

Vascular Plants of the Oasis de Los Osos Reserve, San Jacinto Mountains, California

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ABSTRACT: The flora of Oasis de los Osos is an unusual assemblage of species drawn from the surrounding mountains and deserts of Southern California. The 160 acre palm oasis is a University of California Natural Reserve administered by the University of California, Riverside. The Oasis is located in the western Coachella Valley at the northwestern edge of the Sonoran Desert and on the northern slope of the San Jacinto Mountains. Botanists have visited the area since the 1890s, facilitated by the railroad route through San Geronimo Pass, and have been intrigued by its location in a transitional zone between Sonoran Desert, Mojave Desert, montane, and South Coast floristic regions. Since the 1970s, the Oasis has been protected from development, first by the Nature Conservancy and then as a University of California Natural Reserve. Despite this long history of botanical collections and protection, there has never been a checklist published for the area. We made a comprehensive list of the vascular plants present at the Oasis by documenting the flora with our own botanical surveys and with historical collections in herbaria. We annotated the checklist with information on nativity, habit, rarity, and distribution. A total of 164 native and 24 non-native taxa were documented from the Oasis, including one rare plant, *Galium angustifolium* subsp. *gracillimum* (California Rare Plant Rank 4.2). The vegetation in the Oasis transitions from brittlebush scrub at low elevations to mixed scrub at higher elevations. Shrubs are the dominant cover type and represent 20% (38 taxa) of the plant diversity. The riparian habitat is fed by Lamb Creek, a stream that supports native fan palms, willows, cottonwoods, and a variety of herbaceous species. The Oasis flora represents an unusual mixture of taxa from the surrounding San Jacinto and San Bernardino mountains (138 taxa, 73%) and the Sonoran and Mojave Deserts (109 taxa, 58%). Invasive grasses such as brome (*Bromus* spp.) and Mediterranean grass (*Schismus barbatus*) are the dominant ground cover at lower elevations, but the other 14 invasive species we documented are not well-established. The Oasis contains a great deal of plant diversity, considering its small geographic area. We compared the Oasis flora with Deep Canyon and found that 67% of Oasis species are also present at Deep Canyon. The Oasis de los Osos

is a largely intact palm oasis and canyon that is representative of the transitional floristic diversity of the western Coachella Valley.

KEYWORDS: California, ecotone, floristics, invasive species, Mojave Desert, palm oasis, Peninsular range, riparian, Sonoran desert

INTRODUCTION

California has high native vascular plant diversity with 6,527 minimum-rank taxa and an estimated 2,274 endemic taxa (Jepson Flora Project 2017). Much of this diversity can be attributed to landscape heterogeneity and the resulting diversity in elevation, precipitation, soils, and slopes (Baldwin 2014). Transitional zones between diverse habitats provide additional niches for plants. California is the most populous state in the United States with 39 million people as of 2015 (State of California, Department of Finance 2016). As a result, California's natural resources are under pressure from urban and agricultural development; specifically, water use, energy production, and changes in land-use causing habitat eradication (Riordan & Rundel 2014). Additionally, climate change is projected to negatively affect California's native plants, especially taxa that are unable to quickly disperse to suitable habitats (Anacker et al. 2013).

The coastal basins and coastal mountains of the California Floristic Province (CFP) contain a large portion of the state's plant diversity and bear the brunt of much of the anthropogenic environmental impact, but the California deserts are also botanically diverse and under increasing development pressure. The desert floristic regions in California are the Great Basin, Mojave, and Sonoran (Colorado) Deserts. The Mojave and Sonoran Deserts meet in a sinuous zone, roughly corresponding to the 34th parallel and the northern boundary of Riverside County. Near the Coachella Valley, the Sonoran floristic region displaces the Mojave floristic region and extends through San Gorgonio Pass, an approximately 22 km (14 mi) long and 3.5 km (2.5 mi) wide gap between the San Bernardino Mountains to the north and the San Jacinto Mountains to the south. The elevation in the pass decreases from its western point in Banning (700 m) to its eastern end in Whitewater (400 m). San Gorgonio Pass is naturally unobstructed and has historically been the main transportation route east of the Los Angeles Basin. Interstate 10 and Union Pacific railroad lines currently travel through the pass. The canyon created by the San Bernardino and San Jacinto Mountains makes the pass one of the windiest places in the region, and it is one of the three largest wind energy production areas in California (Bureau of Land Management 1982; California Energy Commission 2017).

Several watersheds drain into San Gorgonio Pass. Notably, the Whitewater River near the eastern edge of the pass winds through a long, broad canyon from the

southern end of the San Bernardino Mountains and eventually enters the Salton Sea 70 km (43 mi) to the southeast. The Whitewater River historically fed a trout farm - usually labeled as "fish hatchery" on maps and specimens - located approximately 8 km (5 mi) north of the mouth of the canyon. Approximately 8 km (5 mi) west of Whitewater, Snow Creek ends its steep course through Snow Canyon, draining the northern San Jacinto Mountains before unceremoniously soaking into the Sonoran sand dunes. There was also a state-owned fish hatchery along Snow Creek that is referenced in legal documents from the 1930s (California Public Utilities Commission 1932) and sometimes on specimen labels. Lamb Creek is just to the west of Snow Creek, where it has cut its own canyon down the north slope of the San Jacintos and trickles into a fan palm oasis called the Oasis de los Osos (Figure 1).

Our goal was to produce a comprehensive list of the vascular plants at the Oasis, including angiosperms, gymnosperms, ferns, and lycophytes. We accomplished this by vouchering 119 taxa present during 12 field days from March 2016 to March 2017, and depositing them in the California State University, Long Beach (CSULB) herbarium (LOB) and the University of California James Reserve Herbarium (UCJR). We also included 69 taxa from specimens previously collected at the Oasis that are housed at the University of California Riverside Herbarium (UCR), Rancho Santa Ana Botanic Garden and Pomona College Herbarium (RSA-POM), and UCJR.

SITE DESCRIPTION

We give a brief account, but a more thorough review of the geology, climate, hydrology, and land use of the Coachella Valley, including Snow Canyon, can be found in McHargue (1973).

Location

The Oasis de los Osos is located in Riverside County in Southern California (Figure 1). The 160 acre property ranges from 400 m to 650 m (1310-2130 ft) in elevation and lies within San Gorgonio Pass, on the northeast edge of the San Jacinto Mountains. The Oasis is 12 miles northwest of Palm Springs and the Coachella Valley, just to the west of the community of Snow Creek. Lamb Creek is a perennial stream fed by the San Jacinto Mountains that cuts a channel from its headwaters at One Horse Ridge and empties into the San Gorgonio River. This area of the San Gorgonio Pass is on the northwestern boundary of the Sonoran desert and is a transition zone between desert and montane regions.



Figure 1. Oasis de los Osos is located in western Riverside County, California. The Oasis is in San Gorgonio Pass, near Whitewater and Palm Springs. Important features of the Oasis (inset) include Lamb Creek, a waterfall, and the alluvial fan near the village of Snow Creek. Images downloaded from Google Earth Pro and used with permission.

Geology

The San Jacinto Mountains are part of the Peninsular Range Province. These mountains were formed when the continued collision of the Pacific and North American tectonic plates created a number of batholiths which made their way through the earth's surface (Millar 2012). As a result, the range is mostly composed of solid granite rock. The Oasis de los Osos is a stream channel formed by north-facing slopes that opens into to an alluvial fan in San Gorgonio Pass.

Climate

Temperature at the Oasis is mild in the winters, 21-32°C (70-90°F), and quite hot in the summers, typically reaching more than 38°C (100°F; NOAA 2002; Table 1). Precipitation is typically concentrated in the fall and winter (August-February). In 2016, temperatures were similar to historical monthly averages. Rainfall in 2016 was limited to late fall and winter, with a period of 234 days (Jan. 31-Sept. 20) during which only 0.28 cm (0.11 in) of precipitation was measured.

	January	February	March	April	May	June	July	August	September	October	November	December
2016 avg. max. temp. (°C)	20.00	28.00	28.00	31.00	33.00	41.00	43.00	42.00	36.00	33.00	27.00	19.00
2016 avg. max. temp. (°F)	68.00	82.00	83.00	87.00	91.00	106.00	109.00	108.00	97.00	91.00	80.00	67.00
Historical avg. max. temp. (°F)	70.00	75.00	80.00	88.00	95.00	104.00	108.00	107.00	101.00	91.00	78.00	70.00
2016 precip. (cm)	8.15	0.00	0.00	0.28	0.00	0.00	0.00	0.00	1.75	0.18	0.36	1.88
2016 precip. (in)	3.21	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.69	0.07	0.14	0.74
Historical precip. (in)	1.27	1.15	0.63	0.08	0.06	0.05	0.19	0.40	0.39	0.11	0.29	0.61

Table 1. Monthly average maximum temperature and monthly total precipitation at Palm Springs Airport, California weather station in 2016 and historical monthly averages, 1971-2000 from NOAA (2002).

Land Ownership

The Coachella Valley is the traditional territory of a number of Native American groups (Bean et al. 1978). Documented archaeological sites on the Oasis property are a temporary Teshana Wanakik camp site (CA-RIV-82) and a rockshelter (CA-RIV-83). Both sites had potsherds of the lower Colorado buff ware typical of the area. In 1929, Lucy and Denver Lamb built a homestead and grazed sheep in the canyon. Their home was ruined during a flood in the late 1930s, and the ruins are visible from the main hiking trail. The land was purchased by John van Pelt in the 1940s with the intention of building a resort. In 1971, The Nature Conservancy purchased the Oasis with donations from Robert Bear, for whom the reserve is named (“Oasis of the Bear”). In 1987, The Nature Conservancy deeded the land to the University of California, and it became part of the UC Natural Reserve System (Fiedler et al. 2013).

Plant Communities

Vegetation at the Oasis ranges from aquatic herbs in Lamb Creek to desert shrubs on the alluvial fan (Figures 2 and 3). The change in elevation, 250 m (820 ft) from the highest point in the south of the Oasis to the lowest point in the north, also contributes to a diverse flora. There are 139 herbaceous taxa (78 annuals and 61 perennials) and 47 woody taxa (38 shrubs and 9 trees) at the Oasis. The main plant associations are (Sawyer et al. 2009):

Brittlebush scrub: The dry, sandy alluvial fan on the northern edge of the Oasis is dominated by *Encelia farinosa*, *Senegalia greggii*, *Phacelia* spp., ferns and many annuals. At the northern boundary of the Oasis, *Encelia farinosa* gives way

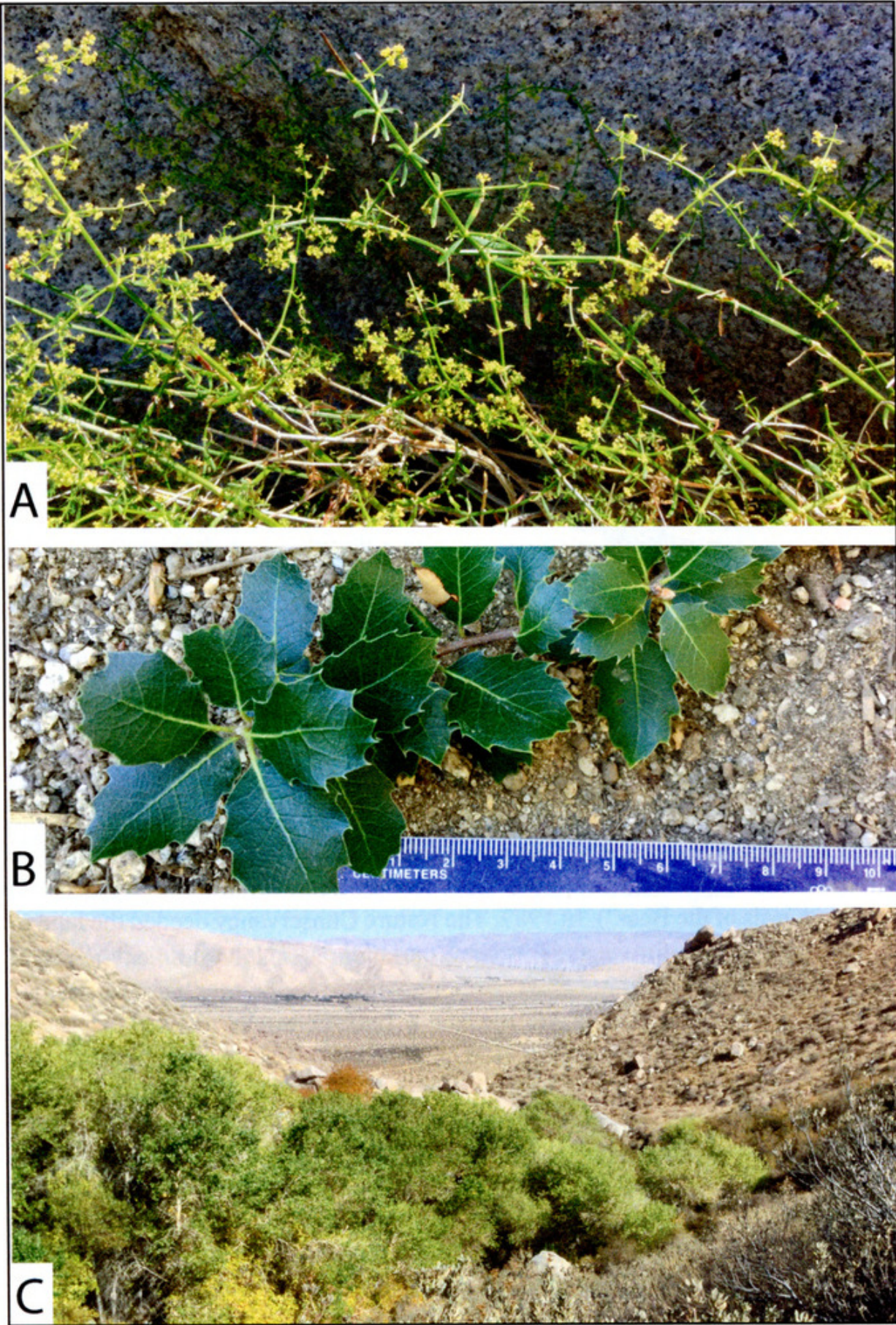


Figure 2. **A)** *Galium angustifolium* subsp. *gracillimum*, CRPR 4.2, is a dioecious shrub growing among boulders on the alluvial fan. **B)** *Quercus wislizeni* var. *frutescens* is an uncommon tree on north-facing granite in the canyon. **C)** View to the north along Lamb Creek in November, 2016.

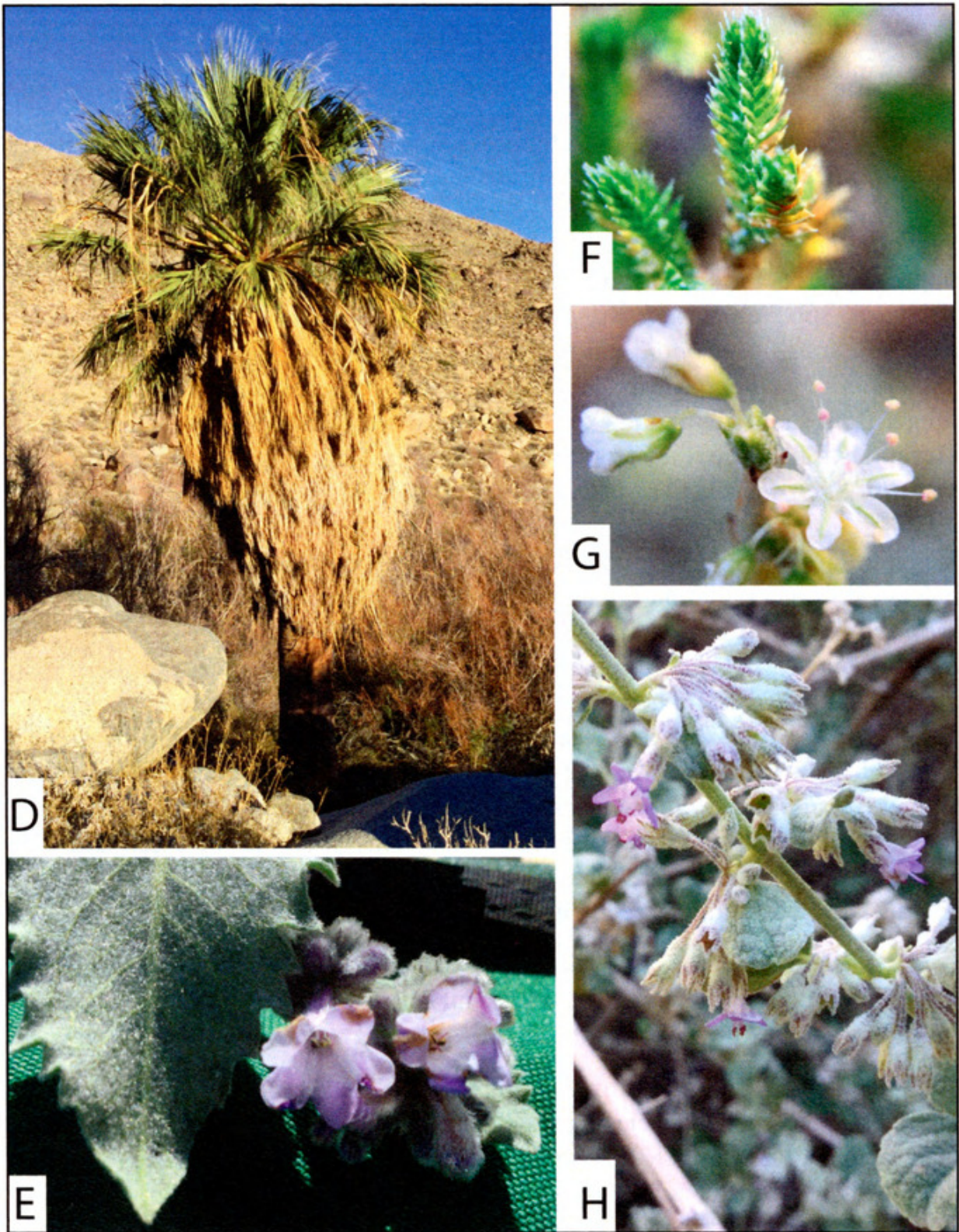


Figure 3. D) A small population of *Washingtonia filifera* persists near Lamb Creek. E) *Eriodictyon crassifolium* var. *crassifolium* is a common shrub on rocky hillsides in the canyon. F) *Selaginella bigelovii* is common in the canyon. Sporangia were present in November, 2016. G) *Eriogonum elongatum* var. *elongatum* is a common shrub in the canyon. H) *Condea emoryi* at the Oasis is on the western edge of the species' natural distribution.

to *Larrea tridentata* as the dominant shrub on the lower alluvial fan. Shrubs and annuals on the alluvial fan tend to bloom when water is available, during or soon after winter rains.

Chamise chaparral: The mid-elevations of Lamb Creek Canyon and rocky hillsides away from Lamb Creek support shrubs such as *Adenostoma fasciculatum* var. *fasciculatum*, *Bahiopsis parishii*, *Ephedra californica*, *Eriodictyon crassifolium* var. *crassifolium*, *Hesperoyucca whipplei*, and *Ziziphus parryi* var. *parryi*. The upper reaches of the canyon and rocky hillsides are above the waterfall and include *Artemisia* spp., *Epilobium canum* subsp. *latifolium*, *Eriogonum* spp., *Populus fremontii* subsp. *fremontii*, and perennial herbs such as *Helianthus gracilentus* and *Solidago velutina* subsp. *californica*. These species are more likely to profit longer from snow runoff and experience cooler temperatures than plants at lower elevations. Therefore, they tend to flower later in the spring (*A. fasciculatum*, *B. parishii*, *E. crassifolium*) or in the fall (*E. canum*, *H. gracilentus*, *S. velutina*).

Riparian Fremont cottonwood forest: Immediately surrounding Lamb Creek is a narrow strip of vegetation dominated by *Populus fremontii*, *Salix* spp., and *Vitis girdiana* and joined by *Carex* spp., *Juncus balticus* subsp. *ater*, *Toxicodendron diversilobum*, *Typha latifolia*, and *Washingtonia filifera*. Adjacent to the stream can be found a number of herbaceous taxa, such as *Epipactis gigantea*, *Erythranthe* spp., *Lobelia cardinalis* var. *pseudosplendens*, *Nicotiana glauca*, and *Oenothera elata* subsp. *hirsutissima*. We found plants in and near Lamb Creek blooming year-round. *Washingtonia filifera* is a native fan palm and is present at the Oasis as a few individuals at the mouth of Lamb Creek Canyon and in the creek bed. The presence of these palms are what allows us to consider the site a “palm oasis”; in Coachella Valley there are many oases of *Washingtonia filifera* in canyons and where fault lines have forced water to the surface (Bakker 1984).

Overview of Diversity

We documented 188 taxa from 54 families at the Oasis de los Osos. Plant families with the most species represented at the Oasis are: Asteraceae (33 taxa), Poaceae (17), Fabaceae (12), Hydrophyllaceae (10), and Boraginaceae (6). Other families with five taxa at the Oasis are Brassicaceae, Onagraceae, Polygonaceae, Pteridaceae, and Solanaceae. Half of the families (27, 49%) have only a single representative species at the Oasis. Of the 188 documented taxa, 87% (164 taxa) of the flora is native, 4% (8 taxa) are naturalized, and 9% (16 taxa) are considered invasive. We recollected invasive taxa, such as *Bromus madritensis*, *Cenchrus setaceus*, *Erodium cicutarium*, *Olea europaea*, and *Schismus barbatus*. These species have been documented at the Oasis since the 1980s and persist today as small populations, with the exception of *B. madritensis* and *S. barbatus*, which have become the dominant ground cover in some areas. *Eucalyptus camuldulensis*,

O. europaea, and *Tamarix ramosissima* are present as single trees. The *Eucalyptus* and *Olea* were presumably planted by the Lambs in the 1930s. We collected one rare species, *Galium angustifolium* subsp. *gracillimum*, which had previously been collected at the Oasis in 1985 (*N. Miles Fellows 160* UCR) and on the east side of Snow Canyon in 1932 (*C.B. Wolf 3648* RSA-POM). Six additional rare taxa have been collected east of the Oasis in Snow Canyon: *Chorizanthe xanti* var. *leucotheca* (*C.B. Wolf 3677* RSA-POM), California Rare Plant Rank (CRPR) 1B.2; *Erigeron breweri* var. *jacintus* (*Mrs. C.M. Wilder 972* CAS-BOT-BC), CRPR 4.3; *Linanthus maculatus* (*Setters & True s.n.* UCR), CRPR 1B.2; *Muhlenbergia californica* (*J.C. Roos 467* RSA-POM) CRPR 4.3; *Penstemon clevelandii* var. *connatus* (*Jim Warren s.n.* UC) CRPR 4.3; and *Quercus turbinella* (*Dick Schwenkmeyer 715* SD) CRPR 4.3). Four of these rare plants were collected prior to 1970 and have not been recollected since.

Origins of the Oasis Flora

The Oasis is located in a transitional zone between California South Coast, montane, and Sonoran and Mojave desert regions. Its proximity to these areas has led to an unusual species assemblage. We analyzed species distributions of Oasis taxa and found that 73% of the flora (138 taxa) is also found in the adjacent montane areas, whereas 58% of the flora (109 taxa) is also found in the surrounding deserts. Thirty-nine percent of taxa (74 taxa) are found in both adjacent montane and desert areas. Perhaps more telling is the large number of taxa that are on the edge of their natural distributions at the Oasis. Of the Oasis taxa, 34% (63 taxa) are primarily found in the South Coast floristic region. Examples of these species are *Adenostoma fasciculatum*, *Artemisia californica*, *Dendromecon rigida*, *Eriodictyon crassifolium*, *Helianthus gracilentus*, *Hesperoyucca whipplei*, *Lupinus bicolor*, *Marah macrocarpa*, *Phacelia minor*, *Rhus ovata*, and *Salvia apiana*. We found that 13% of the taxa (25 taxa) are primarily found in the Mojave or Sonoran deserts. Examples of these species are *Bahiopsis parishii*, *Hyptis emoryi*, *Senegalia greggii*, and *Ziziphus parryi*. Interestingly, four of the 16 invasive species found at the Oasis are primarily found in the South Coast region and have their easternmost populations at or near the Oasis. There are no invasive species at the Oasis that are primarily distributed in the desert.

Comparison of the Oasis to nearby areas

We compared the Oasis flora to Deep Canyon, the only published flora we are aware of from the Coachella Valley (Zabriski 1979). Whitewater Canyon, Morongo Reserve, and Thousand Palms also have a large number of specimens in the Consortium of California Herbaria database, but there are no published species lists for these areas. Many of the taxa at the Oasis (126 taxa, 67%) were

also documented by Zabriskie at Deep Canyon, but a third of Oasis species (62 taxa, 33%) have not been found there, even after nomenclatural changes are taken into account. Overall, there are more species documented at Deep Canyon (355 taxa) than at the Oasis (188 taxa), and we believe this corresponds to the size and diversity of habitats at Deep Canyon. Deep Canyon is approximately 50,000 acres, or 300x larger than the Oasis and spans a larger elevational gradient, from 120 to 2,650 m (400-8700 ft). Zabriskie (1979) found high species diversity in Deep Canyon between 850 and 975 m (2790-3200 ft) and again above 1900 m (6235 ft), whereas the Oasis property only reaches 650 m (2135 ft). Both areas contain alluvial fan, rocky slopes, and riparian habitat, but Deep Canyon also includes canyon bottom, plateaus, and montane slopes. A more equitable method to compare species diversity between areas of different size eludes us, but if we consider taxa per acre then Deep Canyon has 0.007 taxa/acre, whereas the Oasis has 1.2 taxa/acre. One potential explanation for the seeming greater species diversity at the Oasis is its proximity to the floristically distinct South Coast basin and San Bernardino mountains and greater seed dispersal from those areas to the Oasis than to Deep Canyon. Although the Oasis is a relatively small area, it supports high plant diversity for a desert region.

History of Plant Collections at the Oasis

Snow Canyon and the Oasis are along a well-used route east of Los Angeles and would have been accessible to early botanists in Southern California. In the 1860s, stage coach stations at Smith Ranch and Whitewater were along the road to Fort Yuma. In 1875, the Southern Pacific railroad was constructed nearby (Robinson and Risher 1993), and Interstate 10 was built in 1952. The earliest plant vouchers from the Snow Creek area we could find were collected in 1894 by Charles Sargent, Director of the Arnold Arboretum at Harvard. Sargent was primarily interested in woody plants, and on September 22nd, 1894 he collected *Senegalia greggii* and *Quercus wislizeni* in Snow Canyon and then returned on the 27th and collected *Eriodictyon crassifolium* and *Ziziphus parryi*. Since Sargent, there have been three major collecting efforts in Snow Canyon and many other collections during intervening years. Carl B. Wolf and P. A. Munz, both at RSA, collected approximately 150 vouchers in 1932. N. Miles Fellows and Andy Sanders, both at UCR, collected approximately 250 vouchers in 1985, and Sanders collected approximately 100 vouchers in 1995. We collected 175 vouchers in 2016 and 2017. Collecting at the Oasis has been highly seasonal, with almost all collections occurring March-May, following the winter rains or October-November, following the late summer monsoons.

Methods

Fieldwork at the Oasis was completed from March 2016 to March 2017 over 12 days. We visited the Oasis in March, April, May, June, September, November 2016 and January and March 2017. A total of 175 specimens were collected and processed for long-term preservation as herbarium specimens. Plants were collected in flower and fruit, except for *Washingtonia filifera* and *Toxicodendron diversilobum*, which were not observed in flower during our fieldwork. Preliminary identifications were made in the field and verified with keys in The Jepson Flora Project (2017) and through comparison to specimens at LOB, UCR, and RSA-POM. Additional keys in Abrams (1951), Simpson and Hasenstab (2009), and Guillems et al. (2013) were used to identify *Phacelia*, *Cryptantha*, and *Pectocarya* to species. Vouchered specimens were made for each taxon in the list and deposited at LOB, UCJR, and, in some cases, UCR.

We included historical plant vouchers by querying the Consortium of California Herbaria Database (2016) within Riverside County for “Snow Creek” and “Oasis de los Osos.” These parameters returned approximately 800 specimens. We removed specimens that were collected at lower elevations than the Oasis, close to Highway 111, and at higher elevations on Black Mountain at the headwaters of Snow Creek. This left us with 554 historical vouchers that were collected in close proximity to the Oasis. We removed many of the historical collections, such as collections near the fish hatchery, because we could not be confident they were collected at the Oasis and not on the East side of Snow Canyon. We visited the UCR, RSA-POM, and UCJR herbaria to confirm the species determinations on historical specimens and annotated them with updated nomenclature using the Jepson Flora Project (2017), Tropicos.org (2017), and recently published literature.

Data in the checklist come from the following sources: 1) habit and habitat were taken from field notes; 2) common names are from the Jepson Flora Project (2017) or CalFlora (2017); 3) flowering times were taken from The Jepson Flora Project (2017) and expanded, if necessary, to include phenology of plants at the Oasis; 4) nativity is based on The Jepson Flora Project (2017); 5) degree of invasiveness is taken from the CAL-Invasive Plant Council California Invasive Plant Inventory (2017); 6) California Rare plant rankings are from the California Native Plant Society (CNPS) Rare Plant Inventory (2017); 7) synonymy is only meant to include common and recent synonyms, although quite a few synonyms from Munz (1974) are included because they were used by Zabriskie (1979) for the Deep Canyon flora. Most synonyms were found in the Jepson Flora Project (2017), the Jepson Online Interchange for California Floristics (2017), or the

Tropicos database (2017). Nomenclature for *Erythranthe/Mimulus* was updated by Barker et al. (2012). Family arrangements for Boraginaceae/Hydrophyllaceae follow Luebert et al. (2016).

Format of the checklist

The checklist is arranged according to Baldwin et al. (2012) for classification of plants for lycophytes, leptosporangiate ferns, gymnosperms and angiosperms. Angiosperms are separated into Eudicots and Monocots. Taxa are then listed alphabetically by family, following The Jepson Flora Project (2017). Each listing is formatted as:

Scientific name Authority. COMMON NAME. Habit. Flowering times. Habitat in the Oasis. Pertinent literature or other notes. [synonymy] *Representative specimens* (Herbarium Code)

Symbols and abbreviations used in the checklist

* Non-native

I Invasive

R Listed on California Native Plant Society Rare Plant Inventory

! Authors have seen the cited specimen and agree with the identification

CCH Consortium of California Herbaria

DES Desert Botanical Garden Herbarium

RSA-POM Rancho Santa Ana-Pomona College Herbarium

UCR University of California Riverside Herbarium

UCJR University of California James Reserve Herbarium

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LYCOPHYTES

SELAGINELLACEAE – Spike-moss Family

Selaginella bigelovii Underw. BIGELOW'S SPIKE MOSS. Perennial herb. Common in the shade of rocks at lower elevations and forming small monocultures in rocky flat places at higher elevations. *A. Fisher 205 (LOB)*

LEPTOSPORANGIATE FERNS

PTERIDACEAE – Brake Family

Adiantum capillus-veneris L. SOUTHERN MAIDENHAIR. Perennial herb. Common in the shade of rocks at lower elevations or along north-facing canyon walls. *A. Fisher 198 (LOB)*

Myriopteris covillei (Maxon) Á. Löve & D. Löve. COVILLE'S LIP FERN. Perennial herb. Common in the shade of rocks at lower elevations. [syn. *Cheilanthes covillei* Maxon] *A. Fisher 194 (LOB)*

Pellaea andromedifolia (Kaulf) Fée. COFFEE FERN. Perennial herb. Uncommon in the shade of rocks at lower elevations. *A. Fisher 201 (LOB)*

Pellaea mucronata (D.C. Eaton) D.C. Eaton var. ***mucronata*** BIRD'S FOOT FERN. Perennial herb. Uncommon in the shade of rocks at lower elevations. *A. Fisher 248 (LOB)*

Pentagramma triangularis (Kaulf.) Yatsk. et al. subsp. ***triangularis*** GOLDBACK FERN. Perennial herb. Uncommon in the shade of rocks at lower elevations. [syn. *Pityrogramma triangularis* (Kaulf.) Maxon] *A. Fisher 225 (LOB)*

GNETALES

EPHEDRACEAE – Ephedra Family

Ephedra californica S. Watson DESERT TEA. Dioecious shrub. Common at lower elevations. *B. Betz 38 (LOB)*

ANGIOSPERMS: EUDICOTS

AMARANTHACEAE – Amaranth Family

- **Amaranthus albus* L. PIGWEED AMARANTH. Annual. Apr-Oct. Rocky slopes and canyon bottom, disturbed road edge. Collected once in 1986. *N.M. Fellows 191!* (UCR)

ANACARDIACEAE – Sumac Family

- Rhus ovata* S. Watson SUGAR BUSH. Shrub. Mar-Jun. Scattered on rocky slopes and near Lamb Creek above 450m. *A. Fisher 266* (LOB)
Toxicodendron diversilobum (Torr. & A. Gray) Greene POISON OAK. Shrub. Apr-Jun. Common, forming thickets in wet areas near Lamb Creek. *B. Betz 52* (LOB)

APIACEAE – Carrot Family

- Bowlesia incana* Ruiz Lopez & Pavon HOARY BOWLESIA. Annual. Mar-Apr. Rocky slopes and canyon bottom. Collected once in 1985. Constance (1963) noted that *B. incana* has an amphotropical distribution and hypothesized that it naturalized in southern California. *N.M. Fellows 139!* (UCR)

APOCYNACEAE – Dogbane Family

- Funastrum cynanchoides* (Decne.) Schltr. var. *hartwegii* (Vail) Krings CLIMBING MILKWEED. Perennial vine on shrubs. Mar-Jul. Common on alluvial fan and rocky slopes. [syn. *Sarcostemma cynanchoides* subsp. *hartwegii* (Vail) R.W. Holm] *A. Fisher 204* (LOB)

ASTERACEAE – Sunflower Family

- Ambrosia dumosa* (A. Gray) W.W. Payne WHITE BUR-SAGE. Shrub. Dec-Jun. Common on rocky hillsides. *A. Fisher 257* (LOB)
Ambrosia salsola (Torr. & A. Gray) Strother & B.G. Baldwin var. *salsola* BURROBRUSH. Shrub. Feb-Jun. Common in wash [syn. *Hymenoclea salsola* Torr. & A. Gray] *A. Fisher 232*, *B. Betz 16* (LOB)
Artemisia californica Less. CALIFORNIA SAGEBUSH. Shrub. Jan-Nov. Common on alluvial fan. *A. Fisher 303* (LOB)
Artemisia dracunculus L. TARRAGON. Perennial herb. Aug-Nov. Uncommon on rocky slopes and canyon bottom. Collected once in 1984. *N.M. Fellows 22!* (UCR)

- Artemisia ludoviciana* subsp. *incompta*** (Nutt.) D.D. Keck MOUNTAIN MUGWORT. Perennial herb. Jul-Sep. Uncommon on alluvial fan, among boulders. [syn. *Artemisia lindleyana* Besser in Hook.] *D. Schwenkmeyer* 727 (SD) det. verified by J. Rebman, 2013
- Artemisia ludoviciana* × *A. douglasiana*** Perennial herb. Rocky slopes and canyon bottom. Collected as *A. ludoviciana*. Annotated by Scott White as *A. ludoviciana* ssp. *ludoviciana* × *A. ludoviciana* subsp. *incompta*. Andy Sanders determined specimen as likely *A. ludoviciana* × *A. douglasiana* based on leaf width and lobing. *N.M. Fellows* 28! (UCR)
- Baccharis salicifolia*** (Ruiz & Pav.) Pers. subsp. *salicifolia* MULEFAT. Shrub. Year-round. Uncommon along Lamb Creek. [syn. *Baccharis glutinosa* Pers.] *A. Fisher* 197 (LOB).
- Baccharis sarothroides*** A. Gray BROOM BACCHARIS. Shrub. Aug-Jan. Uncommon on rocky slopes and canyon bottom. *A. Fisher* 352 (LOB)
- Baccharis sergiloides*** A. Gray DESERT BACCHARIS. Shrub. May-Nov. Rocky slopes and canyon bottom. *N.M. Fellows* 33!, *June Latting* s.n.! (UCR)
- Bahiopsis parishii*** (Greene) E.E. Schill. & Panero PARISH'S GOLDENEYE. Shrub. Mar-May. Common along trail in upper reaches of alluvial fan. [syn. *Viguiera parishii* Greene, *Viguiera deltoidea* A. Gray var. *parishii* (Greene) Vasey & Rose] *A. Fisher* 293, 302 (LOB)
- Bebbia juncea*** (Benth) Greene var. *aspera* Greene SWEETBUSH. Shrub. Apr-Jul. Common near Lamb Creek. *N.M. Fellows* 26! (UCR), *James Phillips* 26! (UCJR), *A. Fisher* 366 (LOB)
- Brickellia desertorum*** Coville DESERT BRICKELLBUSH. Shrub. Sep-May. Uncommon on rocky slopes and canyon bottom. *N.M. Fellows* 36!, *June Latting* s.n.! (UCR)
- **Centaurea melitensis*** L. Tocalote. Annual. Apr-Jul. Uncommon along edge of Lamb Creek. Collected once in 2015. *James Phillips* 30! (UCJR)
- Chaenactis fremontii*** A. Gray DESERT PINCUSHION. Annual. Feb-May, Dec. Common on alluvial fan. *B. Betz* 14 (LOB)
- Corethrogyne filaginifolia*** (Hook. & Arn.) Nutt. COMMON SANDASTER. Perennial herb. Jul-Nov. Upper Lamb Creek. [syn. *Lessingia filaginifolia* (Hook. & Arn.) M.A. Lane var. *filaginifolia*] *A. Fisher* 364 (LOB)
- Encelia actoni*** Elmer ACTON ENCELIA Shrub. Feb-Jul. Uncommon on rocky slopes <500 m. [syn. *Encelia virginensis* A. Nels. subsp. *actoni* (Elmer) D.D. Keck] *P.A. Munz* 12399! (RSA), *N.M. Fellows* 193! (UCR)
- Encelia farinosa*** Torr. BRITTLEBUSH. Shrub. Jan-May. Dominant shrub on alluvial fan <500 m. *A. Fisher* 221, 247; *B. Betz* 10 (LOB)
- Erigeron canadensis*** L. HORSEWEED. Annual. Year-round. Collected once in 1977. [syn. *Conyza canadensis* (L.) Cronquist] *June Latting* s.n.! (UCR)
- Eriophyllum confertiflorum*** (DC.) A. Gray var. *confertiflorum* GOLDEN YARROW. Shrub. Apr-Aug. Uncommon on rocky slopes and canyon bottom. *N.M. Fellows* 173! (UCR). *P.A. Munz* 12391! (RSA-POM)

- Eriophyllum wallacei*** (A. Gray) A. Gray WALLACE'S WOOLLY DAISY. Annual. Dec-Jul. Uncommon on alluvial fan. *A. Fisher* 294 (LOB)
- Helianthus gracilentus*** A. Gray SLENDER SUNFLOWER. Perennial herb. May-Nov. Common near Lamb Creek. *A. Fisher* 339 (LOB)
- Lasthenia coronaria*** (Nutt.) Ornduff ROYAL GOLDFIELDS. Annual. Mar-May. Uncommon on alluvial fan. *A. Fisher* 222 (LOB)
- Leptosyne californica*** Nutt. CALIFORNIA COREOPSIS. Annual. Feb-Jun. Collected once in 1922. [syn. *Coreopsis californica* (Nutt.) H. Sharsm.] *Mary F. Spencer* 653! (RSA-POM)
- Logfia filaginoides*** (Hook. & Arn.) Morefield CALIFORNIA COTTONROSE. Annual. Feb-May. Common on alluvial fan. [syn. *Filago californica* Nutt.] *A. Fisher* 241 (LOB)
- Malacothrix glabrata*** (D.C. Eaton) A. Gray DESERT DANDELION. Annual. Mar-Jun. Common on alluvial fan. *A. Fisher* 238 (LOB)
- Palafoxia arida*** B. Turner & M. Morris var. ***arida*** B. Turner & M. Morris SPANISH NEEDLE. Annual. Feb-May, Oct. *C.B. Wolf* 3684 (DS); *M.L. Vincent & R.H. Swade* 453 (SFV)
- Pseudognaphalium bioletti*** Anderberg TWO COLOR CUDWEED. Perennial herb. Jan-May. Common on alluvial fan. [syn. *Gnaphalium bicolor* Bioletti] *A. Fisher* 298, *B. Betz* 37 (LOB)
- **Pseudognaphalium luteoalbum*** (L.) Hilliard & B.L. Burt JERSEY CUDWEED. Annual. Mar-Aug. Rocky slopes and canyon bottom. [syn. *Gnaphalium luteoalbum* L.] *N.M. Fellows* 67 (UCR)
- Rafinesquia neomexicana*** A. Gray DESERT CHICORY. Annual. Feb-Jun. Uncommon on alluvial fan. *A. Fisher* 332 (LOB)
- Solidago velutina*** DC. subsp. ***californica*** (Nutt.) Semple CALIFORNIA GOLDENROD. Perennial herb. Jun-Oct. Near Lamb Creek >500m. *A. Fisher* 340 (LOB)
- **Sonchus asper*** L. subsp. ***asper*** PRICKLY SOW THISTLE. Annual. Year-round. Uncommon on rocky slopes and canyon bottom. *N.M. Fellows* 174! (UCR)
- **Sonchus oleraceus*** L. COMMON SOW THISTLE. Annual. Year-round. Uncommon on rocky slopes and canyon bottom. *N.M. Fellows* 185! (UCR)
- Stephanomeria exigua*** Nutt. subsp. ***exigua*** SLENDER STEPHANOMERIA. Annual. Apr-Jul. Uncommon on rocky slopes and canyon bottom. *N.M. Fellows* 164! (UCR); *C.B. Wolf* 3683! (RSA-POM)
- Uropappus lindleyi*** (DC.) Nutt. SILVER PUFFS. Annual. Mar-May. Uncommon in grassy areas. *N.M. Fellows* 130! (UCR)

BORAGINACEAE – Borage Family

- Amsinckia intermedia*** Fisch. & C.A. Mey. COMMON FIDDLENECK. Perennial herb. Mar-Jun. Uncommon on alluvial fan. *A. Fisher* 234 (LOB)
- Cryptantha barbiger*** var. ***fergusoniae*** J.F. MacBride BEARDED CRYPTANTHA. Annual. Feb-Jun. Common on hillsides. *A. Fisher* 226 (LOB)

Cryptantha pterocarya var. ***purpusii*** Jeps. PURPUS' CRYPTANTHA. Annual. Mar-Jun. Rocky slopes and canyon bottom. Determination verified by Mike Simpson (SDSU). *N.M. Fellows 144* (UCR)

Pectocarya anisocarpa Veno Annual. Mar-Apr. Uncommon on alluvial fan. Not yet listed in *The Jepson Manual*, described by Williams et al. (2013) as a relatively common species in Southern California, Baja, Arizona and Utah. At the Oasis, uncommon on alluvial fan. *A. Fisher 243* (LOB)

Pectocarya linearis (Ruiz & Pav.) DC. subsp. ***ferocula*** (I.M. Johnst.) Thorne NARROW-TOOTHED PECTOCARYA. Annual. Feb-May. Common on the alluvial fan. *A. Fisher 236* (LOB)

Plagiobothrys arizonicus (A. Gray) A. Gray ARIZONA POPCORN FLOWER. Annual. Feb-May. Uncommon on alluvial fan. *A. C. Sanders 16286* (DES)

BRASSICACEAE – Mustard Family

****Brassica juncea*** (L.) Czern. INDIA MUSTARD. Annual. Apr-Sep. Roadside. Collected once in 1965. *C. E. Fellows 55* (HSC)

****Brassica tournefortii*** Gouan SAHARAN MUSTARD. Annual. Jan-Jun. Common on alluvial fan. *A. Fisher 231* (LOB)

Lepidium lasiocarpum Nutt. subsp. ***lasiocarpum*** PEPPERWEED. Annual. Feb-Jun. Uncommon. Collected once in 1985. *N.M. Fellows 93!* (UCR)

****Sisymbrium irio*** L. LONDON ROCKET. Annual. Jan-Apr. Common near Lamb Creek. *N.M. Fellows 127!* (UCR)

Thysanocarpus curvipes Hook. FRINGE POD. Annual. Feb-Jun. Common on rocky slopes. *A. Fisher 214* (LOB)

CACTACEAE – Cactus Family

Cylindropuntia echinocarpa (Engelm. & J.M. Bigelow) F.M. Knuth GOLDEN CHOLLA. Shrub. Mar-Jun. Common on alluvial fan. *C. echinocarpa* may be synonymous with *Opuntia wigginsii* L.D. Benson (CNPS 3.3), but the rare forms are not known to occur as far north as the Oasis. [syn. *Opuntia echinocarpa* Engelm. & J.M. Bigelow, *Opuntia wigginsii* L.D. Benson] *A. Fisher 372* (LOB)

Opuntia basilaris Engelm. & J.M. Bigelow var. ***basilaris*** BEAVERTAIL CACTUS. Shrub. Mar-Jun. Common on alluvial fan. *A. Fisher 219* (LOB)

CAMPANULACEAE – Bellflower Family

Lobelia cardinalis L. var. ***pseudosplendens*** McVaugh CARDINAL FLOWER. Perennial herb. Jun-Oct. Uncommon, near Lamb Creek. *B. Betz 48* (LOB)

CARYOPHYLLACEAE – Pink Family

- Loeflingia squarrosa* Nutt. SPREADING PYGMYLEAF. Annual. Spring-Summer. Uncommon in open areas. *N.M. Fellows 122!* (UCR)
- **Stellaria media* (L.) Vill. COMMON CHICKWEED. Annual. Feb-Sep. Shady bank near Lamb Creek waterfall. Collected once in 1985. *N.M. Fellows 141!* (UCR)

CHENOPODIACEAE – Goosefoot Family

- Atriplex canescens* (Pursh) Nutt. var. *canescens* FOUR-WING SALTBUCH. Dioecious shrub. Apr-Aug. Uncommon on alluvial fan. *A. Fisher 301* (LOB)
- Chenopodium* cf. *berlandieri* Moq. PITSEED GOOSEFOOT. Annual. Uncommon on disturbed slopes. Andy Sanders (UCR) identified as *C. album*. Mitch Provance annotated as *C. berlandieri*. No fruits present on specimen. Collected once in 1986. *N.M. Fellows 194!* (UCR)
- **Chenopodium murale* L. NETTLE-LEAF GOOSEFOOT. Annual. Year-round. Uncommon along Lamb Creek and rocky slopes. *A. Fisher 265* (LOB)

CRASSULACEAE – Stonecrop Family

- Crassula connata* (Ruiz & Pav.) A. Berger PYGMY WEED. Annual. Feb-May. Common in shade on alluvial fan. *A. Fisher 223* (LOB)
- Dudleya saxosa* subsp. *aloides* (Rose) Moran PANAMINT DUDLEYA. Perennial herb. Apr-Jun. Common on North-facing rocks. Endemic to California. *B. Betz 30* (LOB)

CUCURBITACEAE – Gourd Family

- Cucurbita foetidissima* Kunth CALABAZILLA. Perennial vine. Jun-Aug. Uncommon among rocks near Lamb Creek. *James Philips 39!* (UCJR)
- Cucurbita palmata* S. Watson COYOTE MELON. Perennial vine. Apr-Sept. Uncommon in sandy soil. *B. Betz 49* (LOB)
- Marah macrocarpa* (Greene) Greene CHILICOTHE. Perennial vine. Jan-Apr. Uncommon on shrubs in wash. Jan-Apr. *A. Fisher 267* (LOB)

EUPHORBIACEAE – Spurge Family

- Croton californicus* Müll. Arg. CALIFORNIA CROTON. Dioecious perennial herb. Apr-Jul. Fellows wrote that this plant was common among boulders in wash, but it has only been collected once in 1985. *N.M. Fellows 63!* (UCR)
- Euphorbia micromera* Boiss. SONORAN SANDMAT. Annual. Apr-Jun, Sep-Dec. Along road. [syn. *Chamaesyce micromera* (Boiss.) Wootton & Standl.] *M. L.*

Vincent, R. H. Swade 454 (SFV)

Euphorbia polycarpa Benth. var. ***hirtella*** Boiss. SMALL SEED SANDMAT. Perennial herb. Year-round. Common on alluvial fan. [syn. *Chaemaesyce polycarpa* (Benth.) Millsp.] *A. Fisher 260 (LOB)*

Stillingia linearifolia S. Watson NARROW LEAVED STILLINGIA. Perennial herb. Mar-May. Common on alluvial fan. *A. Fisher 239 (LOB)*

FABACEAE – Legume Family

Acmispon glaber var. ***brevialatus*** (Ottley) Brouillet SHORT WINGED DEERWEED. Perennial herb. Mar-Aug. Common on rocky slopes and canyon bottom. [syn. *Lotus scoparius* (Torr. & A. Gray) Ottley var. *brevialatus* Ottley] *A. Fisher 203 (LOB)*

Acmispon grandiflorus (Benth.) Greene var. ***grandiflorus*** LARGE LEAFED LOTUS. Perennial herb. Apr-Jul. Uncommon on rocky slopes and canyon bottom. Collected once in 1985. [syn. *Lotus grandiflorus* (Benth.) Greene var. *grandiflorus*] *N.M. Fellows 137! (UCR)*

Acmispon micranthus (Torr. & A. Gray) Brouillet SMALL FLOWERED LOTUS. Annual. Mar-Jun. Uncommon on rocky slopes. Collected once in 1986. [syn. *Lotus hamatus* (Benth.) Greene] *N.M. Fellows 188! (UCR)*

Acmispon strigosus (Nutt.) Brouillet STRIGOSE LOTUS. Annual. Mar-Jun. Common on alluvial fan. [syn. *Lotus strigosus* (Nutt.) Greene] *A. Fisher 242 (LOB)*

Astragalus douglasii (Torr. & A. Gray) A. Gray var. ***douglasii*** DOUGLAS' MILKVETCH. Perennial herb. Apr-Jun, Nov. Collected once in 1977. *June Latting s.n.! (UCR)*

Hoita macrostachya (DC.) Rydb. LEATHER ROOT. Perennial herb. Jun-Jul, Nov. [syn. *Psoralea hallii* (Rydb.) Jeps. var. *media* Jeps., *Psoralea macrostachya* DC.] Uncommon near Lamb Creek. *N.M. Fellows 169! (UCR)*

Lupinus bicolor Lindley BICOLORED LUPINE. Annual to perennial herb. Mar-Jun. Collected once in 1985. *N.M. Fellows 135! (UCR)*

Lupinus concinnus J. Agardh BAJADA LUPINE. Annual. Mar-May. Uncommon in wash. *A. Fisher 244 (LOB)*

Lupinus hirsutissimus Benth. STINGING LUPINE. Annual. Mar-May. Uncommon on east-facing hillsides. *N.M. Fellows 167! (UCR)*

Lupinus sparsiflorus Benth. subsp. ***mohavensis*** Dziekanowski & D. Dunn MOJAVE LUPINE. Annual. Mar-Apr. Subspecies not recognized by TJM3. Uncommon on upper north-facing slope. Collected once in 1985. *N.M. Fellows 148! (UCR)*

Lupinus truncatus Hook. & Arn. BLUNT-LEAVED LUPINE. Annual. Mar-May. Uncommon among rocks. *A. Fisher 400 (LOB)*

Senegalia greggii (A. Gray) Britton & Rose CATCLAW. Shrub. Apr-Jun. Common on alluvial fan. [syn. *Acacia greggii* A. Gray] *A. Fisher 284, B. Betz 35 (LOB)*

FAGACEAE – Oak Family

Quercus wislizeni var. *frutescens* Engelm. CHAPPARAL OAK. Tree. Mar-May. Single individual from a crack in north-facing rock wall. *A. Fisher* 356 (LOB)

GERANIACEAE – Geranium Family

¹ *Erodium cicutarium* (L.) L'Hér. ex Aiton RED-STEMMED FILAREE. Annual. Feb-Sep. Common on alluvial fan. *B. Betz* 15 (LOB)

GROSSULARIACEAE – Gooseberry Family

Ribes indecorum Eastw. WHITE-FLOWERING CURRANT. Shrub. Dec-Mar. Growing from north rock face near Lamb Creek waterfall. *A. Fisher* 195 (LOB)

KRAMERIACEAE – Rhatany Family

Krameria bicolor S. Watson WHITE RHATANY. Shrub. Apr-May. Uncommon on south-facing slopes above Lamb Creek. [syn. *Krameria grayi* Rose & Painter] *N.M. Fellows* 167! (UCR)

HYDROPHYLLACEAE – Waterleaf Family

Emmenanthe penduliflora Benth var. *penduliflora* WHISPERING BELLS. Annual. Mar-Jul. Uncommon on alluvial fan and near Lamb Creek. *A. Fisher* 262 (LOB)

Eucrypta chrysanthemifolia (Benth.) Greene var. *chrysanthemifolia* COMMON EUCRYPTA. Annual. Mar-Jun. Uncommon on alluvial fan. *A. Fisher* 389 (LOB)

Nemophila menziesii Hook. & Arn. var. *menziesii* BABY BLUE EYES. Annual. Feb-May. Uncommon on north-facing slopes. *A. Fisher* 213 (LOB)

Phacelia brachyloba (Benth.) A. Gray SHORT LOBED PHACELIA. Annual. Apr-Jul. Uncommon on burned slopes. Collected once in 1986. *N.M. Fellows* 181! (UCR)

Phacelia cicutaria var. *hispida* (A. Gray) J.T. Howell CATERPILLAR PHACELIA. Annual. Feb-Jun. Rocky slopes. *A. Fisher* 206 (LOB)

Phacelia cryptantha Greene HIDDENFLOWER PHACELIA. Annual. Mar-May. Uncommon. *A. Fisher* 297 (LOB)

Phacelia distans Benth. COMMON PHACELIA. Annual. Mar-May. Common on rocky slopes. *A. Fisher* 207 (LOB)

Phacelia minor (Harvey) Thell. CALIFORNIA BLUEBELL. Annual. Mar-Jun. Common on alluvial fan. *A. Fisher* 217, 287, *B. Betz* 9 (LOB)

Phacelia ramosissima Douglas ex Lehm. BRANCHING PHACELIA. Perennial herb. Apr-Oct. Uncommon near Lamb Creek. *A. Fisher* 208 (LOB)

Pholistoma membranaceum (Benth.) Constance WHITE FIESTA FLOWER. Annual. Feb-May. Common on alluvial fan. *A. Fisher* 229 (LOB)

LAMIACEAE – Mint Family

Condea emoryi (Torr.) Harley & J.F.B. DESERT LAVENDER. Shrub. Jan-May, Nov. Uncommon on West side of Lamb Creek Canyon. Based on CCH records, this appears to be the western-most population in California. [syn. *Hyptis emoryi* Torr.] *A. Fisher* 362 (LOB)

Salvia apiana Jeps. WHITE SAGE. Shrub. Apr-Aug. Uncommon. *N.M. Fellows* 175!, *June Latting* s.n.! (UCR)

Salvia columbariae Benth. CHIA. Annual. Mar-Jun. Uncommon. *N.M. Fellows* 166! (UCR); *James Philips* 19! (UCJR)

Stachys stebbinsii G.A. Mulligan & D.B. Munro STEBBINS' HEDGENETTLE. Perennial herb. Summer flowering. Collected once in fruit November 2016, near Lamb Creek. *A. Fisher* 355 (LOB)

MALVACEAE – Mallow Family

Malacothamnus fasciculatus (Nutt. ex Torr. & A. Gray) Greene var. *fasciculatus* CHAPARRAL BUSH MALLOW Shrub. Mar-Jul. Common along Lamb Creek. *B. Betz* 34 (LOB)

Sphaeralcea ambigua var. *rugosa* (Kearney) Kearney ROUGHLEAF APRICOT MALLOW. Perennial herb. Mar-Sep. Uncommon near Lamb Creek. *James Philips* 21! (UCJR)

MONTIACEAE – Mallow Family

Calandrinia menziesii (Hook.) Torr. & A. Gray. RED MAIDS. Annual herb. Feb-May. Uncommon on North slope. Collected once in 1985. *N. M. Fellows* 146! (UCR)

Calyptridium monandrum Nutt. PUSSY PAWS. Annual. Jan-Jul. Uncommon on north slope above ruins. [syn. *Cistanthe monandra* (Nutt.) Hershk.] Collected once in 1985. *N. M. Fellows* 145! (UCR)

Claytonia parviflora Hook. NARROW LEAVED MINER'S LETTUCE. Annual herb. Mar-May. Uncommon near the stream. Collected once in 1985. In 2016 we saw vegetation consistent with *C. parviflora* (Jan, 2016), but did not observe it in flower. *N. M. Fellows* 132! (UCR)

MYRTACEAE – Myrtle Family

**Eucalyptus camaldulensis* Dehnh. RED GUM. Tree. Apr-Jul. Single tree by house ruins, probably planted. *A. Fisher* 252 (LOB)

NAMACEAE – Nama Family

Eriodictyon crassifolium Benth. var. *crassifolium* L. THICK-LEAVED YERBA SANTA. Shrub. Mar-Jun. Common on rocky hillsides. *A. Fisher* 210 (LOB)

NYCTAGINACEAE – Four-o'clock Family

Mirabilis laevis var. *retrorsa* (A. Heller) Jeps. WISHBONE BUSH. Perennial herb. Feb-Jun. Common on alluvial fan. [syn. *Mirabilis bigelovii* A. Gray var. *retrorsa* (A. Heller) Munz] *A. Fisher* 237 (LOB)

OLEACEAE – Olive Family

¹ *Olea europaea* L. OLIVE. Tree. Feb-Jun. CIPC limited invasive. Single individual near house ruins in rocky wash. *A. Fisher* 344 (LOB)

ONAGRACEAE – Evening-Primrose Family

Camissoniopsis confusa (P.H. Raven) W.L. Wagner & Hoch SAN BERNARDINO SUN CUP. Annual. Mar-May. Common on alluvial fan. [syn. *Camissonia confusa* P.H. Raven] *A. Fisher* 240 (LOB).

Camissoniopsis confusa × *C. pallida* A. Sanders annotated as *Camissonia confusa* × *C. pallida*. Erroneously listed on CCH as *C. confusa*. *N.M. Fellows* 121! (UCR).

Camissoniopsis pallida (Abrams) W.L. Wagner & Hoch subsp. *pallida* PALE SUN CUP. Annual herb. Mar-Aug. Sandy flats near Lamb Creek. [syn. *Camissonia pallida* (Abrams) P.H. Raven subsp. *pallida*]. *A. Fisher* 397 (LOB)

Chylismia claviformis (Torr. & Frém.) A. Heller CLAVATE FRUITED PRIMROSE. Annual. Along Lamb Creek. [syn. *Camissonia claviformis* (Torr. & Frém.) P.H. Raven] *George K. Helmkamp* 3081! (UCR)

Epilobium canum (E. Greene) Raven subsp. *latifolium* (Hook.) Raven CALIFORNIA FUCHSIA. Perennial herb. Aug-Dec. Common on rocky hillsides. [syn. *Zauschneria californica* C. Presl subsp. *latifolia* (Hook.) D.D. Keck] *A. Fisher* 361 (LOB)

Eulobus californicus Nutt. ex Torr. & A. Gray RAVEN'S PRIMROSE. Annual. Apr-Jun. Common on alluvial fan. [syn. *Camissonia californica* (Nutt. ex Torr. & A. Gray) P.H. Raven] *A. Fisher* 264 (LOB)

Oenothera elata Kunth subsp. ***hirsutissima*** (W. Watson) W. Dietr. EVENING PRIMROSE. Perennial herb. Jun-Nov. Along upper Lamb Creek. *A. Fisher* 357 (LOB)

OROBANCHACEAE – Broomrape Family

Orobanche fasciculata Nutt. CLUSTERED BROOM RAPE. Perennial herb. Mar-Aug. Parasite on *Eriodictyon*. Collected once in 1986. *Kenneth Cooper s.n.!* (UCR)

PAPAVERACEAE – Poppy Family

Argemone munita Durand & Hilg. PRICKLY POPPY. Annual or perennial herb. Apr-May, [Aug-TJM]. Uncommon on alluvial fan. *N.M. Fellows* 136! (UCR)

Dendromecon rigida Benth. BUSH POPPY. Shrub. Apr-Jun. Uncommon on alluvial fan. *B. Betz* 39 (LOB)

Ehrendorferia chrysantha (Hook. & Arn.) Rylander GOLDEN EARDROPS. Perennial herb. Apr-Nov. Collected once in Nov, 1977. [syn. *Dicentra chrysantha* (Hook. & Arn.) Walp.] *June Latting s.n.!* (UCR)

PHRYMACEAE – Lopseed Family

Erythranthe cardinalis (Douglas ex Benth.) Spach CARDINAL MONKEYFLOWER. Perennial herb. Mar-Nov. Uncommon, trailing along edge of upper Lamb Creek. [syn. *Mimulus cardinalis* Benth.] *A. Fisher* 358 (LOB)

Erythranthe guttata (Fisch. ex DC.) G.L. Nesom YELLOW MONKEYFLOWER. Annual. Mar-Nov. Common along edge of lower Lamb Creek. [syn. *Mimulus guttatus* Fisch. ex DC.] *B. Betz* 47 (LOB)

PLANTAGINACEAE – Plantain Family

Antirrhinum nuttallianum Benth. ex A. DC. subsp. ***nuttallianum*** NUTTALL'S SNAPDRAGON. Annual. Apr-Jul. Uncommon near lower Lamb Creek. *B. Betz* 36 (LOB)

Collinsia concolor E. Greene CHINESE HOUSES. Annual. Apr-Jun. Uncommon on rocky hillside. *N.M. Fellows* 168! (UCR)

Keckiella antirrhinoides (Benth.) Straw var. ***antirrhinoides*** CHAPARRAL BEARD TONGUE. Shrub. Mar-May. Uncommon on alluvial fan. *A. Fisher* 245 (LOB)

POLEMONIACEAE – Phlox Family

Gilia angelensis V.E. Grant CHAPARRAL GILIA. Annual. Feb-Jun. Uncommon in dry stream bed on alluvial fan. *A. Fisher* 216 (LOB)

- Gilia ochroleuca*** M.E. Jones subsp. ***exilis*** (A. Gray) A.D. Grant & V. Grant
VOLCANIC GILIA. Annual. Mar-Aug. Rocky slopes and canyon bottom.
Collected once in 1985. *N.M. Fellows* 142! (UCR)
- Linanthus dianthiflorus*** (Benth.) Greene FRINGED LINANTHUS. Annual. Feb-Jun.
Sandy soil near Lamb Creek. *A. Fisher* 398 (LOB)
- Saltugilia australis*** (H. Mason & A.D. Grant) L.A. Johnson SOUTHERN GILIA.
Annual. Mar- Jun. Common along trail to waterfall. [syn. *Gilia australis* (H.
Mason & A.D. Grant) V.E. Grant & A.D. Grant, *Gilia splendens* Douglas ex
H. Mason & A.D. Grant subsp. *australis* H. Mason & A.D. Grant] *A. Fisher*
295 (LOB)

POLYGONACEAE – Buckwheat Family

- Eriogonum elongatum*** Benth. var. ***elongatum*** LONG-STEMMED BUCKWHEAT.
Perennial herb. Year-round. Scattered on rocky hillsides. [syn. *Eriogonum*
denudatum Nutt.] *A. Fisher* 336 (LOB)
- Eriogonum fasciculatum*** var. ***foliolosum*** (Nutt.) Abrams LEAFY CALIFORNIA
BUCKWHEAT. Shrub. Year-round. Rocky hillsides. *A. Fisher* 202 (LOB)
- Eriogonum fasciculatum*** Benth. var. ***polifolium*** (Benth.) Torr. & A. Gray MOJAVE
DESERT CALIFORNIA BUCKWHEAT. Shrub. Year-round. *Dick Schwenkmeyer* 729
(SD)
- Eriogonum thurberi*** Torr. THURBER'S BUCKWHEAT. Annual. Year-round.
Occasional on sandy flats near Lamb Creek. Collected once in 1998. *George*
K. Helmkamp 3075! (UCR)
- Eriogonum wrightii*** Benth var. ***nodosum*** (Small) Rev. WRIGHT'S BUCKWHEAT.
Shrub. Jun-Feb. Uncommon on rocky hillside. *A. Fisher* 335 (LOB)
- Pterostegia drymarioides*** Fischer & C. Meyer FAIRY MIST. Annual. Mar-Jul. *N.M.*
Fellows 125! (UCR)
- Rumex californicus*** Rech. f. CALIFORNIA DOCK. Perennial herb. May-Sept.
Uncommon near Lamb Creek. *N.M. Fellows* 176! (UCR)

RANUNCULACEAE – Buttercup Family

- Clematis pauciflora*** Nutt. SOUTHERN CALIFORNIA CLEMATIS. Perennial vine. Jan-
Jun. Climbing into shrubs on rocky hillsides. *B. Betz* 50 (LOB)
- Delphinium parishii*** A. Gray subsp. ***parishii*** DESERT LARKSPUR. Perennial herb.
Mar-May. Uncommon on north-facing slopes. *N.M. Fellows* 155! (UCR)
- Delphinium parryi*** A. Gray SAN BERNARDINO LARKSPUR. Perennial herb. Apr-Jun.
Uncommon on north-facing slopes. Collected once in 1986. *N.M. Fellows*
187! (UCR)

RHAMNACEAE – Buckthorn Family

Ceanothus leucodermis Greene CHAPARRAL WHITETHORN. Shrub. Apr-Jun. Uncommon near Lamb Creek. *James Philipps 10!* (UCJR), *A. Fisher 368* (LOB)

Ziziphus parryi Torr. var. ***parryi*** PARRY'S JUJUBE. Shrub. Feb-Apr. Common on rocky slopes. [syn. *Condaliopsis parryi* (Torr.) Suesseng. in Engler & Prantl] *A. Fisher 233* (LOB)

ROSACEAE – Rose Family

Adenostoma fasciculatum Hook & Arn. var. ***fasciculatum*** CHAMISE. Shrub. Apr-Jun. Common on rocky slopes among granitic boulders. *A. Fisher 333* (LOB)

Prunus ilicifolia (Nutt. ex Hook. & Arn.) D. Dietr. HOLLY LEAF CHERRY. Shrub. Feb-May. Uncommon on steep, rocky slopes. *N.M. Fellows 187!* (UCR), *A. Fisher 360* (LOB)

RUBIACEAE – Coffee Family

^R ***Galium angustifolium*** subsp. ***gracillimum*** Dempster & Stebbins SLENDER BEDSTRAW. Dioecious, perennial herb. Apr-Jul. Uncommon in rocky wash among granitic boulders. California endemic, uncommon in California, CRPR 4.2 S4 G5T4. First added to CNPS ranking in 1994. See *Madroño* 21(2):90-92 (1971) for description. Found in Riverside Co. and San Bernardino Co. 130-1550m. Also found at East fork of Snow Creek. *C.B. Wolf 3648* (RSA). *N.M. Fellows 160!* (UCR); *A. Fisher 288* (LOB)

SALICACEAE – Willow Family

Populus fremontii S. Watson subsp. ***fremontii*** FREMONT COTTONWOOD. Tree. Mar-Apr. Common along Lamb Creek. [syn. *Populus deltoides* Bartram ex Marshall var. *fremontii* (S. Watson) Cronquist] *A. Fisher 193* (LOB)

Salix exigua Nutt. NARROW LEAVED WILLOW. Tree. Mar-May. Common along Lamb Creek. *A. Fisher 249* (LOB)

Salix laevigata Bebb. RED WILLOW. Tree. Dec-Jun. Common along Lamb Creek. [syn. *Salix bonplandiana* Kunth var. *laevigata* (Bebb) Dorn] *A. Fisher 191* (LOB)

SCROPHULARIACEAE – Figwort Family

Scrophularia californica Cham. & Schldl. CALIFORNIA FIGWORT. Perennial herb. Feb-Jul. Uncommon near Lamb Creek. Collected once in 1985. *N.M. Fellows 180!* (UCR)

SOLANACEAE – Nightshade Family

Datura wrightii Regel JIMSONWEED. Annual or perennial herb. Apr-Nov. Uncommon in sandy areas along Lamb Creek. [syn. *Datura meteloides* A. DC.] *A. Fisher* 253 (LOB)

Lycium andersonii A. Gray ANDERSON'S DESERT THORN. Dioecious shrub. Mar-May. Uncommon on rocky hillsides. *B. Betz* 33 (LOB)

¹ ***Nicotiana glauca*** Graham TREE TOBACCO. Tree. Apr-Aug. Common in lower Lamb Creek streambed. *A. Fisher* 378 (LOB)

Nicotiana obtusifolia M. Martens & Galeotti DESERT TOBACCO. Perennial herb. Mar-Jun. Common on alluvial fan. [syn. *Nicotiana trigonophylla* Dunal] *A. Fisher* 300 (LOB)

Physalis crassifolia Benth. THICK-LEAVED GROUND CHERRY. Perennial herb. Mar-May. Common on alluvial fan among granitic boulders. *A. Fisher* 286 (LOB)

Solanum douglasii Dunal DOUGLAS' NIGHTSHADE. Perennial herb. Year-round. Uncommon on alluvial fan among granitic boulders. *A. Fisher* 261 (LOB)

TAMARICACEAE – Tamarisk Family

¹ ***Tamarix ramosissima*** Ledeb. SALT CEDAR. Tree. Mar-Aug. Single tree on alluvial fan near Lamb Creek. *A. Fisher* 399 (LOB)

URTICACEAE – Nettle Family

Parietaria hespera B.D. Hinton var. *hespera* RILLITA PELLITORY. Annual. Feb-Jun. Shady area on a north slope. Collected once in 1985. *N.M. Fellows* 147! (UCR)

VISCACEAE – Mistletoe Family

Phoradendron californicum Nutt. DESERT MISTLETOE. Hemiparasitic shrub. Nov-Mar. Growing on *Senegalia* on alluvial fan. *A. Fisher* 256 (LOB)

VITACEAE – Grape Family

Vitis girdiana Munson DESERT WILD GRAPE. Woody vine. Mar-Jun. Common along upper Lamb Creek. *B. Betz* 32 (LOB)

ZYGOPHYLLACEAE – Caltrop Family

Larrea tridentata (DC.) Coville CREOSOTE BUSH. Shrub. Mar-May. Common on alluvial fan, especially below 450m. Dominant on alluvial fan north of the Oasis. *B. Betz* 11 (LOB)

ANGIOSPERMS: MONOCOTS

AGAVACEAE – Agave Family

Hesperoyucca whipplei (Torr.) Trel. CHAPARRAL YUCCA. Shrub. Apr-Jun. Rocky slopes. >500m. [syn. *Yucca whipplei* Torr.] *N.M. Fellows* 42! (UCR)

ARECACEAE – Palm Family

Washingtonia filifera (L. Linden) H.A. Wendl. CALIFORNIA FAN PALM. Tree. Feb-Jun. See Vogl & McHargue (1966) for a review of *Washingtonia* oases in the eastern Coachella Valley. Fiedler et al. (2013) state that *Washingtonia* was planted by the Lamb family who resided there in the 1930s. There are other cultivated trees along the creek (*Eucalyptus*, *Olea*), but the Oasis is within the natural range of *Washingtonia*, is good habitat for the native palm, and there seems to be no reason to believe they were planted. McClenaghan & Beauchamp (1986) studied the population genetics of *Washingtonia* in San Diego Co. and Imperial Co. and found low genetic differentiation within and between populations, but did not sample palms at the Oasis. Fossils from the Miocene and Pliocene support that fan palms were once common along the California coast and in the area that is now the Mojave Desert (Bailey 1936). *A. Fisher* 345 (LOB)

CYPERACEAE – Sedge Family

Carex alma L. H. Bailey STURDY SEDGE. Perennial herb. Apr-Aug. Along Lamb Creek. *N.M. Fellows* 168!, *N.M. Fellows* 178! (UCR)

Carex schottii Dewey SCHOTT'S SEDGE. Perennial herb. Mar-Jun. Common along Lamb Creek. *A. Fisher* 341 (LOB)

Carex senta Boott SWAMP SEDGE. Perennial herb. Apr-Aug. Along Lamb Creek. Collected once in 1985. *N.M. Fellows* 191! (RSA-POM)

JUNCACEAE – Rush Family

Juncus balticus Willd. subsp. ***ater*** (Rydb.) Snogerup BALTIC RUSH. Perennial herb. Jun-Jan. Common along upper Lamb Creek. *A. Fisher* 338 (LOB)

ORCHIDACEAE – Orchid Family

Epipactis gigantea Hook. STREAM ORCHID. Perennial herb. Mar-Oct. Common along upper Lamb Creek at waterfall and at higher elevations. *B. Betz* 31 (LOB)

POACEAE – Grass Family

- **Avena barbata* Pott ex Link SLENDER WILD OAT. Annual or perennial. Mar-Jun. Common on alluvial fan. *A. Fisher* 235 (LOB)
- Bromus arizonicus* (Shear) Stebbins ARIZONA BROME. Annual. Mar-Jun. Uncommon, beneath shrubs on alluvial fan. Collected once in 1995. *A. C. Sanders* 16271! (RSA-POM)
- **Bromus berterioanus* Colla CHILEAN CHESS. Annual. Mar-Jun. [syn. *Bromus trinii* Desv. var. *trinii*] *N.M. Fellows* 171! (UCR)
- **Bromus madritensis* L. subsp. *rubens* (L.) Husn. FOXTAIL BROME. Annual. Feb-Jun. Dominant ground cover on alluvial fan. [syn. *Bromus rubens* L.] *A. Fisher* 255 (LOB)
- ¹ *Cenchrus setaceus* (Forssk.) Morrone CRIMSON FOUNTAIN GRASS. Annual or perennial. Mar-Dec. Name change the result of Chemisquy et al. 2010. Uncommon on rocky slopes. [syn. *Pennisetum setaceum* (Forssk.) Chiov.] *A. Fisher* 259 (LOB)
- **Festuca myuros* L. RATTAIL SIXWEEKS GRASS. Annual. Feb-May. Uncommon on alluvial fan. [syn. *Vulpia myuros* (L.) C.C. Gmel.] *N.M. Fellows* 177! (UCR)
- Festuca octoflora* Walters SIXWEEKS GRASS. Annual. Mar-Jun. Growing in the shade of boulders on alluvial fan. [syn. *Vulpia octoflora* (Walter) Rydb.] *N.M. Fellows* 133! (UCR)
- **Hordeum murinum* L. WALL BARLEY. Annual. Mar-Jul. Uncommon in disturbed areas near house ruins. Collected once in 1985. [syn. *Hordeum glaucum* Steud.] *N.M. Fellows* 119! (UCR)
- Melica frutescens* Scribn. WOODY MELIC. Perennial. Mar-May. Common on alluvial fan. *A. Fisher* 289 (LOB)
- Melica imperfecta* Trin. LITTLE CALIFORNIA MELICA. Perennial. Mar-May. Uncommon in rocky soils. *A. Fisher* 227 (LOB)
- Muhlenbergia microsperma* (DC.) Kunth LITTLESEED MUHLY. Annual. Mar-May. *B. Betz* 12 (LOB)
- Muhlenbergia rigens* (Benth.) Hitchc. DEERGRASS. Perennial. Jun-Nov. Common near Lamb Creek. *N.M. Fellows* 29! (UCR)
- Poa secunda* J. Presl. subsp. *secunda* ONE-SIDED BLUE GRASS. Perennial. Mar-Aug. Common on rocky, north-facing slopes. [syn. *Poa scabrella* (Thurb.) Vasey] *N.M. Fellows* 96!, 156! (UCR)
- ¹ *Polypogon monspeliensis* (L.) Desf. RABBITFOOT GRASS. Annual. Apr-Aug. Common near Lamb Creek. *N.M. Fellows* 172! (UCR), *James Phillips* 33! (UCJR)
- ¹ *Schismus barbatus* (L.) Thell. MEDITERRANEAN GRASS. Annual. Mar-Apr. Common on alluvial fan. *A. Fisher* 285 (LOB)
- ¹ *Stipa miliacea* (L.) Hoover var. *miliacea* SMILO GRASS. Perennial. Mar-Nov. Common near Lamb Creek. [syn. *Piptatherum miliaceum* (L.) Coss.] *A. Fisher* 342 (LOB)

Stipa speciosa Trin. & Rupr. DESERT NEEDLE GRASS. Perennial. Apr-Jul. Common on rocky, north-facing slopes. [syn. *Achnatherum speciosum* (Trin. & Rupr.) Barkworth] *N.M. Fellows 192!* (UCR)

THEMIDACEAE – Brodiaea Family

Dichelostemma capitatum (Benth.) Alph. Wood. subsp. ***capitatum*** BLUE DICKS. Perennial herb. Mar-Jun. Common on alluvial fan. [syn. *Brodiaea capitata* Benth. var. *insularis* (Greene) J.F. Macbride] *A. Fisher 230* (LOB)

TYPHACEAE – Cat tail Family

Typha latifolia L. BROAD-LEAVED CATTAIL. Perennial herb, aquatic. Jun-Jul. Common in Lamb Creek. *A. Fisher 199* (LOB)

APPENDIX 1: RARE PLANTS OF THE OASIS DE LOS OSOS

Plants collected at the Oasis de los Osos with a California Rare Plant Ranking as of August 2017.

Galium angustifolium Nutt. subsp. *gracillimum* Dempster & Stebbins CRPR 4.2
S4 G5T4

APPENDIX 2: NON-NATIVE PLANTS OF THE OASIS DE LOS OSOS

Amaranthus albus
Avena barbata
Brassica juncea
Brassica tournefortii
Bromus madritensis subsp. *rubens*
Cenchrus setaceum
Centaurea melitensis
Chenopodium murale
Erodium cicutarium
Eucalyptus camaldulensis
Festuca myuros
Hordeum murinum
Nicotiana glauca
Olea europaea
Polypogon monspeliensis
Pseudognaphalium luteoalbum
Schismus barbatus
Sisymbrium irio
Sonchus asper subsp. *asper*
Sonchus oleraceus
Stellaria media
Stipa miliacea var. *miliacea*
Tamarix ramosissima

APPENDIX 3: TAXA OF THE OASIS DE LOS OSOS PRIMARILY FOUND IN THE THE SOUTH COAST BIOREGION

Acmispon grandiflorus var. *grandiflorus*
Acmispon micranthus
Adenostoma fasciculatum var. *fasciculatum*
Antirrhinum nuttallianum subsp. *nuttallianum*
Artemisia californica
Astragalus douglasii var. *douglasii*
Bowlesia incana
Calandrinia menziesii
Camissoniopsis confusa
Carex schottii
Carex senta
Ceanothus leucodermis
Claytonia parviflora
Clematis pauciflora
Collinsia concolor
Corethrogyne filaginifolia
Cryptantha pterocarya var. *purpusii*
Delphinium parryi
Dendromecon rigida
Ehrendorferia chrysantha
Epilobium canum subsp. *latifolium*
Eriodictyon crassifolium var. *crassifolium*
Eriogonum elongatum var. *elongatum*
Erythranthe cardinalis
Eucrypta chrysanthemifolia var. *chrysanthemifolia*
Gilia angelensis
Helianthus gracilentus
Hesperoyucca whipplei
Hoita macrostachya
Keckiella antirrhinoides var. *antirrhinoides*
Linanthus dianthiflorus
Lobelia cardinalis var. *pseudosplendens*
Loeflingia squarrosa
Lupinus bicolor
Lupinus hirsutissimus
Lupinus truncatus
Malacothamnus fasciculatus var. *fasciculatus*
Orobanche fasciculata
Pellaea andromedifolia
Pentagramma triangularis subsp. *triangularis*

Phacelia brachyloba
Phacelia cicutaria var. *hispida*
Phacelia ramosissima
Prunus ilicifolia
Pseudognaphalium biolettii
Pseudognaphalium luteoalbum
Quercus wislizenii var. *frutescens*
Rhus ovata
Ribes indecorum
Rumex californicus
Salix exigua
Salvia apiana
Scrophularia californica
Solanum douglasii
Solidago velutina subsp. *californica*
Stachys stebbinsii
Stellaria media
Vitis girdiana

APPENDIX 4: TAXA OF THE OASIS DE LOS OSOS PRIMARILY FOUND IN THE MOJAVE AND SONORAN DESERT BIOGREGIONS

Ambrosia dumosa
Ambrosia salsola var. *salsola*
Artemisia ludoviciana subsp. *incompta*
Bahiopsis parishii
Bromus arizonicus
Chaenactis fremontii
Chylismia claviformis
Condea emoryi
Croton californicus
Cylindropuntia echinocarpa
Encelia farinosa
Eriogonum thurberi
Eriogonum wrightii var. *nodosum*
Euphorbia micromera
Krameria bicolor
Malacothrix glabrata
Mirabilis laevis var. *retrorsa*
Nicotiana obtusifolia
Palafoxia arida var. *arida*
Phoradendron californicum
Senegalia greggii
Sphaeralcea ambigua var. *rugosa*
Stephanomeria exigua
Washingtonia filifera
Ziziphus parryi var. *parryi*



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