

CAMISSONIA CAMPESTRIS (Greene) P.H. Raven subsp. CAMPESTRIS. Annual. Common on bajadas and desert slopes, 1100–1300 m (3600–4300 ft). *Gardner & De Groot 700*.

CAMISSONIA INTEGRIFOLIA P.H. Raven. Annual. Rare on bajadas on flat exposed sandy soil, 1400 m (4600 ft). *Gardner & England 755a*.

CAMISSONIA KERNENSIS (Munz) P.H. Raven subsp. KERNENSIS. Annual. Common on bajadas and desert slopes, 1300–2000 m (4300–6600 ft). *Gardner; Alba, Alba, & Alba 119*.

CAMISSONIA PUSILLA P.H. Raven. Annual. Uncommon in wet soil in drainages, 1900 m (6300 ft). *Gardner & Columbus 290*.

CAMISSONIA STRIGULOSA (Fisch. & C.A. Mey.) P.H. Raven. Annual. Common in disturbed sandy soil, usually around primitive campsites and along roadcuts and trails, 1200–1600 m (4000–5300 ft). *Gardner & De Groot 721*.

CAMISSONIOPSIS PALLIDA (Abrams) W.L. Wagner & Hoch subsp. PALLIDA. Annual. Uncommon in desert washes and loose sandy soil, 1200 m (4000 ft). *Gardner & De Groot 685*.

CHYLISMIA CLAVIFORMIS (Torr. & Frém.) A. Heller subsp. CLAVIFORMIS. Annual. Common on desert slopes and bajadas, 1200–1800 m (4000–5900 ft). *Gardner & Columbus 277*.

CLARKIA XANTIANA A. Gray subsp. PARVIFLORA (Eastw.) H. Lewis & P.H. Raven. Annual. Uncommon on bajadas and banks of washes, 1200–1300 m (4000–4300 ft). *Geber 95-2W* (UC).

EPILOBIUM CANUM (Greene) P.H. Raven subsp. LATIFOLIUM (Hook.) P.H. Raven. Perennial herb. Occasional in drainages surrounded by pinyon and Jeffrey pines, 1500–2000 m (4900–6600 ft). *Gardner & Forgrave 424*.

EPILOBIUM CILIATUM Raf. subsp. CILIATUM. Perennial herb. Common in canyons and along banks of washes, 1500 m (4900 ft). *Gardner & Forgrave 416*.

EPILOBIUM DENSIFLORUM (Lindl.) Hoch & P.H. Raven. Annual. Occasional in springs and seasonally wet locations, 2000 m (6600 ft). *Shevock 10932* (CAS).

GAYOPHYTUM DIFFUSUM Torr. & A. Gray subsp. PARVIFLORUM H. Lewis & Szweyk. Annual. Common in shade of shrubs in recovering post-burn sites, 2000–2100 m (6600–6900 ft). *Gardner & Columbus 309*.

TETRAPTERON GRACILIFLORUM (Hook. & Arn.) W.L. Wagner & Hoch. Annual. Occasional in canyons disturbed by cattle grazing, 1000 m (3300 ft). *Shevock 11406* (CAS).

TETRAPTERON PALMERI (S. Watson) W.L. Wagner & Hoch. Annual. Common on bajadas and in washes and loose sandy soil, 1100 m (3600 ft). *Gardner & De Groot 691*.

OROBANCHACEAE

CASTILLEJA APPLIGATEI Fernald subsp. DISTICHA (Eastw.) T.I. Chuang & Heckard. Perennial herb (parasitic). Uncommon in pinyon woodlands and along the Pacific Crest Trail, 1800 m (5900 ft). *York 736* (CAS).

CASTILLEJA APPLIGATEI Fernald subsp. MARTINII (Abrams) T.I. Chuang & Heckard. Perennial herb (parasitic). Common in pinyon woodlands, in washes and along the Pacific Crest Trail, 1700–2000 m (5600–6600 ft). *Gross 2473*.

CASTILLEJA CHROMOSA A. Nelson. Perennial herb (parasitic). Common on rocky sandy soil, slopes and in washes, 1200–2000 m (4000–6600 ft). *Gardner & Stoughton 540*.

- CASTILLEJA EXSERTA (A. Heller) T.I. Chuang & Heckard subsp. EXSERTA. Annual. Common on bajadas and desert slopes, 900–1300 m (3000–4300 ft). *Gardner, Poutasse, & Chumchim 1169.*
- CASTILLEJA MINOR (A. Gray) A. Gray subsp. SPIRALIS (Jeps.) T.I. Chuang & Heckard. Annual. Uncommon in wet soil in drainages, 1500 m (4900 ft). *Gardner & Forgrave 420.*
- # CORDYLANTHUS RIGIDUS (Benth.) Jeps. subsp. BREVIBRACTEATUS (A. Gray) Munz. Annual (parasitic). Rare in pinyon woodlands, 1900 m (6300 ft). *Shevock 6550* (CAS).
- KOPSIPSIS STROBILACEA (A. Gray) Beck. Perennial herb (parasitic). Rare in pinyon woodlands on ridges, 1900 m (6300 ft). *Shevock 10804* (CAS).
- OROBANCHE FASCICULATA Nutt. Perennial herb (parasitic). Occasional on exposed rocky soil and mountain slopes, 2000–2200 m (6600–7200). *Gardner & Columbus 918.*
- OROBANCHE UNIFLORA L. Perennial herb (parasitic). Rare in unburned Jeffrey pine forest in pine duff, 2100 m (6900 ft). *Gardner & Columbus 993.*

PAPAVERACEAE

- ARGEMONE MUNITA Durand & Hilg. Perennial herb. Occasional in disturbed dry soils, drainages and rock outcrops, 1800–2000 m (5900–6600 ft). *Gardner, Elam, & Nico 402.*
- # CANBYA CANDIDA A. Gray. Annual. Uncommon on sandy desert slopes in well drained soils, 1000–1500 m (3300–4900 ft). *Gardner & Poutasse 830.*
- EHRENDORFERIA CHRYSANTHA (Hook. & Arn.) Rylander. Perennial herb. Uncommon in rocky drainages in canyons, 2000 m (6600 ft). *Gardner & Columbus 287.*
- ESCHSCHOLZIA CAESPITOSA Benth. Annual. Uncommon in pinyon woodlands and along the Pacific Crest Trail, 1700 m (5600 ft). *Shevock 12164* (CAS).
- ESCHSCHOLZIA CALIFORNICA Cham. Annual. Common on desert slopes, 1000–2000 m (3300–6600 ft). *Gardner & Forgrave 433.*
- ESCHSCHOLZIA GLYPTOSPERMA Greene. Annual. Occasional on steep sandy exposed desert slopes, 1200–1700 m (4000–5600 ft). *Gardner & De Groot 606.*
- ESCHSCHOLZIA MINUTIFLORA S. Watson. Annual. Occasional in rock outcrops and drainages, 1100–1700 m (3600–5600 ft). *Gardner & De Groot 650.*
- PAPAVER HETEROPHYLLUM (Benth.) Greene. Annual. Uncommon on bank of wash in canyon, 1000 m (3300 ft). *Gardner & Fraga 1355.*
- PLATYSTEMON CALIFORNICUS Benth. Annual. Common on bajadas and desert slopes, 1000–1300 m (3300–4300 ft). *Gardner, Poutasse, & Maldonado 564.*

PHRYMACEAE

- DIPLOPUS BIGELOVII (A. Gray) G.L. Nesom. Annual. Common in well drained exposed sandy soil in pinyon woodlands, 1700–2000 m (5600–6600 ft). *Gardner & Fraga 191.*
- DIPLOPUS CALYCINUS Eastw. Shrub. Occasional in crevices of rocks, 1500 m (4900 ft). *Gardner & Columbus 377.*
- ERYTHRANTHE ANDROSACEA (Curran ex Greene) N.S. Fraga. Annual. Occasional on bajadas and well drained level sandy soil, 1000–1200 m (3300–4000 ft). *Gardner & Sutton 1231.*
- ERYTHRANTHE DISCOLOR (A.L. Grant) N.S. Fraga. Annual. Occasional in pinyon woodlands on well drained soft soil, 1900 m (6300 ft). *Gardner & Fraga 184.*
- ERYTHRANTHE FLORIBUNDA (Douglas ex Lindl.) G.L. Nesom. Annual. Uncommon in crevices of rocks, 2000 m (6600 ft). *Gardner & Paik 1129.*
- ERYTHRANTHE GUTTATUS (Benth.) G.L. Nesom. Perennial herb. Common in wet seeps and springs, 2000 m (6600 ft). *Gardner & Columbus 347.*

PLANTAGINACEAE

- COLLINSIA CALLOSA Parish. Annual. Common on desert slopes and mountain slopes, 1500–2000 m (4900–6600 ft). *Gardner & Fraga 189.*
- KECKIELLA BREVIFLORA (Lindley) Straw var. BREVIFLORA. Shrub. Occasional in rock outcrops and exposed sandy soil, 1800 m (5900 ft). *Gardner & Columbus 279.*

- PENSTEMON GRINNELLII Eastw. var. GRINNELLII. Perennial herb. Uncommon only one found in Scodie Canyon, bank of wash, 1100 m (3600 ft). *Gardner & Poutasse 857.*
- PENSTEMON INCERTUS Brandegee. Shrub. Common on bajadas and desert slopes, 1200–2100 m (4000–6900 ft). *Gardner & Columbus 376.*
- PENSTEMON NEWBERRYI A. Gray var. NEWBERRYI. Perennial herb. Uncommon on N rocky mountain slopes, 1900 m (6300 ft). *Gardner & Fraga 223.*
- PENSTEMON ROSTRIFLORUS Kellogg. Perennial herb. Uncommon in drainages of post-burn sites by downed logs, 1900 m (6300 ft). *Gardner & Pilapil 456.*
- PENSTEMON SPECIOSUS Lindl. Perennial herb. Occasional on steep sandy exposed mountain slopes, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 239.*
- VERONICA AMERICANA Benth. Perennial herb. Uncommon in seeps and springs, 2000 m (6600 ft). *Gardner & Columbus 344.*

POLEMONIACEAE

- ALLOPHYLLUM GILIOIDES (Benth.) A.D. Grant & V.E. Grant subsp. GILIOIDES. Annual. Occasional in post-burn site in soft well drained soil in disturbed soil along the Pacific Crest Trail, 2000 m (6600 ft). *Gardner & Columbus 936.*
- ALLOPHYLLUM GILIOIDES (Benth.) A.D. Grant & V.E. Grant subsp. VIOLACEUM (A. Heller) A.G. Day. Annual. Occasional in drainages, in pine duff and exposed sandy soil, 1900–2100 m (6300–6900 ft). *Gardner & Fraga 197.*
- ERIASTRUM DENSIFOLIUM (Benth.) H. Mason subsp. ELONGATUM (Benth.) H. Mason. Perennial herb. Occasional on exposed steep slopes, 1600 m (5300 ft). *Gardner 36.*
- ERIASTRUM EREMICUM (Jeps.) H. Mason subsp. EREMICUM. Annual. Occasional on bajadas and compact soil, 1100 m (3600 ft). *Gardner & Paik 1445.*
- ERIASTRUM SAPPHIRINUM (Eastw.) H. Mason subsp. BREVIBRACTEATUM S. De Groot. Annual. Uncommon on desert slopes and bank of wash, 1500 m (4900 ft). *Gardner & Poutasse 820.*
- ERIASTRUM SIGNATUM D. Gowen. Annual. Uncommon in dry flat meadows and drainages, 1900 m (6300 ft). *Gardner & Fraga 161.*
- GILIA BRECCIARUM M.E. Jones subsp. BRECCIARUM. Annual. Common in washes and exposed rocky slopes and in pinyon woodlands, 1900 m (6300 ft). *Gardner & Fraga 169.*
- GILIA BRECCIARUM M.E. Jones subsp. NEGLECTA A.D. Grant & V.E. Grant. Annual. Common on bajadas and desert slopes, 1300–1500 m (4300–4900 ft). *Gardner, Alba, & Alba 120.*
- GILIA CANA (M.E. Jones) A. Heller subsp. CANA. Annual. Occasional in drainages and steep exposed slopes, 1900 m (6300 ft). *Gardner & Fraga 235.*
- GILIA CAPITATA Sims subsp. ABROTANIFOLIA (Greene) V.E. Grant. Annual. Occasional on steep exposed rocky slopes and in seeps, 1300–2000 m (4300–6600 ft). *Gardner & Columbus 372.*
- GILIA CLOKEYI H. Mason. Annual. Occasional in rock outcrops and drainages, 1200–2000 m (4000–6600 ft). *Gardner & Fraga 190.*
- # GILIA INTERIOR (H. Mason & A.D. Grant) A.D. Grant. Annual. Common in disturbed sites and sandy soil, 900–2000 m (3000–6600 ft). *Gardner & De Groot 610.*
- # GILIA LATIFLORA (A. Gray) A. Gray subsp. CUYAMENSIS A.D. Grant & V.E. Grant. Annual. Rare on desert slopes and in rock outcrops only found in Cholla Canyon, 1300 m (4300 ft). *Gardner & De Groot 653.*
- GILIA LATIFLORA (A. Gray) A. Gray subsp. DAVYI (Milliken) A.D. Grant & V.E. Grant. Annual. Uncommon on sandy slopes and banks of washes, 1100–1600 m (3600–5300 ft). *Gardner & Poutasse 828.*
- GILIA LATIFLORA (A. Gray) A. Gray subsp. LATIFLORA. Annual. Common on bajadas and steep sandy slopes, 1100–1900 m (3600–6200 ft). *Gardner & Columbus 924.*
- # GILIA LEPTANTHA Parish subsp. PINETORUM A.D. Grant & V.E. Grant. Annual. Rare on rocky flat ground on the plateau, 2000 m (6600 ft). *Gardner & Nazaire 1024.*

- GILIA LEPTANTHA Parish subsp. PURPUSII (Milliken) A.D. Grant & V.E. Grant. Annual. Common in drainages and gravel slopes under Jeffrey pines, 2000 m (6600 ft). *Gross 2501*.
- GILIA LEPTANTHA Parish subsp. TRANSVERSA A.D. Grant & V.E. Grant. Annual. Rare around rock outcrops on ridges. Determination confirmed by Dr. J. Mark Porter, 2000 m (6600 ft). *Gardner & Columbus 312*.
- GILIA MALIOR A.G. Day & V.E. Grant. Annual. Uncommon on steep slopes and compact conglomerate soil, 1100–1300 m (3600–4300 ft). *Gardner; Poutasse, & Chumchim 1189*.
- GILIA MINOR A.D. Grant & V.E. Grant. Annual. Occasional on bajadas and well drained level sandy soil, 1000–1300 m (3300–4300 ft). *Gardner; Poutasse, & Maldonado 565*.
- GILIA OCHROLEUCA M.E. Jones subsp. OCHROLEUCA. Annual. Common on bajadas and desert slopes, 1200–1600 m (4000–5300 ft). *Gardner & De Groot 617*.
- GILIA OCHROLEUCA M.E. Jones subsp. VIVIDA (A.D. Grant & V.E. Grant) A.D. Grant & V.E. Grant. Annual. Uncommon on bajadas and mountain slopes, 1000–2000 m (3300–6600 ft). *Gardner & De Groot 629*.
- GILIA SINUATA Benth. Annual. Uncommon on bajadas and along disturbed old OHV road, 1200 m (4000 ft). *Gardner & Fraga 1312*.
- GILIA TRANSMONTANA (H. Mason & A.D. Grant) A.D. Grant & V.E. Grant. Annual. Uncommon in pinyon woodlands along the Pacific Crest Trail, 2000 m (6600 ft). *Gardner & England 779b*.
- LEPTOSIPHON CHRYSANTHUS J.M. Porter & R. Patt. [= *L. AUREUS* (Nutt.) E. Vilm. subsp. *AUREUS*]. Annual. Common on bajadas and desert slopes, 1000–1600 m (3300–5300 ft). *Gardner; Alba, Alba, & Alba 124*.
- LEPTOSIPHON NUDATUS (Greene) J.M. Porter & L.A. Johnson. Annual. Occasional on steep exposed mountain slopes, 2000 m (6600 ft). *Gardner & Fraga 172*.
- LINANTHUS BIGELOVII (A. Gray) Greene. Annual. Uncommon on bajadas and desert slopes, 1300 m (4300 ft). *Gardner & De Groot 618*.
- LINANTHUS DICHOTOMUS Benth. subsp. DICHOTOMUS. Annual. Common on bajadas and rocky desert slopes, 1200–2000 m (4000–6600 ft). *Gardner & De Groot 674*.
- LINANTHUS PARRYAE (A. Gray) Greene. Annual. Common on bajadas, desert floor, drainages and rock outcrops, 1100–1700 m (3600–5600 ft). *Gardner & England 756*.
- LINANTHUS PUNGENS (Torr.) J.M. Porter & L.A. Johnson. Annual. Occasional in rock outcrops and drainages, 2000–2100 m (6600–6900 ft). *Gardner & Fraga 220*.
- LOESLIASTRUM MATTHEWSII (A. Gray) Timbrook. Annual. Common on bajadas and desert slopes, 1600 m (5300 ft). *Gardner & Fraga 262*.
- MICROSTERIS GRACILIS (Hook.) Greene. Annual. Common on bajadas and in pinyon woodlands, 1000–2000 m (3300–6600 ft). *Gardner; Alba, Alba, & Alba 129*.
- PHLOX DIFFUSA Benth. Perennial herb. Uncommon along the Pacific Crest Trail in pinyon woodlands, 2000 m (6600 ft). *Gardner; Elam, & Nico 411*.

POLYGONACEAE

- CENTROSTEGIA THURBERI A. Gray. Annual. Common on bajadas and desert slopes, 1000–2000 m (3300–6600 ft). *Gardner & Paik 111*.
- CHORIZANTHE BREVICORNU Torr. Annual. Occasional on bajadas and rocky desert slopes, 1200 m (4000 ft). *Gardner & Sutton 1230*.
- CHORIZANTHE RIGIDA (Torr.) Torr. & A. Gray. Annual. Rare on bajadas and rolling compacted conglomerate clay soil, 1200 m (4000 ft). *Gardner; Poutasse, & Chumchim 1184*.
- CHORIZANTHE WATSONII Torr. & A. Gray. Annual. Common on bajadas and in washes and loose sandy soil, 1200–2000 m (4000–6600 ft). *Gardner & Gardner 139a*.
- ERIOGONUM ANGULOSUM Benth. Annual. Occasional in rock outcrops and desert slopes, 1100–1300 m (3600–4300 ft). *Gardner & Columbus 913*.
- ERIOGONUM BAILEYI S. Watson var. BAILEYI. Annual. Occasional on bajadas and desert slopes, 1600 m (5300 ft). *Gardner & Fraga 260*.
- # ERIOGONUM BREEDLOVEI (J.T. Howell) Reveal var. SHEVOCKII J.T. Howell. Perennial herb. Rare on exposed mountain ridges, 2000 m (6600 ft). *Shevock 11421* (CAS).

- ERIOGONUM DEFLEXUM Torr. var. BARATUM (Elmer) Reveal. Annual. Common in disturbed sandy soil, usually along roadcuts and trails, 1600–1700 m (5300–5600 ft). *Gardner & Columbus 275*.
- ERIOGONUM FASCICULATUM Benth. var. POLIFOLIUM (DC.) Torr. & A. Gray. Shrub. Common on bajadas and desert slopes, 1400–1600 m (4600–5300 ft). *Gardner & Columbus 378*.
- ERIOGONUM GRACILLIMUM S. Watson. Annual. Common on rocky desert slopes, 1000–1200 m (3300–4000 ft). *Gardner & De Groot 643*.
- ERIOGONUM HIRTIFLORUM S. Watson. Annual. Uncommon on mountain ridges in well drained soil, 1500 m (4900 ft). *Erter 6000* (UC).
- ERIOGONUM INERME (S. Watson) Jeps. var. HISPIDULUM Goodman. Annual. Uncommon on mountain ridge in well drained soil, 2000 m (6600 ft). *Gardner & Columbus 310*.
- ERIOGONUM INFLATUM Torr. & Frém. Perennial herb. Occasional on bajadas and desert slopes, 1400 m (4600 ft). *Gardner & Pilapil 470*.
- ERIOGONUM MACULATUM A. Heller. Annual. Occasional on bajadas and site disturbed by cattle, 1300–1400 m (4300–4600 ft). *Gardner & Gardner 142*.
- ERIOGONUM NIDULARIUM Coville. Annual. Occasional on bajadas and rocky desert slopes, 1200–1300 m (4000–4300 ft). *Gardner & Columbus 914*.
- ERIOGONUM NUDUM Benth. var. WESTONII (S. Stokes) J.T. Howell. Perennial herb. Common on banks of washes and in pinyon woodlands, 2000 m (6600 ft). *Gardner & Pilapil 463*.
- ERIOGONUM PUSILLUM Torr. & A. Gray. Annual. Common on bajadas, rock outcrops and desert slopes, 1400–1700 m (4600–5600 ft). *Gardner & De Groot 652*.
- ERIOGONUM ROSEUM Durand & Hilg. Annual. Common on exposed steep mountain slopes, 1200–2000 m (4000–6600 ft). *Gardner & Fraga 253*.
- ERIOGONUM SAXATILE S. Watson. Perennial herb. Common in rock outcrops in crevices of rocks and in dense pinyon pine woodland, 1100–2100 m (3600–6900 ft). *Gardner & Fraga 219*.
- ERIOGONUM UMBELLATUM Torr. var. SUBARIDUM S. Stokes. Perennial herb. Common in rock outcrops and compact rocky soil, 2000 m (6600 ft). *Gardner & Columbus 314*.
- ERIOGONUM WRIGHTII Benth. var. SUBSCAPOSUM S. Watson. Shrub. Common on the plateau and along the Pacific Crest Trail, 2000 m (6600 ft). *Shevock 11023* (CAS).
- * POLYGONUM AVICULARE L. subsp. AVICULARE. Annual. Uncommon in disturbed sites along roadside in Horse Canyon, 1600 m (5300 ft). *Gardner & De Groot 723*.
- POLYGONUM POLYGALOIDES Meisn. subsp. KELLOGGII (Greene) J.C. Hickman. Annual. Uncommon in disturbed washes and exposed compact soil, 2000 m (6600 ft). *Gardner & Columbus 330*.
- PTEROSTEGIA DRYMARIOIDES Fisch. & C.A. Mey. Annual. Occasional from base of rocks in moist soil and shade from rock, 1000–1200 m (3300–4000 ft). *Gardner & De Groot 638*.
- RUMEX SALICIFOLIUS Weinm. Perennial herb. Common in rocky, seasonally wet drainages and around boulders, 1900 m (6300 ft). *Gardner & Columbus 297*.

PRIMULACEAE

- # ANDROSACE ELONGATA L. subsp. ACUTA (Greene) G.T. Robbins. Annual. Rare on bajadas on gentle sloping exposed sandy soil, 1000 m (3300 ft). *Gardner & Fraga 1361*.

RANUNCULACEAE

- AQUILEGIA FORMOSA DC. Perennial herb. Rare in seeps in protected shaded canyon. Only found in Sage Canyon, 1600 m (5300 ft). *Gardner & Columbus 373*.
- CLEMATIS LIGUSTICIFOLIA Nutt. Perennial herb (vine). Uncommon in shade of pines in drainage of canyon, 1500 m (4900 ft). *Gardner & Forgrave 430*.
- DELPHINIUM HANSENII (Greene) Greene subsp. KERNENSE (Davidson) Ewan. Geophyte. Uncommon in mountain drainages and along the Pacific Crest Trail, 2000–2100 m (6600–6900 ft). *Gardner & Columbus 357*.
- DELPHINIUM PARISHII A. Gray subsp. PARISHII. Geophyte. Common along the Pacific Crest Trail and desert slopes, 1200–2100 m (4000–6900 ft). *Gardner & Poutasse 839*.

- # DELPHINIUM PURPUSII Brandegee. Geophyte. Rare along Highway 178 near Onyx. 900 m (3000 ft). *Howald 2496* (UCR).
 MYOSURUS MINIMUS L. Annual. Uncommon in moist soil in open pinyon woodland, 1400 m (4600 ft). *Ertter 6007* (UC).
 RANUNCULUS CYMBALARIA Pursh. Perennial herb. Occasional in moist soil in springs, 1100–1800 m (3600–5900 ft). *Gardner & Poutasse 860*.

RHAMNACEAE

- CEANOTHUS VESTITUS Greene. Shrub. Common in post-burn sites on the plateau in thickets, 1000–2000 m (3300–6600 ft). *Gardner & Fraga 252*.
 FRANGULA CALIFORNICA (Eschsch.) A. Gray subsp. CUSPIDATA (Greene) Kartesz & Gandhi. Shrub. Uncommon in shade of pines in rock outcrops, 1500–2000 m (4900–6600 ft). *Gardner, Elam, & Nico 394*.

ROSACEAE

- AMELANCHIER UTAHENSIS Koehne. Shrub. Uncommon in mountain drainages and near springs, 2000 m (6600 ft). *Gardner & Columbus 917*.
 CERCOCARPUS BETULOIDES Nutt. var. BETULOIDES. Shrub. Occasional on mountain slopes and among pines, 1100–2100 m (3600–6900 ft). *Gardner & Fraga 215*.
 CERCOCARPUS LEDIFOLIUS Nutt. Shrub. Rare on exposed mountain slopes, 1900 m (6300 ft). *Shevock 10800* (CAS).
 COLEOGYNE RAMOSISSIMA Torr. Shrub. Common on desert slopes and mountain slopes, 1200 m (4000 ft). *Gardner & Sutton 1208*.
 DRYMOCALLIS GLANDULOSA (Lindl.) Rydb. var. REFLEXA (Greene) Ertter. Perennial herb. Occasional in drainages and rocky soil, 1900 m (6300 ft). *Gardner & Columbus 286*.
 HOLODISCUS DISCOLOR (Pursh.) Maxim. var. MICROPHYLLUS (Rydb.) Jeps. Shrub. Common in rock outcrops and rocky moist drainages, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 227*.
 HORKELIELLA PURPURASCENS (S. Watson) Rydb. Perennial herb. Occasional in pinyon woodlands on level rocky soil in drainages, 1900–2000 m (6300–6600 ft). *Gardner & Columbus 350*.
 IVESIA SANTOLINOIDES A. Gray. Perennial herb. Occasional in rock outcrops in mixed conifer forest, 1900 m (6300 ft). *Gardner & Fraga 192b*.
 IVESIA SAXOSA (Greene) Ertter. Perennial herb. Occasional in rock outcrops in mixed conifer forest, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 187*.
 PRUNUS ANDERSONII A. Gray. Shrub. Common on bajadas and desert slopes, 1400–1500 m (4600–4900 ft). *Gardner & Paik 88*.
 PRUNUS FASCICULATA (Torr.) A. Gray var. FASCICULATA. Shrub. Uncommon on rocky mountain slopes along Highway 178, 900 m (3000 ft). *Gardner & De Groot 679*.
 PURSHIA TRIDENTATA (Pursh.) DC. var. GLANDULOSA (Curran) M.E. Jones. Shrub. Occasional in pinyon woodlands in rock outcrops, 1100 m (3600 ft). *Gardner & De Groot 680*.

RUBIACEAE

- # GALIUM ANGUSTIFOLIUM A. Gray subsp. ONYCNENSE (Dempster) Dempster & Stebbins. Perennial herb. Rare in rocky drainages on plateau, 2000 m (6600 ft). *Gardner & Columbus 932*.
 GALIUM APARINE L. Annual. Common under pinyon-oak understory and along the Pacific Crest Trail, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 202*.
 GALIUM HALLII Munz & I.M. Johnst. Perennial herb. Common on desert slopes and in open pinyon forests, 1800–1900 m (5900–6300 ft). *Gardner & Fraga 225*.

SALICACEAE

- POPULUS FREMONTII S. Watson subsp. FREMONTII. Tree. Occasional in desert springs and riparian areas, 1200 m (4000 ft). *Gardner & Paik 102*.
 SALIX EXIGUA Nutt. Shrub. Occasional in seeps in Jeffrey pine forest, 2000 m (6600 ft). *Gardner & Paik 1465*.
 SALIX GOODINGII C.R. Ball. Tree. Occasional in desert riparian areas, 1200–1500 m (4000–4900 ft). *Gardner & England 757*.
 SALIX LAEVIGATA Bebb. Tree. Common in desert washes and mountain drainages, 1500–1900 m (4900–6300 ft). *Gardner & Paik 95*.

- SALIX LASIANDRA Benth. Tree. Common in desert washes and riparian areas, 1300 m (4300 ft). *Gardner & Nazaire 1054*.
 SALIX LASIOLEPIS Benth. Shrub. Occasional in mountain drainages, 2000 m (6600 ft). *Gardner & Nazaire 1014*.
 SALIX LUTEA Nutt. Shrub. Occasional in drainages along the Pacific Crest Trail, 1600 m (5300 ft). *York 744* (CAS).

SAXIFRAGACEAE

- HEUCHERA RUBESCENS Torr. Perennial herb. Occasional in cracks of boulders and in shade of boulders, 2100 m (6900 ft). *Gardner & Columbus 959*.

SCROPHULARIACEAE

- SCROPHULARIA CALIFORNICA Cham. & Schltdl. Perennial herb. Occasional from base of boulders and in crevices of rocks, 1000–1400 m (3300–4600 ft). *Gardner & De Groot 631*.

SOLANACEAE

- DATURA WRIGHTII Regel. Perennial herb. Occasional on rocky desert slopes and banks of washes, 1300–1600 m (4300–5300 ft). *Gardner & Forgrave 440*.
 LYCIUM ANDERSONII A. Gray. Shrub. Common on bajadas and desert slopes, 1000–1200 m (3300–4000 ft). *Gardner & De Groot 663*.
 LYCIUM COOPERI A. Gray. Shrub. Common on bajadas and desert slopes, 1000–1400 m (3300–4600 ft). *Gardner & De Groot 664*.
 NICOTIANA ATTENUATA S. Watson. Annual. Common in pinyon woodlands and along the Pacific Crest Trail and disturbed soils, 1300–2000 m (4300–6600 ft). *Gardner, Elam, & Nico 386*.
 SOLANUM XANTI A. Gray. Perennial herb. Occasional in open pine woodland around base of boulders, 1900–2100 m (6300–6900 ft). *Gardner & Columbus 930*.

URTICACEAE

- URTICA DIOICA L. subsp. HOLOSERICEA (Nutt.) Thorne. Perennial herb. Occasional in seeps and desert washes on banks of washes, 1300 m (4300 ft). *Gardner & Nazaire 1046*.

VALERIANACEAE

- PLECTRITIS CONGESTA (Lindl.) DC. subsp. BRACHYSTEMON (Fisch. & C.A. Mey.) Morey. Annual. Occasional in drainages in mixed conifer forests, 2000 m (6600 ft). *Gardner & Columbus 368*.

VIOLACEAE

- VIOLA PURPUREA Kellogg subsp. QUERCETORUM (M.S. Baker & J.C. Clausen) R.J. Little. Perennial herb. Rare in unburned Jeffrey pine forest in pine duff, 2100 m (6900 ft). *Gardner & Columbus 990*.

VISCACEAE

- ARCEUTHOBIUM CAMPYLOPODUM Engelm. Perennial herb (parasitic). Common on gray pines and in pinyon woodlands, 1100–1900 m (3600–6200 ft). *Gardner & Paik 107*.
 PHORADENDRON JUNIPERINUM A. Gray. Perennial herb (parasitic). Occasional on junipers, 1500 m (4900 ft). *Gardner & Paik 109*.
 PHORADENDRON LEUCARPUM (Raf.) Reveal & M.C. Johnst. subsp. TOMENTOSUM (DC.) J.R. Abbott & R.L. Thomps. Perennial herb (parasitic). Common on oaks, 1900 m (6300 ft). *Gardner & Fraga 251*.

ZYGOPHYLLACEAE

- LARREA TRIDENTATA (DC.) Coville. Shrub. Common on bajadas and desert floor, 1100–1200 m (3600–4000 ft). *Gardner & Forgrave 443*.

ANGIOSPERMAE—MONOCOTYLEDONES

AGAVACEAE

- HESPEROYUCCA WHIPPLEI (Torr.) Trel. Perennial subshrub. Common on alluvial bajadas. Upper reaches of southern canyons, abundant in W and E canyons, 1700–2100 m (5600–6900 ft). *Gardner, Elam, & Nico 410*.

YUCCA BREVIFOLIA Engelm. Tree. Occasional on rocky steep slopes and outcrops, 1200–1700 m (4000–5600 ft). *Gardner & Paik 98*.

ALLIACEAE

ALLIUM BURLEWII Davidson. Geophyte. Common in soft sandy granitic soil among pinyon woodlands, usually N-facing slopes, 1800–2100 m (5900–6900 ft). *Gardner & Fraga 174*.

ALLIUM DENTICULATUM (Traub) McNeal. Geophyte. Common in washes, intermittent streams and compacted soils, 2000 m (6600 ft). *Gross 2477*.

ALLIUM FIMBRIATUM S. Watson var. FIMBRIATUM. Geophyte. Common in washes, intermittent streams, exposed pebbly soils, 1400–2100 m (4600–6900 ft). *Gardner & England 789*.

ALLIUM LACUNOSUM S. Watson var. KERNENSE McNeal & Ownbey. Geophyte. Occasional on compacted, exposed conglomerate clay desert bajada soils, 1000–1300 m (3500–4300 ft). *Gardner 1384*.

ALLIUM PENINSULARE Greene var. PENINSULARE. Geophyte. Uncommon in shaded NW slopes of the Wilderness. Near Highway 178, 900 m (3000 ft). *Shevock 9572* (CAS).

CYPERACEAE

CAREX ALMA L.H. Bailey. Perennial herb. Common in springs and seeps, 2000 m (6600 ft). *Gardner & Nazaire 1013*.

CAREX DOUGLASII Boott. Perennial herb. Occasional in disturbed dry soils, intermittent drainages and around water sources, 2000 m (6600 ft). *Gardner & Columbus 370*.

ELEOCHARIS PARISHII Britton. Perennial herb. Common in springs and drainages with standing water, 1200–2000 m (4000–6600 ft). *Gardner & Columbus 301*.

JUNCACEAE

JUNCUS BALTICUS Willd. subsp. ATER (Rydb.) Snogerup. Perennial herb. Common in springs and drainages with standing water, 2000 m (6600 ft). *Gardner & Columbus 345b*.

JUNCUS BUFONIUS L. var. BUFONIUS. Perennial herb. Common in springs and drainages with standing water, 2000 m (6600 ft). *Gardner & Columbus 346*.

JUNCUS MACROPHYLLUS Coville. Perennial herb. Common in springs and drainages with standing water, 2000 m (6600 ft). *Gardner & Columbus 300*.

JUNCUS MEXICANUS Willd. Perennial herb. Occasional in drainages in moist rocky soil, 2000 m (6600 ft). *Gardner & Columbus 295*.

JUNCUS RUGULOSUS Engelm. Perennial herb. Occasional in desert wash in shade of oaks in wet soil, 1500 m (4900 ft). *Gardner & Forgrave 417*.

JUNCUS XIPHIODES E. Mey. Perennial herb. Uncommon in desert riparian spring in shady wet rich soil, 1300 m (4300 ft). *Gardner & Nazaire 1049*.

IRIDACEAE

* IRIS PSEUDACORUS L. Geophyte. Rare in moist wet soils along Highway 178, found at only one site, 1200 m (4000 ft). *Gardner & Paik 1446*.

SISYRINCHIUM HALOPHILUM Greene. Geophyte. Uncommon in springs, 2000 m (6600 ft). *Gardner & Columbus 335*.

LILIACEAE

CALOCHORTUS INVENUSTUS Greene. Geophyte. Occasional in pinyon woodlands and along the Pacific Crest Trail, 1600–2000 m (5300–6600 ft). *Gardner & LaShure 898*.

FRITILLARIA PINETORUM Davidson. Geophyte. Rare on coarse, fine, gravelly, steep, sandy N-facing slope, 1700 m (5600 ft). *Shevock 11432* (CAS).

ORCHIDACEAE

EPIPACTIS GIGANTEA Hook. Perennial herb. Rare in shaded moist canyons. Only one known occurrence in Cap Canyon, 1200 m (4000 ft). *Shevock 12153* (CAS).

POACEAE

* AVENA FATUA L. Annual. Uncommon only one patch found in Scodie Canyon along bank of wash, 1200 m (4000 ft). *Gardner & Poutasse 857*.

BROMUS CARINATUS Hook. & Arn. var. CARINATUS. Perennial. Common in rock outcrops and rocky moist drainages, 1200–2000 m (4000–6600 ft). *Gardner & Columbus 294*.

BROMUS CARINATUS Hook. & Arn. var. MARGINATUS (Steud.) Barkworth & Anderton. Perennial. Occasional in shade of Jeffrey pines and in pine duff, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 193*.

* BROMUS MADRITENSIS L. subsp. RUBENS (L.) Husn. Annual. Common on bajadas, sites disturbed by cattle and rock outcrops, 1200–1500 m (4000–4900 ft). *Gardner & Gardner 159*.

* BROMUS TECTORUM L. Annual. Common on bajadas, sites disturbed by cattle, mountain slopes and the entire plateau, 1200–2000 m (4000–6600 ft). *Shevock 9500* (CAS).

DESCHAMPSIA DANTHONIOIDES (Trin.) Munro. Annual. Occasional in springs and seasonally wet locations, 1900 m (6300 ft). *Gardner & Fraga 209*.

DESCHAMPSIA ELONGATA (Hook.) Munro. Annual. Occasional in springs and seasonally wet locations, 1900–2000 m (6300–6600 ft). *Gardner & Columbus 333*.

DISTICHLIS SPICATA (L.) Greene. Perennial. Occasional in alkaline soils on flat ground, 1300–1900 m (4300–6200 ft). *Gardner & Paik 104*.

ELYMUS ELYMOIDES (Raf.) Swezey var. BREVIFOLIUS (J.G. Sm.) Dorn. Perennial. Occasional in disturbed post-burn sites, 1700–1900 m (5600–6300 ft). *Gardner & Fraga 212*.

ELYMUS ELYMOIDES (Raf.) var. CALIFORNICUS (J.G. Sm.) J.P. Sm. Perennial. Occasional in dense forested wash in pine duff, 2000 m (6600 ft). *Gardner, Elam, & Nico 384*.

ELYMUS ELYMOIDES (Raf.) Swezey var. ELYMOIDES. Perennial. Common on bajadas and roadsides, 1400–1500 m (4600–4900 ft). *Gardner & Paik 97*.

ELYMUS TRITICOIDES Buckley. Perennial. Occasional in canyon drainages, seeps and springs, 1500–1900 m (4900–6300 ft). *Gardner & Columbus 291*.

ELYMUS X HANSENII Scribn. Perennial. Uncommon in pinyon woodlands and drainages, 1700–1900 m (5600–6300 ft). *Gross 2494*.

* FESTUCA ARUNDINACEA Schreb. Perennial. Uncommon in and around springs and mountain drainages, 2000 m (6600 ft). *Gardner & Columbus 337*.

FESTUCA MICROSTACHYS Nutt. Annual. Common on mountain slopes in shade of pinyon woodlands and disturbed desert soils, 900–2000 m (3000–6600 ft). *Gardner & Fraga 170*.

* FESTUCA MYUROS L. Annual. Uncommon in disturbed soil around pinyon pines and drainages, 900–2000 m (3000–6600 ft). *Gardner & Columbus 303*.

FESTUCA OCTOFLORA Walter. Annual. Common on bajadas and exposed rock outcrops, 1200–2000 m (4000–6600 ft). *Gardner & Fraga 1311*.

HORDEUM BRACHYANTHERUM Nevski subsp. BRACHYANTHERUM. Perennial. Uncommon in springs in pinyon-pine forest, 2000 m (6600 ft). *Gardner & Columbus 351*.

* HORDEUM MURINUM L. subsp. GLAUCUM (Steud.) Tzvelev. Annual. Occasional along roadsides in sandy disturbed soil and alluvial slopes, 1500 m (4900 ft). *Gardner & Gardner 155*.

* HORDEUM MURINUM L. subsp. MURINUM. Annual. Occasional on steep desert slopes, 1700 m (5600 ft). *Gardner & De Groot 586*.

MELICA IMPERFECTA Trin. Perennial. Common in rock outcrops, sandy soils and on mountain slopes, 1200–2000 m (4000–6600 ft). *Gardner & Fraga 194*.

MELICA STRICTA Bol. Perennial. Occasional in rocky drainages and in shade of Jeffrey pines, 1700–1900 m (5600–6300 ft). *Gardner & Fraga 246*.

MUHLENBERGIA RIGENS (Benth.) Hitchc. Perennial. Occasional in drainages surrounded by pinyon and Jeffrey pines, 1400–2000 m (4600–6600 ft). *Gardner & Columbus 356*.

* POA ANNUA L. Annual. Common on bajadas and desert slopes, 1200 m (4000 ft). *Twisselmann 8190* (CAS).

POA PRATENSIS L. subsp. PRATENSIS. Perennial. Occasional in springs and seasonally wet locations, 2000–2100 m (6600–6900 ft). *Gardner & Columbus 338a*.

POA SECUNDA J. Presl subsp. SECUNDA. Perennial. Common on desert slopes and understory of pinyon woodlands, 1500–2000 m (4900–6600 ft). *Gardner & Paik 90*.

- * POLYPOGON INTERRUPTUS Kunth. Perennial. Uncommon in desert springs and loose sandy soil, 1400 m (4600 ft). *Henry s.n* (UCR).
- * POLYPOGON MONSPELIENSIS (L.) Desf. Perennial. Uncommon in springs in pinyon-pine forest, 2000 m (6600 ft). *Gardner & Columbus 302*.
- * POLYPOGON VIRIDIS (Gouan) Breistr. Perennial. Uncommon in desert riparian area of Sage Canyon, 1200 m (4000 ft). *Gardner & Nazaire 1050*.
- * SCHISMUS ARABICUS Nees. Annual. Common on bajadas and roadsides, 1100 m (3600 ft). *Shevock 10369* (CAS).
- * SCHISMUS BARBATUS (L.) Thell. Annual. Common on bajadas and in pinyon woodlands, 900–1300 m (3000–4300 ft). *Shevock 9208* (CAS).
- STIPA HYMENOIDES Roem. & Schult. Perennial. Occasional on bajadas and well drained level sandy soil, 1000–1100 m (3300–3600 ft). *Gardner & Columbus 1004*.
- STIPA LATIGLUMIS Swallen. Perennial. Occasional in rock outcrops, 1900–2000 m (6300–6600 ft). *Gardner & Fraga 221*.
- STIPA OCCIDENTALIS S. Watson var. CALIFORNICA (Merr. & Burt Davy) C.L. Hitchc. Perennial. Occasional on exposed rocky clay soil and mountain slopes, 2100 m (6900 ft). *Gardner & Columbus 948*.
- STIPA PARISHII Vasey var. PARISHII. Perennial. Uncommon in pinyon woodlands and drainages, 1900 m (6300 ft). *Gardner & Fraga 200*.

STIPA SPECIOSA Trin. & Rupr. Perennial. Common on desert slopes and in pinyon woodlands, 1200–2100 m (4000–6900 ft). *Gardner & Columbus 289*.

THEMIDACEAE

DICHELOSTEMMA CAPITATUM (Benth.) Alph. Wood subsp. CAPITATUM. Geophyte. Abundant and common, on dry, exposed rocky S-facing slopes and outcrops, 1000–2000 m (3300–6600 ft). *Gardner, Alba, Alba, & Alba 126*.

MUILLA CORONATA Greene. Geophyte. Uncommon on pebbly, sandy desert bajadas and steep sandy N-facing slopes of mountains, 1300–1700 m (4300–5600 ft). *Gardner & Fisher 1285*.

MUILLA MARITIMA (Torr.) S. Watson. Geophyte. Uncommon base of rock outcrops, desert bajadas, 1200–1400 m (4000–4600 ft). *Gardner, Poutasse, & Chumchim 1149*.

TYPHACEAE

TYPHA DOMINGENSIS Pers. Perennial herb. Rare in seeps in protected shaded canyon. Only found in Sage Canyon, 1600 m (5300 ft). *Gardner & Columbus 375*.