

**A SURVEY OF THE VASCULAR PLANTS IN THE AREA OF LIME CREEK,
MARICOPA COUNTY, ARIZONA: A UNIQUE UPLAND
SONORAN DESERT ENVIRONMENT**

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ABSTRACT

A survey of the vascular plants of the exposed late Tertiary limestone lacustrine unit and surrounding areas near Lime Creek in Tonto National Forest near Horseshoe Lake Recreation Area, Maricopa County, Arizona, was conducted from September 2003 to September 2006. The survey area comprises 1280 acres (two square miles) of Upland Sonoran Desert environment with washes and riparian habitats. We identified 254 native species and 17 introduced species from 199 genera and 68 families. This flora is unique in that it includes some species indicative of semidesert grasslands and interior chaparral that are presumed to be relicts of a Miocene pine-oak-juniper woodland (*Juniperus coahuilensis*, *Rhus ovata*); others that are endemics to this soil type (*Lotus mearnsii* var. *equisolensis*, *Purshia* ×*subintegra*); and finally species that are disjuncts from both higher elevations and other deserts (*Eriogonum ripleyi*, *Lesquerella cinerea*, *Packera neomexicana*, *Polygala rusbyi*, *Polygala macradenia*, *Polygala scoparioides*, *Thamnosma texanum*). Here we also report on two more disjunct species, *Agave chrysantha* and *Parthenium incanum*. In addition, the Lime Creek area flora includes one federally listed endangered species, *Purshia* ×*subintegra*, and two rare species of concern, *Eriogonum ripleyi* and *Lotus mearnsii* var. *equisolensis*, occur in the survey area.

INTRODUCTION

The Lime Creek study site (LCSS) is an area of limestone rocks degraded to various degrees that were originally formed in the Tertiary geologic period as deposits in a small lake. Similar deposits are found throughout the Southwest; these have been found to support an unusual assemblage of plant species (Anderson 1992). Although studies of the rare and endemic plants of these lacustrine soils have been conducted, to the best of our knowledge, this study is the first comprehensive inventory of the vascular plants growing in any such area. An inventory of all the plants, or flora, of an area is a valuable tool for land managers. This is especially the case when the area supports rare or endangered species that require special attention. Thus, we decided, after being encouraged by our colleagues, that a study of the LCSS flora would be a useful contribution.

SURVEY AREA

Area boundaries—The LCSS (Fig. 1) is located about 40 miles northeast of Phoenix between 33° 53' and 33° 54' north latitude and between 111° 42' and 111° 45' west longitude and covers about 1280 acres or two square miles. The area is south of Horseshoe Reservoir along the Verde River, and runs southeast to northwest along the jeep trail crossing Lime creek, with access from Horseshoe Dam and Bartlett Dam Roads. The LCSS is near the reservoir and exhibits rare to infrequent use; this is most frequently noticed along the jeep trail and includes vehicular and horse traffic, target practice, and camping.

Topography, geology, and soils—The elevation of the LCSS ranges from the bed of Lime Creek at 563 m (1850 ft) to the highest point located north of Lime Creek at 734 m (2409 ft). The terrain includes part of Lime Creek, rolling hills, ridges, washes, and one perennial spring (see “Springs” in Fig. 1; hereafter the Spring). The survey area falls in the USGS Horseshoe Dam 7.5' Quadrangle, Maricopa, Arizona County map (Ferguson et al. 1999), and geologically consists of a Tertiary stratigraphic sequence with basaltic lava, conglomerate, sandstone, and lesser amounts of mudstone, limestone and felsic tuff. The younger sequence consists of volcanoclastic conglomerate interbedded with sandstone, fine-grained lacustrine, siliciclastic and carbonate rocks and several discontinuous and relatively thin basalt flows (Ferguson et al. 1999). The lacustrine unit of Horseshoe Dam quadrangle was originally mapped as a calcareous tuff (Wrucke and Conway 1987). Ferguson et al. (1999) found little evidence of pyroclastic textures in these rocks and reinterpreted the deposit as a lacustrine unit dominated by limestone (LLU), correlating it with the Chalk Mountain limestone a few kilometers to the north. Nations and Stump (1996) refer to this area as an example of a Tertiary basin fill sequence known as the Verde Formation in the Verde Basin. In late Miocene time the Verde drainage system was blocked at the southern end resulting in a closed drainage system. Sedimentation proceeded within the basin. External drainage from the basin was restored in the Pleistocene; thus deposition, with rapid accumulation of carbonate and clastic sediments, continued through the Miocene on into the early Pleistocene. Anderson (1996) determined these lacustrine units to be comparatively infertile with very low levels of phosphorus and nitrogen.

Climate—Amount and seasonality of rainfall are defining characteristics of the Sonoran Desert. Much of the Desert has a bimodal rainfall pattern, though even during the rainy seasons most days are sunny. From December to March frontal storms from the northern Pacific Ocean occasionally bring widespread, gentle rain to the northwestern areas of Arizona's Sonoran Desert. From July to mid-September, the summer monsoon brings surges of wet tropical air and frequent but localized violent thunderstorms (Demmitt 1999).

The bimodal weather patterns of the Sonoran Desert promote diverse ephemeral vegetation. The winter rains, when ample, produce large populations of short lived ephemeral plants commonly called “annuals.” Normally the annual precipitation is split evenly between the winter and summer rainy seasons (Demmitt 1999). The Flood Control District of Maricopa County (FCDMC; 2008) maintains a gauge at Horseshoe Lake. Recent yearly totals for precipitation are 12.13 inches for

2003, 11.38 inches for 2004, 21.3 inches for 2005, and 10.91 for 2006 inches. During the survey the monthly averages ranged from zero for many months to a high of 5.35 inches in March of 2005 (FCDMC 2008).

The Sonoran Desert differs from the other three North American deserts in having mild winters; most of the Sonoran Desert rarely experiences frost (Demmitt 1999). The FCDMC also maintains a temperature gauge at Horseshoe Lake. The temperature ranged from a low of 22° F in December 2005 to a high of 116° F in July 2005. Mean summer temperatures (June/July/August) were 88° F, while the mean temperature for the winter (December/January) was 52° F (FCDMC 2008).

Historic land use—The survey area lies within the Lower Verde River basin and exhibits evidence of prehistoric use by the agrarian Hohokam people. Evidence of their occupation or use includes temporary collecting camps, field houses, petroglyphs, agricultural fields with check dams and terraces, and quarries (Wood 2006). Quarries were the most common evidence of prehistoric use that we encountered.

In the late 1800s, the region's most valuable resources proved to be mild climate, abundant water, and lush grassland to support cattle operations. One of the first families to establish grazing rights was the Cartwright family who settled on a ranch near what is now Seven Springs Recreational Area in 1887. The LCSS lies completely within the Cartwright grazing allotment. Examination of grazing records indicates that most grazing occurred near and to the west of Lime Creek. This area has not been grazed since 2000 (USDA 2006). While the surrounding hillsides have been grazed for more than 100 years, the exposed LLU is inhospitable to forage plants (Anderson 1996).

Previous botanical studies—No complete floristic work has been published on this area of Tonto National Forest. Botanists made collections between 1960 and 2003 resulting in 70 vouchers. These document the occurrence of 46 taxa. The nearest similar floristic inventory was conducted by Shannon Doan (2002) of the Seven Springs Region of Tonto National Forest.

Vegetation—The Lime Creek region lies within the boundaries of the Arizona Upland Subdivision of the Sonoran Desertscrub Biotic Community as described by Turner and Brown (1994). The flora of the LCSS is unique in that it includes some species (*Juniperus coahuilensis*, *Rhus ovata*) normally encountered at higher elevations, which are presumed to be relicts of a Miocene pine-oak-juniper woodland that once inhabited the area; others that are endemics to the exposed LLU (*Lotus mearnsii* var. *equisolensis*, *Purshia* ×*subintegra*); and finally species that are disjuncts from both higher elevations and other deserts (*Eriogonum ripleyi*, *Lesquerella cinerea*, *Packera neomexicana*, *Polygala rusbyi*, *Polygala macradenia*, *Polygala scoparioides*, *Thamnosma texanum*; Anderson 1996). We here report two more disjuncts, *Parthenium incanum* and *Agave chrysantha*.

Endangered, rare, or sensitive species—*Purshia* ×*subintegra* is the only listed endangered species in this area. *Lotus mearnsii* var. *equisolensis* and *Eriogonum ripleyi* are the rare or sensitive species in this area (Arizona Rare Plant Committee 1999).

METHODS

Herbarium searches—The Southwest Environmental Information Network (SEINet; 2007) database was queried using the boundaries of our survey area to produce a list of specimens deposited with University of Arizona Herbarium (ARIZ) and Arizona State University Herbarium (ASU). We were able to study these specimens by examining them ourselves when the specimens were sent on loan (ARIZ) or we were able to visit the herbarium (ASU). A manual search was conducted at Tonto National Forest office of the Terrestrial Ecological Unit Survey Herbarium (TEUI) in the fall of 2006. A similar search was conducted at Desert Botanical Garden Herbarium (DES) in the fall of 2006 and spring of 2007. The identities of all specimens found from the LCSS were verified and annotations were made as necessary.

Collecting methods—The survey area was visited 19 times from September 2003 to September 2006. The entire area was searched on foot in all seasons, excluding the summer months of June and July, for plants in flower and fruit. The most extensive sampling occurred after the summer monsoons and in the spring of each year. Data for each locality, including habitat type, dominant vegetation, and global positioning system (GPS) coordinates and elevation, were recorded for each specimen. Some descriptive information and relative abundance of the plants collected was also noted. Place and road names follow those assigned on TNF maps. Using standard methods, voucher specimens were pressed, dried, mounted, and then deposited with DES. Duplicate vouchers, when available, were sent to ASU and TEIU.

Plant identifications, nomenclature, and archiving of data—*Arizona Flora* (Kearney et al. 1960) was the basic reference for identification, but was superseded by new treatments for the *Manual of Vascular Plants of Arizona* (in progress) as published in the *Journal of the Arizona-Nevada Academy of Science*, 1992–2003 or in *Canotia*, 2005–2009 (Vascular Plants of Arizona Editorial Committee 2010). The *Flora of North America* (<http://www.fna.org/>) was also used when treatments were published.

Nomenclature follows first the recent treatments for Arizona, and then the *Flora of North America* (<http://www.fna.org/>). Taxa not covered in these publications follow the United States Department of Agriculture PLANTS database in the World Wide Web (United States Department of Agriculture, Natural Resources Conservation Service 2001; <http://plants.usda.gov/>). Life form descriptions are based on our observations and on the USDA PLANTS database. Data from all collections were entered in the DES collections database and made publicly available on the World Wide Web at <http://swbiodiversity.org/seinet/index.php>. Photos taken during the course of the study were printed and mounted on voucher specimens.

Floristic comparison—The floras of the Lime Creek LLU Area and the nearby Seven Springs Recreational Region (Doan 2002) were compared by calculating Jaccard's coefficient of community (Jaccard 1912), which results in a percent similarity metric between the two floras. Geographically the two areas are close, with Seven Springs being less than 3 miles away, but there is no elevational

overlap: Lime Creek LLU area ranges from 1800 feet to about 2300 feet, while the Seven Springs Region ranges from 3300 feet to 5200 feet.

RESULTS AND DISCUSSION

Herbarium searches and collections—Herbarium search results are shown in Table 1. Previous collections (mentioned above) yielded 46 taxa. In our survey we found most of these again. There were four taxa collected previously that were not recollected during this survey: *Astragalus tephrodes* var. *brachylobus*, *Encelia frutescens*, *Lupinus arizonicus*, and *Penstemon eatonii* var. *undosus*.

Plant collections—During the 37-month survey period, 565 collections were made. Including specimens found during the herbarium searches, the flora of LCSS comprises 271 species in 199 genera of 68 families (Table 2). The best-represented families (Table 3) are, in descending order: Asteraceae, Poaceae, Fabaceae, and Brassicaceae. Introduced species (Table 4) numbered 17, representing 6% of the flora.

The current survey added 225 taxa to the known vascular flora of the LCSS, a five-fold increase. Although there were no new, endangered, rare or sensitive species found during this survey, a few known taxa do warrant mention. *Agave chrysantha*, a disjunct of higher elevation was found in several locations. Whenever found, this plant exhibits cloning, which is an infrequent form of reproduction for this species (Hodgson, pers. com.). *Juniperus coahuilensis* and *Rhus ovata*, presumed relicts of a Miocene pine-oak-juniper woodland (Anderson 1996), were also found in several locations. The only recorded Maricopa County collection of *Parthenium incanum* was made during this survey. Also included in this flora catalog are the only Maricopa County collections of *Eriogonum ripleyi*, *Lesquerella cinerea*, *Lotus mearnsii* var. *equisolensis*, *Polygala rusbyi*, *Polygala scoparioides*, *Purshia* × *subintegra*, *Thamnosma texana*, all collected by earlier workers and recollected by the authors.

Lime Creek and the Spring comprise habitats that foster uncommon communities of plants within the survey area. *Fraxinus anomala*, *Juglans major*, *Prosopis velutina*, *Parkinsonia florida*, *Salix gooddingii* and the introduced *Tamarix ramosissima* were found in Lime Creek and surrounding drainage areas. Of the 17 introduced taxa collected during this survey, 8 were found only in Lime Creek and the surrounding drainage. In addition *Ambrosia monogyra* and *Chilopsis linearis* var. *arcuata* were found only in the Lime Creek drainage area. *Typha domingensis* was found only at the Spring.

Life form descriptions are perennial herbs, ephemerals, shrubs, trees, stem succulents, leaf succulents, vines and parasites. Perennial herbs (Table 5) account for 79 species, while ephemerals number 114. Six main habitat types or communities were observed during the course of the survey. Their descriptions and designations are: hills and slopes (HILL), ridges (RIDGE), roads and trails (ROAD), rocks (ROCK), dry washes (WASH), and wetlands including Lime Creek, its borders and the spring (WET). There were 50 taxa (18%) that were found only in the habitat designated WET.

Floristic evaluation of richness—Using Bowers and McLaughlin's (1982) formula for predicting the number of species expected based on elevational range

and collecting time, where ‘*S*’ is the estimated richness, ‘*E*’ is the range in elevation in meters, and ‘*T*’ is the time of collection to the nearest 0.5 years:

$$\hat{S} = 47 + 0.349E + 8.2T$$

For the Lime Creek LLU Area flora, the equation results are:

$$47 + 0.349(160) + 8.2(3) = 121.$$

The actual number of taxa collected by these authors is 227 indicating that there are other factors contributing to the Lime Creek LLU Area’s richness besides elevational range and collecting time.

Bowers and McLaughlin (1982) derived an expression of relative richness for Arizona floras examined, where ‘*R*’ is relative richness and ‘*S*’ is the observed number of species:

$$R = 100(S - \hat{S}) \div \hat{S}$$

Applied to the current flora, the following equation results:

$$100(227 - 121) \div 121 = 88$$

R-values express the extent to which factors other than elevational range and collecting time contribute to the absolute diversity of the area. Therefore an R-value of 88 means that there are 88% more species in the survey area than would be expected based on the elevational gradient and collecting time. The perennial supply of water in Lime Creek and at the Spring, and the unique LLU may be contributing factors to the actual number of species found. The winter-spring precipitation, especially the unusually heavy rains in 2005, accompanied by mild temperatures, contributed to diverse, numerous spring ephemerals that year. Spring ephemerals account for about 34% of the total flora. The winter-spring precipitation, especially the unusually heavy rains in 2005, accompanied by mild temperatures contributed to diverse, numerous spring ephemerals, comprising about one-third (34%) of the total flora, and undoubtedly contributed to the overall richness.

Floristic comparison—Jaccard’s index (1912) was used to calculate the percent similarity between the flora of the Lime Creek LLU Area and that of the flora of the nearby Seven Springs Recreational Region (Doan 2002). Comparing the flora, a percent similarity can be determined by calculating Jaccard’s coefficient of community (Jaccard 1912):

$$J = \{ \text{number of taxa in common} / [(\text{total taxa in first flora} + \text{total taxa in second flora}) - \text{number of taxa in common}] \} \times 100$$

The equation results are:

$$\{ 171 / [(271 + 444) - 171] \} \times 100 = 31.4\%$$

Elevation gradient seems to be one of the factors most influential in relative species richness among Arizona regional floras (Bowers and McLaughlin 1982). The calculations made to determine percent similarity between the current flora and the flora for the Seven Springs Region (Doan 2002) indicates other factors might be influencing both the richness and the percent similarity. Geographically the two areas are close with Seven Springs being less than 3 miles away, but there is no elevational overlap. The elevation for the Lime Creek LLU area ranges from 1800 feet to about 2300 feet, while the Seven Springs Region ranges from 3300 feet to 5200 feet. Nevertheless, these two areas show a moderate percent similarity (31.4%). In addition to proximity, the presence of a perennial water supply and the exposed LLU in the area of Lime Creek may offer environments for overlap of vegetation yielding this similarity.

Parabotanist training—This survey began as a suggestion by our colleagues to conduct a flora study of the LCSS as a useful contribution in understanding the floras of the lacustrine soils found at the site. We also set out to determine if training lay men and women as parabotanists (in this case ourselves) is a viable plan to increase the knowledge of Arizona's flora. The experience was a learning process and both of us are still actively involved in collecting in Arizona. The success of this project has encouraged the Arizona Native Plants Society to begin a parabotanist program modeled after the San Diego County Plant Atlas project (SDCPAP 2005).

Table 1. Results of herbarium searches for vascular plant specimens from the Lime Creek area.

Collectors	# of Specimens	Herbarium
Karen Adams & John Welch	7	University of Arizona (ARIZ)
John Anderson	18	Arizona State University (ASU)
Dixie Damrel & the TEUI team	17	Terrestrial Ecological Unit Inventory (TEUI)
Shannon Doan	18	Desert Botanical Garden (DES)
Wendy Hodgson	8	Arizona State University (ASU)
Richard Spellenberg	2	University of Arizona (ARIZ)

Table 2. Taxonomic composition of the Lime Creek LLU area flora (*includes three varieties of *Aristida purpurea*).

Taxonomic Group	Families	Genera	Species
Polypodiophyta	1	2	2
Pinophyta	1	1	1
Magnoliophyta, Magnoliopsida	61	168	232
Magnoliophyta, Liliopsida	5	28	36*
Totals	68	199	271*

Table 3. The best represented families composing the Lime Creek LLU area flora (*includes three varieties of *Aristida purpurea*).

Taxonomic Group	Genera	Species	Percent of Total
Asteraceae	37	43	16.0%
Poaceae	22	30*	11.0%
Fabaceae	14	25	9.0%
Brassicaceae	9	11	4.0%
Boraginaceae	6	9	3.3%
Cactaceae	6	9	3.3%
Solanaceae	6	9	3.3%
Hydrophyllaceae	4	9	3.3%

Table 4. Number of introduced plant taxa, by family, in the Lime Creek LLU area flora.

Family	Number of Taxa
Poaceae	7
Asteraceae	2
Brassicaceae	2
Caryophyllaceae	1
Chenopodiaceae	1
Fabaceae	1
Geraniaceae	1
Lamiaceae	1
Tamaricaceae	1

Table 5. Number of plant taxa, by life form, in the Lime Creek LLU area flora.

Life Form	Number of Taxa
Ephemerals	114
Perennial Herbs	79
Shrubs	43
Trees	14
Stem Succulents	9
Vines	7
Parasites	3
Leaf Succulents	2

**CATALOG OF VASCULAR PLANTS IN THE AREA OF LIME CREEK,
MARICOPA COUNTY, ARIZONA**

POLYPODIOPHYTA (FERNS)

Pteridaceae

Astrolepis cochisensis (Goodd.) D. M. Benhan & Windham ssp. *cochisensis* – Cochise Scaly
Cloakfern. (N) (PH) Rare, 2100 ft. LLU; ROCK, WASH; *DG208*, 256.

Pellaea truncata Goodd. – Spiny Cliffbrake. (N) (PH) Rare, 2297 ft. MIXED; ROCK; *DG66*.

PINOPHYTA (GYMNOSPERMS)

Cupressaceae

Juniperus coahuilensis (Martinez) Gausson ex R.P.Adams – Redberry Juniper. (N) (T) Occasional to
frequent, 2063–2128 ft. LLU; RIDGE; *DG206*, 230.

MAGNOLIOPHYTA (ANGIOSPERMS)

MAGNOLIOPSIDA (DICOTYLEDONS)

Acanthaceae

Anisacanthus thurberi A. Gray – Thurber's Desert Honeysuckle. (N) (S) Rare, 2042 ft. AL; WET;
DG160.

Amaranthaceae

Amaranthus palmeri S. Watson – Carelessweed. (N) (E) Infrequent, 2042 ft. MIXED; ROAD;
DG527.

Anacardiaceae

Rhus ovata S. Watson – Sugar Sumac. (N) (T) Infrequent, 2060–2297 ft. LLU; HILL, RIDGE;
DG223, 324, 380.

Apiaceae

Daucus pusillus Michx. – American Wild Carrot. (N) (E) Frequent, 1960–2339 ft. ALL; WET,
ROAD, HILL; *DG118*, 155, 358, 405, 453, *SD1486*.

Lomatium nevadense J. M. Coult. & Rose – Nevada Biscuit Root. (N) (PH) Rare, 2036 ft. MIXED;
WASH; *DG273b*.

Yabea microcarpa Koso-Pol. – False Carrot. (N) (E) Rare, 2355 ft. LLU; HILL; *DG446*.

Apocynaceae

Amsonia palmeri A. Gray – Palmer's Bluestar. (N) (PH) Infrequent, 2161 ft. LLU; HILL; *DG462*,
DZD1893-b, *JLA87-16*.

Aristolochiaceae

Aristolochia watsoni Wooton & Standl. – Watson's Dutchman's Pipe. (N) (PH) Rare, 1999 ft. LLU;
ROAD; *DG205j*.

Asclepiadaceae

Funastrum cynanchoides (Decne.) Schltr. ssp. *heterophyllum* (Engelm. ex. Torr.) Kartesz –
Hartweg's Twinevine. (N) (V) Rare, 2042 ft. AL; WET; *DG159*.

Matelea parvifolia (Torr.) Woodson – Spearleaf. (N) (V) Occasional, 2128–2218 ft. MIXED, LLU;
HILL; *DG04*, 431.

Asteraceae

- Acamptopappus sphaerocephalus* (Harr. & A. Gray ex A. Gray) A. Gray var. *sphaerocephalus* – Rayless Goldenhead. (N) (S) Frequent, 1994–2138 ft. LLU, MIXED; HILL, ROAD; *DG149, 394, 494, DZD1905-b SD1493*.
- Acourtia wrightii* (A. Gray) Reveal & R.M. King – Brownfoot. (N) (PH) Occasional, 2209–2220 ft. LLU; HILL, ROAD; *DG192, 475, JW20-92*.
- Adenophyllum porophylloides* (A. Gray) Strother – San Felipe Dogweed. (N) (S) Rare, 2128 ft. LLU; ROAD; *DG417*.
- Ambrosia confertiflora* DC. – Weakleaf Burr Ragweed. (N) (PH) Frequent, 2120–2231 ft. AL, MIXED; ROAD, WET; *DG13, 520, 521*.
- Ambrosia deltoidea* (Torr.) W.W. Payne – Triangle Burr Ragweed. (N) (S) Rare, 2067 ft. LLU, HILL; *DG506*.
- Ambrosia dumosa* (A. Gray) W.W. Payne – Burrobush. (N) (S) Rare, 2067 ft. LLU; HILL; *DG504*.
- Ambrosia monogyra* (Torr. & A. Gray) Strother & B.G. Baldwin [Syn. *Hymenoclea mongyra* Torr. & A. Gray ex A. Gray] – Singlewhorl Burrobush. (N) (S) Frequent, especially in the creek bed. 1996 ft. AL; WET; *DG45*.
- Artemisia ludoviciana* Nutt. ssp. *mexicana* (Willd. ex Spreng.) D.D. Keck – White Sagebrush. (N) (PH) Rare, 2013 ft. AL; WET; *DG56*.
- Baccharis salicifolia* (Ruiz & Pav.) Pers. – Mule’s Fat. (N) (S) Infrequent, 2075–2091 ft. AL, LLU; RIDGE, WET; *DG59, 332*.
- Baccharis sarothroides* A. Gray – Desert Broom. (N) (S) Infrequent, 2013–2124 ft. AL, LLU; ROCK, WET; *DG55, 554*.
- Baccharis sergiloides* A. Gray – Desert Baccharis. (N) (S) Rare, 2000 ft. AL; WET; *DG77*.
- Bahiopsis parishii* (Greene) E. E. Schill. & Panero [Syn. *Viguiera parishii* Greene] – Parish’s Goldeneye. (N) (S) Frequent, 2013–2275 ft. LLU, MIXED; RIDGE, ROAD, WASH; *DG146, 384, 525*.
- Baileya multiradiata* Harv. & A. Gray ex Torr. – Desert Marigold. (N) (PH) Infrequent, 2013–2060 ft. AL, LLU; RIDGE, WET; *DG52, 224, 348*.
- Bebbia juncea* Greene – Chuckawalla’s Delight. (N) (S) Infrequent, 2016–2278 ft. AL, LLU; ROAD, WET; *DG216, 524, 566*.
- Centaurea melitensis* L. – Maltese Star-thistle. (I) (E) Rare, 2063 ft. LLU; HILL; *DG514*.
- Chaenactis carphoclinia* A. Gray – Pebble Pincushion. (N) (E) Occasional, 2067 ft. LLU; HILL; *DG500*.
- Conyza canadensis* (L.) Cronquist – Canadian Horseweed. (N) (E) Infrequent, 1996 ft. AL; WET; *DG43*.
- Dieteria asteroides* Torr. var. *glandulosa* (B.L. Turner) D.R. Morgan & R.L. Hartm. (Syn. *Machaeranthera asteroides* (Torr.) Greene) – Fall Tansyaster. (N) (PH) Rare, 2042 ft. AL; WET; *DG158*.
- Encelia farinosa* A. Gray ex Torr. – Brittlebush. (N) (S) Frequent, 1998–2080 ft. LLU; HILL, RIDGE; *DG133, 286, 327, 345*.
- Encelia virginensis* A. Nelson – Virgin River Brittlebush. (N) (S) Absent, 2004 ft. LLU; HILL; *SD1494*.
- Erigeron divergens* Torr. & A. Gray – Spreading Fleabane. (N) (E) Rare, 1996 ft. AL; WET; *DG40*.
- Eriophyllum lanosum* A. Gray [Syn. *Antheropeas lanosum* (A. Gray) Rydb.] – White Easter Bonnets. (N) (E) Occasional, 1994–2002 ft. MIXED; ROAD; *DG100, 402*.
- Gutierrezia sarothrae* (Pursh) Britton & Rusby – Broom Snakeweed. (N) (S) Frequent, 2013–2050 ft. AL, LLU; ROAD, WET; *DG51, 224a, 538, JW17-92*.
- Helianthus annuus* L. – Common Sunflower. (N) (E) Rare, 2056 ft. AL; WET; *DG581*.
- Heliomeris longifolius* Cockerell var. *annuus* (M.E. Jones) H. O. Yates – Longleaf False Goldeneye. (N) (E) Frequent, 2138–2294 ft. LLU; ROAD; *DG21, 485, 534*.
- Heterotheca subaxillaris* (Lam.) Britton & Rusby var. *latifolia* (Buckley) Gandhi & R.D. Thomas – Camphorweed. (N) (E) Infrequent, 1996–2041 ft. AL; WET; *DG47*.
- Isocoma acradenia* (Greene) Greene var. *acradenia* – Alkali Goldbush. (N) (S) Frequent, 1978 ft. ROAD; *DG27*.

- Machaeranthera tagetina* Greene – Mesa Tansyaster. (N) (E) Occasional, 2013–2231 ft. AL, LLU; ROAD, WET; *DG16*, 54.
- Melampodium leucanthum* Torr. & A. Gray – Plains Blackfoot Daisy. (N) (PH) Abundant, 1979–2209 ft. LLU; HILL, RIDGE; *DG178*, 193, 260, 326, *JLA* 86-3.
- Monoptilon bellioides* H. M. Hall – Mohave Desert Star. (N) (E) Occasional, 1960–2002 ft. MIXED; ROAD, WASH; *DG101*, 121.
- Packera neomexicana* (A. Gray) W.A. Weber & A. Love var. *neomexicana* – New Mexico Groundsel. (N) (PH) Occasional, 2135–2339 ft. LLU; HILL, ROAD; *DG205h*, 452, 490, *JLA*86-13, 86-18.
- Parthenium incanum* Kunth – Mariola. (N) (S) Rare, 2100–2293 ft. LLU; RIDGE; *DG73*, *DG209*.
- Porophyllum gracile* Benth. – Slender Poreleaf. (N) (S) Frequent, 1998–2220 ft. AL, LLU; HILL, RIDGE, ROAD, WET; *DG58*, 132, 353, 474, 511.
- Psilostrophe cooperi* Greene – Whitestem Paperflower. (N) (PH) Occasional, 1994–2257 ft. MIXED, LLU; RIDGE, ROAD; *DG25*, 252, 371, 396.
- Rafinesquia neomexicana* A. Gray – New Mexico Plumseed. (N) (E) Occasional, 1960–2267 ft. LLU, MIXED; RIDGE, ROAD; *DG112*, 376.
- Senecio flaccidus* Less. var. *monoensis* (Greene) B.L. Turner & T.M. Barkley. – Smooth Threadleaf Ragwort. (N) (PH) Frequent, 2013–2042 ft. AL; WET; *DG49*, 168.
- Sonchus oleraceus* L. – Common Sowthistle. (I) (E) Frequent, 2036–2069 ft. AL; WET; *DG169*, 272, 322.
- Stephanomeria pauciflora* (Torr.) A. Nelson – Brownplume Wirelettuce. (N) (S) Infrequent, 2013–2067 ft. AL, MIXED; WET, ROAD; *DG50*, 497.
- Stylocline micropoides* A. Gray – Woolyhead Neststraw. (N) (E) Occasional, 1960–2054 ft. LLU, MIXED; RIDGE, ROAD; *DG117*, 352, 403.
- Thymophylla acerosa* (DC.) Strother – Pricklyleaf Dogweed. (N) (S) Abundant, 2027–2220 ft. LLU; HILL, RIDGE; *DG190*, 194, 280, 459, 479.
- Trixis californica* Kellogg – American Threefold. (N) (S) Rare, 2355 ft. LLU; HILL; *DG438*.
- Uropappus lindleyi* Nutt. – Lindley’s Silverpuff. (N) (E) Occasional, 1998–2119 ft. LLU; RIDGE, ROAD; *DG130*, 310, 355.
- Xanthisma spinulosum* (Pursh) Morgan & R.L. Hartm. var. *gooddingii* (A. Nelson) D.R. Morgan & R.L. Hartm. [Syn. *Machaeranthera pinnatifida* (Hook.) Shinnery] – Lacy Tansyaster. (N) (PH) Occasional, 2067–2355 ft. LLU; HILL, RIDGE; *DG369*, 436, 505, 544, *DZD1895-b*.

Berberidaceae

- Berberis haematocarpa* Wootton – Red Barberry. (N) (S) Rare, 2078 ft. LLU; RIDGE; *DG186a*.

Bignonicaceae

- Chilopsis linearis* (Cav.) Sweet ssp. *arcuata* (Fosberg) Henrickson – Desert Willow. (N) (T) Rare, 2000 ft. AL; WET; *DG71*.

Boraginaceae

- Amsinckia menziesii* A. Nelson & J.F. Macbr. var. *intermedia* (Fisch & C.A. Mey) Ganders – Menzie’s Fiddleneck. (N) (E) Abundant, 1958–2119 ft. AL, MIXED; HILL, RIDGE, ROAD, WASH, WET; *DG82*, 91, 129b, 265, 305, 341.
- Cryptantha barbiger* Greene – Bearded Cryptanth. (N) (E) Occasional, 1958–2220 ft. LLU, MIXED; HILL, ROAD; *DG88*, 484, *SD1488*.
- Cryptantha maritima* Greene – Guadalupe Cryptantha. (N) (E) Rare, 1998 ft. MIXED; WASH; *DG130b*.
- Cryptantha muricata* A. Nelson & J.F. Macbr. - Pointed *Cryptantha*. (N) (E) Occasional, 1960–2355 ft. LLU, MIXED; HILL, RIDGE, ROAD; *DG128*, 281, 444.
- Heliotropium curassavicum* L. var. *oculatum* DC. – Salt Heliotrope. (N) (E) Rare, 2041 ft. AL; WET; *DG219*.
- Pectocarya recurvata* I.M. Johnston – Curvenut Combseed (N) (E) Frequent, 2002–2042 ft. LLU; RIDGE, ROAD; *DG109*, 269.

Pectocarya platycarpa Munz & I.M. Johnst. – Broadfruit Combseed. (N) (E) Frequent, 2002–2049 ft. LLU, MIXED; RIDGE, WASH; *DG110a*, 267.

Plagiobothrys arizonicus (A. Gray) Greene ex. A. Gray – Arizona Popcorn Flower. (N) (E) Abundant, 1960–2128 ft. ALL; RIDGE, ROAD, WASH, WET; *DG81*, 127, 152, 339, 423, *SD1487*.

Tiquilia canescens (DC.) A.T. Richardson – Woody Crinklemat. (N) (S) Frequent, 2138–2235 ft. LLU; HILL, RIDGE; *DG195*, 368, 439, 477, *DZD1903-b*.

Brassicaceae

Boechera perennans (S. Watson) W.A. Weber – Perennial Rockcress. (N) (PH) Infrequent, 2110 ft. AL; WASH, WET; *DG258*, 315.

Brassica tournefortii Gouan – Asian Mustard. (I) (E) Occasional, 2002–2069 ft. AL, MIXED; WASH, WET; *DG99*, 319.

Caulanthus lasiophylla (Hook. & Arn.) Greene – California Mustard. (N) (E) Abundant, 1974–2297 ft. LLU; HILL, RIDGE, ROAD; *DG237*, 263, 312, 379, 419.

Descurainia pinnata (Walter) Britton – Western Tansymustard. (N) (E) Occasional, 1974–2119 ft. LLU, MIXED; HILL, ROAD, WASH; *DG105*, 238, 306.

Draba cuneifolia Nutt. ex Torr. & A. Gray – Wedgeleaf Draba. (N) (E) Abundant, 1992–2161 ft. LLU, MIXED; HILL, RIDGE, ROAD, WASH; *DG102*, 246, 279, 328, 461.

Lepidium lasiocarpum Nutt. ex Torr. & A. Gray – Shaggyfruit Pepperweed. (N) (E) Frequent, 1960–2054 ft. LLU, MIXED; HILL, RIDGE, ROAD, WASH; *DG107*, 116, 234, 351.

Lepidium cf. *oblongum* Small – Veiny Pepperweed. (N) (E) Rare, 1958 ft. MIXED; ROAD; *DG89*.

Lesquerella cinerea S. Watson – Basin Bladderpod. (N) (PH) Abundant, 1979–2339 ft. LLU; HILL, RIDGE, ROAD; *DG179*, 205g, 262, 381, 455, 472, *DZD1891-b*, *JLA99-7*.

Lesquerella gordonii (A. Gray) S. Watson – Gordon's Bladderpod. (N) (E) Rare, 2069 ft. AL; WET; *DG320*.

Sisymbrium irio Crantz ex Steud. – London Rocket. (I) (E) Rare, 1979 ft. MIXED; HILL; *DG239*.

Thysanocarpus curvipes Hook. – Sand Fringepod. (N) (E) Occasional, 1992–2119 ft. AL, MIXED; ROAD, WET; *DG243*, 308.

Cactaceae

Carnegiea gigantea (Engelm.) Britton & Rose. – Saguaro. (N) (SS) Frequent 2067 ft. MIXED; ROAD; *DG582*.

Cylindropuntia acanthocarpa (Engelm. & J.M. Bigelow) F.M. Knuth var. *thornberi* (Thornber & Bonker) Pinkava – Thornber Buckhorn Cholla. (N) (SS) Infrequent, 1999–2249 ft. MIXED; ROAD. *DG35*, 205a, *WCH7230*.

Cylindropuntia bigelovii (Engelm.) F.M. Knuth – Teddybear Cholla. (N) (SS) Infrequent, 2016 ft. MIXED; ROAD; *DG583*.

Cylindropuntia leptocaulis (DC.) F.M. Knuth – Christmas Cactus. (N) (SS) Frequent, 1963–2060 ft. LLU, MIXED; RIDGE, ROAD; *DG79*, 229a, 270.

Echinocereus engelmannii (Parry ex Engelm.) Lemaire ssp. *engelmannii* – Engelman's Hedgehog. (N) (SS) Infrequent, 1994 ft. LLU, MIXED; HILL, ROAD; *DG138*, 404.

Ferocactus cylindraceus (Engelm.) Orcutt – California Barrel Cactus. (N) (SS) Infrequent, 2067–2294 ft. MIXED; ROAD, WASH; *DG24*, 508.

Mammillaria grahamii Engelm. – Arizona Pincushion. (N) (SS) Infrequent, 2063 ft. LLU; HILL, ROAD; *DG231*, 507.

Opuntia engelmannii Salm.-Dyck var. *engelmannii* – Cactus Apple. (N) (SS) Frequent, 2013 ft. MIXED; WASH; *DG142*.

Opuntia phaeacantha Engelm. – Tulip Pricklypear. (N) (SS) Frequent, 2209 ft. LLU; HILL; *DG191*.

Campanulaceae

Nemacladus glanduliferus Jeps. var. *orientalis* McVaugh – Glandular Threadplant. (N) (E) Frequent, 1994–2355 ft. LLU, MIXED; HILL, RIDGE, ROAD; *DG373*, 399, 433, 480, *DZD1904-b*, *SD1495*.

Capparidaceae

Polanisia dodecandra (L.) DC. ssp. *trachysperma* (Torr. & A. Gray) Iltis – Sandy Clammyweed. (N) (E) Rare, 1996 ft. AL; WET; DG39.

Caryophyllaceae

Herniaria hirsuta L. var. *cinera* (DC.) Coutinho – Hairy Rupturewort. (I) (E) Frequent, 1994–2355 ft. LLU, MIXED; HILL, ROAD; DG397, 450, 481, SD1492.

Silene antirrhina L. – Sleepy Silene. (N) (E) Frequent, 1994–2220 ft. LLU, MIXED; HILL, ROAD; DG349, 390, 426, 471, DZD1902-b, SD1485.

Celastraceae

Canotia holacantha Torr. – Crucifixion Thorn. (N) (T) Abundant, 2027–2305 ft. LLU; RIDGE, ROAD; DG26, 276, 378, 545.

Chenopodiaceae

Atriplex canescens (Pursh.) Nutt. var. *canescens* – Fourwing Saltbush. (N) (S) Infrequent, 2065–2118 ft. AL, LLU; ROAD, WET; DG210, 535, 575.

Atriplex elegans (Moq.) D. Dietr. var. *elegans* – Wheelscale Saltbush. (N) (E) Rare, 2254 ft. LLU; ROAD; DG07.

Atriplex polycarpa (Torr.) S. Watson – Cattle Saltbush. (N) (S) Rare, 2120 ft. MIXED; ROAD; DG518.

Chenopodium fremontii S. Watson – Fremont's Goosefoot. (N) (E) Rare, 2035 ft. AL; WET; DG572.

Chenopodium watsonii A. Nelson – Watson's Goosefoot. (N) (E) Rare, 2080 ft. LLU; HILL; DG292.

Salsola tragus L. – Russian Thistle. (I) (E) Infrequent, 1851 ft. AL; WET; DG38.

Convolvulaceae

Evolvulus alsinoides L. – Slender Dwarf Morning Glory. (N) (PH) Rare, 2075 ft. AL; WET; DG62.

Evolvulus arizonicus A. Gray – Wild Dwarf Morning Glory. (N) (PH) Rare, 2063 ft. LLU; WET; DG212.

Evolvulus nuttallianus Schult. – Shaggy Dwarf Morning Glory. (N) (PH) Rare 2078 ft. LLU; RIDGE; DG185.

Ipomoea cristulata Hallier f. – Transpecos Morning Glory. (N) (V) Rare, 2047 ft. AL; WET; DG571.

Cucurbitaceae

Marah gilensis Greene – Gila Manroot. (N) (V) Rare, 2042–2119 ft. AL; WET; DG172, 300.

Cuscutaceae

Cuscuta indecora Choisy – Alfalfa Dodder. (N) (P) Frequent, 2116–2258 ft. LLU; HILL, RIDGE; DG20, 248, 294, 416.

Euphorbiaceae

Argythamnia lanceolata Pax & K. Hoffm. – Narrowleaf Silverbush. (N) (S) Rare, 2366 ft. LLU; HILL; DG74.

Argythamnia neomexicana Mull.Arg. – New Mexico Silverbush. (N) (E) Infrequent, 2124 ft. LLU; HILL; DG553.

Chamaesyce arizonica (Engelm.) Arthur – Arizona Sandmat. (N) (PH) Rare, 2294 ft. LLU; ROAD; DG18.

Chamaesyce capitellata Millsp. – Head Sandmat. (N) (PH) Occasional, 2254–2366 ft. LLU; RIDGE, ROAD; DG08, 78, 211.

Chamaesyce chaetocalyx (Boiss.) Wooton & Standl. var. *chaetocalyx* – Bristlecup Sandmat. (N) (PH) Occasional, 2220–2339 ft. LLU; HILL; DG456, 478, WCH7228.

Chamaesyce florida (Engelm.) Millsp. – Chiricahua Mountain Sandmat. (N) (E) Infrequent, 2056–2231 ft. AL, MIXED; ROCK, WET; DG15, 579.

Chamaesyce pediculifera Rose & Standl. – Carrizo Mountain Sandmat. (N) (PH) Rare, 1946 ft. LLU; RIDGE; DG564.

Euphorbia heterophylla L. – Mexican Fireplant. (N) (E) Rare, 2056 ft. AL; WET; DG580.

Fabaceae

Acacia constricta Benth. var. *paucispina* Woot. & Standl. – White Thorn Acacia. (N) (T) Occasional, 2104–2249 ft. LLU; HILL; DG33, 205f, 257.

Acacia greggii A. Gray – Catclaw Acacia. (N) (T) Infrequent, 2042–2135 ft. LLU; WASH, HILL; DG164, 205e.

Astragalus lentiginosus Douglas ex Hook. – Freckled Milkvetch. (N) (E) Rare, 2068 ft. AL; WET; DG334.

Astragalus nuttallianus Speg. – Small Flowered Milkvetch. (N) (E) Occasional, 1994–2138 ft. LLU, MIXED; RIDGE, ROAD; DG372, 388, 429, SD1483.

Astragalus tephrodes A. Gray var. *brachylobus* (A. Gray) Barneby – Ashen Milkvetch. (N) (PH) Absent, LLU; JLA87-23.

Astragalus tephrodes A. Gray var. *chloridae* (M. E. Jones) – Ashen Milkvetch. (N) (PH) Infrequent, 2027–2102 ft. LLU, MIXED; HILL, RIDGE; DG273, 274, 470, 515.

Calliandra eriophylla Benth. – Fairyduster. (N) (S) Abundant, 1960–2131 ft. LLU; RIDGE, ROAD; DG124, 228, 277, 360, 558.

Dalea formosa Torr. – Featherplume. (N) (S) Rare, 2120 ft. LLU; HILL; DG72.

Lotus humistratus Greene – Foothill Deervetch. (N) (E) Frequent, 2002–2138 ft. LLU; HILL, RIDGE, WASH; DG97, 342, 427, 487, SD1490.

Lotus mearnsii (Britton) Greene var. *equisolensis* J.L. Anderson – Mearns's Bird's-foot Trefoil. (N) (PH) Frequent, 2050–2229 ft. LLU; HILL, RIDGE; DG293, 382, 509, JLA 86-33, JLA 87-21, WCH7227.

Lotus rigidus (Benth.) Greene – Shrubby Deervetch. (N) (PH) Frequent, 2013–2104 ft. AL, LLU; HILL, WET; DG57, 259, 273a.

Lotus salsuginosus Greene var. *brevivexillus* Ottley – Coastal Bird's-foot Trefoil. (N) (E) Infrequent, 1992–2080 ft. LLU; RIDGE, ROCK; DG241, 285.

Lotus strigosus (Nutt.) Greene var. *tomentellus* (Greene) Isely – Strigose Bird's-foot Trefoil. (N) (E) Rare, 2128 ft. LLU; HILL; DG428.

Lupinus arizonicus (S. Watson) S. Watson – Arizona Lupine. (N) (E) Absent, WASH; RS(sn).

Lupinus brevicaulis Griseb. – Shortstem Lupine. (N) (E) Infrequent, 1994–2138 ft. LLU, MIXED; HILL, ROAD; DG387, 486.

Lupinus sparsiflorus Torr. – Mojave Lupine. (N) (E) Occasional, 1998–2069 ft. AL; WASH, WET; DG92, 136, 316.

Lupinus succulentus Douglas ex K. Koch – Hollowleaf Annual Lupine. (N) (E) Infrequent, 2027–2102 ft. MIXED; HILL, ROAD; DG282, 469.

Marina parryi (A. Gray) Barneby – Parry's False Prairie Clover. (N) (PH) Occasional, 2050–2161 ft. AL, LLU; HILL, WET; DG65, 231b, 463.

Medicago polymorpha L. – Burclover. (I) (E) Rare, 2069 ft. AL; WET; DG318.

Olneya tesota A. Gray – Desert Ironwood. (N) (T) Rare, 2045 ft. LLU; RIDGE; DG541a.

Parkinsonia florida S. Watson – Blue Palo Verde. (N) (T) Rare, 2042 ft. MIXED; WASH; DG162.

Prosopis velutina Wootton – Velvet Mesquite. (N) (T) Frequent, 2067–2121 ft. LLU, MIXED; HILL, WASH; DG189, 503, 555.

Senna covesii (A. Gray) H.S. Irwin & Barneby – Cove's Cassia (N) (PH) Frequent, 2038–2063 ft. AL, LLU; HILL, WET; DG213, 231a, 569.

Tephrosia vicoides Schtdl. – Red Hoarypea. (N) (PH) Rare, 2075 ft. AL; WET; DG64.

Vicia ludoviciana Nutt. ex Torr. & A. Gray – Louisiana Vetch. (N) (V) Rare, 2075 ft. LLU; HILL; DG440, DZD1896-b.

Fouquieriaceae

Fouquieria splendens Engelm. ssp. *splendens* – Ocotillo. (N) (S) Occasional, 2013 ft. LLU; HILL; DG143.

Geraniaceae

Erodium cicutarium L' Her. ex At. – Redstem Stork's Bill. (I) (E) Frequent, 1960–2054 ft. LLU; HILL, ROAD; DG80, 119, 340.

Erodium texanum A. Gray – Texas Stork Bill. (N) (E) Frequent, 1994–2138 ft. LLU, MIXED; HILL, ROAD; DG275, 364, 401.

Hydrophyllaceae

Eriogonum penduliflorum Benth. – Whispering Bells. (N) (E) Infrequent, 1998–2116 ft. LLU; RIDGE, WASH; DG131, 156, 299, SD1481.

Eucrypta chrysanthemifolia Greene var. *bipinnatifida* (Torr.) Constance – Spotted Hideseed. (N) (E) Rare, 1974 ft. LLU; ROCK; DG240.

Eucrypta micrantha A. Heller – Dainty Desert Hideseed. (N) (E) Rare, 2355 ft. LLU; HILL; DG442.

Phacelia affinis A. Gray – Limestone Phacelia. (N) (E) Occasional, 1979–2091 ft. AL, LLU; HILL, WET; DG264, 331, 356.

Phacelia crenulata Torr. ex S. Watson var. *ambigua* (M.E. Jones) J.F. Macbr. [Syn. *Phacelia ambigua* M. E. Jones] – Cleftleaf Wild Heliotrope. (N) (E) Abundant, 1960–2091 ft. LLU, MIXED; HILL, ROAD, WASH; DG106, 123, 330, 407.

Phacelia distans Benth. – Distant Phacelia. (N) (E) Infrequent, 2090 ft. LLU; RIDGE; DG290, 329.

Phacelia ivesiana Torr. – Ive's Phacelia. (N) (E) Rare, 2355 ft. LLU; HILL; DG443.

Phacelia ramosissima Dougl ex Lehm. – Branching Phacelia. (N) (PH) Infrequent, 2138–2154 ft. LLU, MIXED; HILL, ROAD; DG150, 370.

Pholistoma auritum (Lindl.) Lilja – Blue Fiestaflower. (N) (E) Rare, 2119 ft. MIXED; ROAD; DG311.

Juglandaceae

Juglans major (Torr.) A. Heller – Arizona Walnut. (N) (T) Rare, 2056 ft. AL; WET; DG576.

Krameriaceae

Krameria erecta Willd ex Schult. – Littleleaf Ratany. (N) (S) Infrequent, 1983–2209 ft. LLU, MIXED; ROAD; DG32, 393, KRA07-93.

Lamiaceae

Hedeoma nana (Torr.) Briq. ssp. *macrocalyx* W. S. Stewart – Dwarf False Pennyroyal. (N) (E) Frequent, 2042–2138 ft. LLU; HILL, ROAD, WASH; DG161, 181, 205c, 491.

Lamium amplexicaule L. – Henbit Deadnettle. (I) (E) Rare, 2069 ft. LLU, HILL; DG323.

Salvia columbariae Benth. – Chia. (N) (E) Occasional, 1998–2116 ft. LLU; RIDGE, ROAD, WASH; DG104, 137, 295.

Linaceae

Linum lewisii Pursh – Lewis Flax. (N) (PH) Occasional, 2054–2339 ft. LLU; HILL, RIDGE; DG297, 354, 457.

Linum puberulum (Engelm.) A. Heller – Plains Flax. (N) (E) Occasional, 2078–2209 ft. LLU; HILL; DG175, 201, DZD1898-b.

Loasaceae

Mentzelia affinis Greene – Yellowcomet. (N) (E) Rare, 1960 ft. MIXED; ROAD; DG120.

Mentzelia multiflora (Nutt.) A. Gray – Adonis Blazingstar. (N) (PH) Occasional, 1996–2273 ft. AL, LLU; HILL, WASH, WET; DG46, 205d, 516, 533.

Malpighiaceae

Janusia gracilis A. Gray – Slender Janusia. (N) (V) Frequent, 2120–2294 ft. LLU, MIXED; ROAD; DG22, 414, 517, 526.

Malvaceae

Abutilon incanum Sweet – Sweet Pelotazo. (N) (PH) Rare, 2336 ft. LLU; RIDGE; *DG75*.

Herissantia crispa (L.) Briz. – Bladdermallow. (N) (E) Rare, 2056 ft. AL; WET; *DG577*.

Sphaeralcea ambigua A. Gray – Desert Globemallow. (N) (PH) Frequent, 1960 ft. MIXED; ROAD, WASH; *DG113, SD1496*.

Nyctaginaceae

Allionia incarnata L. var. *villosa* (Standl.) B.L. Turner – Trailing Windmills. (N) (PH) Frequent, 2051–2355 ft. AL, LLU; HILL, ROAD, WET; *DG01, 432, 549*.

Mirabilis laevis (Benth.) Curran var. *retrorsa* (A. Heller) Munz [Syn. *Mirabilis bigelovii* A. Gray] – Wishbone-bush. (N) (PH) Occasional, 1974–2080 ft. LLU; HILL, RIDGE; *DG135, 235, 284, SD1491*.

Oleaceae

Fraxinus anomala Torr. ex S. Watson – Single Leaf Ash. (N) (T) Rare, 2069 ft. AL; WET; *DG325*.

Menodora scabra A. Gray – Rough Menodora (N) (PH) Frequent, 1998–2294 ft. LLU; HILL, ROAD; *DG06, 19, 134, 207*.

Onagraceae

Camissonia californica (Nutt. ex Torr. & A. Gray) P.H. Raven – California Suncup. (N) (E) Rare, 2013 ft. LLU; WASH; *DG141*.

Camissonia claviformis (Torr. & Frem.) P.H. Raven ssp. *auratiaca* (S. Watson) Munz – Brown Eyes. (N) (E) Rare, 2002 ft. LLU; WASH; *DG95, SD1484*.

Camissonia micrantha (Hornem. ex Spreng.) P.H. Raven – Miniature Suncup. (N) (E) Occasional, 2042–2161 ft. AL, LLU; HILL, ROAD, WET; *DG154, 309, 464*.

Gaura mollis Nutt. ex Torr. – Velvetweed. (N) (E) Rare, 1996 ft. AL; WET; *DG44*.

Oenothera elata Kunth. – Hooker's Evening Primrose. (N) (PH) Rare, 2047 ft. AL; WET; *DG574*.

Oenothera primiveris A. Gray – Desert Evening Primrose. (N) (E) Infrequent, 1963–2002 ft. LLU; ROAD, WASH; *DG83, 93*.

Orobanchaceae

Orobanche cooperi (A. Gray) A. Heller ssp. *cooperi* – Louisiana Broomrape. (N) (P) Rare, 2050 ft. LLU; HILL; *DG510*.

Papaveraceae

Argemone gracilentia Greene – Sonoran Pricklypoppy. (N) (PH) Rare, 2041 ft. AL; WET; *DG217*.

Eschscholzia californica Cham. ssp. *mexicana* (Greene) C. Clark – California Poppy. (N) (E) Occasional, 1998–2138 ft. LLU; RIDGE, ROAD, WASH; *DG94, 129, 283, 302, 367*.

Platystemon californicus Benth. - Cream Cups. (N) (E) Rare, 2068 ft. AL; WET; *DG335*.

Pedaliaceae

Proboscidea parviflora Wootton & Standl. – Devilsclaw. (N) (E) Rare, 2047 ft. AL; WET; *DG570*.

Plantaginaceae

Plantago ovata Phil. – Desert Indianwheat. (N) (E) Frequent, 1963–2138 ft. LLU; HILL, ROAD; *DG85, 346, 489, SD1480*.

Plantago patagonica Bert. ex Steud. – Woolly Plantain. (N) (E) Occasional, 1960–2042 ft. AL, MIXED; ROAD, WET; *DG126, 165, 173*.

Plantago rhodosperma Decne. – Redseed Plantain. (N) (E) Rare, 2138 ft. LLU; HILL. *DG488*.

Polemoniaceae

Eriastrum eremicum (Jeps.) H. Mason – Desert Woollystar. (N) (E) Infrequent, 1960–2138 ft. LLU, MIXED; HILL, ROAD; *DG114, 492*.

- Gilia flavocincta* A. Nelson ssp. *flavocincta* – Yellowthroat Gilia. (N) (E) Abundant, 1960–2116 ft. LLU; HILL, RIDGE, ROAD, WASH; *DG103, 115, 287, 307, 350, SD1482*.
- Leptosiphon aureus* (Nutt.) J.M. Porter & L.A. Johnson ssp. *aureus* – Golden Linanthus. (N) (E) Rare, 1994 ft. MIXED; ROAD; *DG400*.
- Linanthus bigelovii* Greene – Bigelow's Linanthus. (N) (E) Rare, 2355 ft. LLU; HILL; *DG449*.
- Phlox tenuifolia* E.E. Nelson – Santa Catalina Mountain Phlox. (N) (PH) Rare, 2299 ft. MIXED; ROAD; *DG386*.

Polygalaceae

- Polygala macradenia* A. Gray – Glandleaf Milkwort. (N) (PH) Infrequent 2078–2209 ft. LLU; HILL; *DG186, 199, 562, DZD1863-b*.
- Polygala rusbyi* Greene – Rusby's Milkwort. (N) (S) Frequent, 2220–2339 ft. LLU; HILL. *DG454, 476, DZD1890-b, JLA87-22*.
- Polygala scoparioides* Chodat. – Broom Milkwort. (N) (PH) Rare, 2102 ft. LLU; HILL; *DG468, DZD1894-b*.

Polygonaceae

- Chorizanthe brevicornu* Torr. var. *brevicornu* – Brittle Spineflower. (N) (E) Infrequent, 1999–2355 ft. LLU, MIXED; HILL, ROAD; *DG205k, 445*.
- Eriogonum arizonicum* Gand. – Arizona Buckwheat. (N) (PH) Rare, 2034 ft. LLU, MIXED; ROAD; *DG69, SD1489*.
- Eriogonum deflexum* Torr. var. *deflexum* – Flatcrown Buckwheat. (N) (E) Frequent, 2013–2212 ft. AL, LLU; HILL, ROAD, WET; *DG02, 48, 502, 542*.
- Eriogonum fasciculatum* Benth. var. *polifolium* (Benth.) Torr. & A. Gray – Eastern Mohave Buckwheat. (N) (S) Frequent, 2013–2275 ft. LLU, MIXED; HILL, RIDGE, ROAD; *DG147, 291, 365, 532*.
- Eriogonum inflatum* Torr. – Desert Trumpet. (N) (E) Abundant, 1960–2355 ft. LLU; HILL, ROAD; *DG03, 125, 357, 395, 437, KRA16-92, SD1497*.
- Eriogonum ripleyi* J.T. Howell – Fraziers Well Buckwheat. (N) (PH) Frequent, 2078–2209 ft. LLU; HILL; *DG180, 204, 561, DZD1899-b, JL86-34, KRA08-93, RS(s. n.), WCH7226*.
- Eriogonum trichopes* Torr. – Little Desert Trumpet. (N) (E) Infrequent, 1983 ft. ROAD; *DG30*.
- Eriogonum wrightii* Torr. ex Benth. var. *wrightii* – Bastardsage. (N) (S) Rare, 2013 ft. AL; WET; *DG53*.

Portulacaceae

- Calandrinia ciliata* DC. – Fringed Redmaids. (N) (E) Occasional, 2068–2116 ft. AL, LLU; ROAD, WET; *DG298, 336, 337*.
- Claytonia perfoliata* Donn ex Willdenow – Miners Lettuce. (N) (E) Infrequent, 2091 ft. AL; WET; *DG333*.

Ranunculaceae

- Anemone tuberosa* Rydb. – Tuber Anemone. (N) (PH) Frequent, 2002–2297 ft. LLU; RIDGE, WASH; *DG98, 145, 266, 375*.
- Delphinium parishii* A. Gray ssp. *parishii* – Desert Larkspur. (N) (PH) Infrequent, 2013–2128 ft. LLU; HILL, ROAD, WASH; *DG144, 409, 420, 499*.

Rhamnaceae

- Ceanothus vestitus* Greene [Syn. *Ceanothus greggii* A. Gray] – Desert Ceanothus. (N) (S) Frequent, 2100–2220 ft. LLU; HILL, RIDGE; *DG254, 255, 259a, 374, 483*.
- Zizyphus obtusifolia* (Hook. ex Torr. & A. Gray) A. Gray var. *canescens* (A. Gray) M.C. Johnst. – Graythorn. (N) (S) Occasional, 2050–2209 ft. LLU; HILL, ROAD; *DG200, 222*.

Roseaceae

Purshia × *subintegra* (Kearney) Henrickson [*P. pinkavae* Schaack × *P. stansburyana* (Torr.) Henrickson] (N) (S) Frequent, 2078–2136 ft. LLU; RIDGE; *DG516a*, *KA/JW 22-92*, *JLA83-36*, *JLA86-15*, *JLA86-16*, *JLA86-17*, *JLA86-35*, *WCH7229*.

Rubiaceae

Galium aparine L. – Cleavers Stickywillie. (N) (E) Rare, 2119 ft. MIXED; ROAD; *DG303*.
Galium proliferum A. Gray – Limestone Bedstraw. (N) (E) Frequent, 2118–2220 ft. LLU; HILL; *DG425*, *482*, *DZD1901-b*.
Galium stellatum Kellogg ssp. *eremicum* Hilend & J.T. Howell – Starry Bedstraw. (N) (PH) Rare, 2172 ft. LLU; HILL; *DG458*, *JW23-02*.

Rutaceae

Thamnosma texana Torr. – Rue of the Mountains. (N) (PH) Occasional, 2027–2155 ft. LLU; RIDGE; *DG251*, *278*, *JLA87-25*.

Salicaceae

Salix gooddingii Ball – Goodding's Willow. (N) (T) Rare, 2042 ft. AL; WET; *DG167*.

Sapindaceae

Dodonaea viscosa Mart. – Florida Hopbush. (N) (S) Frequent, 2050–2305 ft. AL, LLU; HILL, RIDGE, ROAD, WET; *DG60*, *61*, *225*, *250*, *363*, *546*.

Scrophulariaceae

Castilleja angustifolia (Nutt.) G. Don var. *dubia* A. Nelson – Wavyleaf Paintbrush. (N) (PH) Infrequent, 2080–2155 ft. LLU; RIDGE; *DG249*, *289*.
Castilleja exserta (A. Heller) Chuang & Heckard ssp. *exserta* – Exserted Paintbrush. (N) (E) Frequent to abundant, 1960–2209 ft. LLU; HILL, RIDGE, ROAD; *DG111*, *202*, *288*, *321*, *343*, *391*.
Castilleja lanata A. Gray ssp. *lanata* – Sierra Woolly Indian Paintbrush. (N) (PH) Rare, 2042 ft. AL; WET; *DG171*.
Keckiella antirrhinoides (Benth.) Straw ssp. *microphylla* (A. Gray) Straw – Snapdragon Penstemon. (N) (S) Rare, 2006 ft. MIXED; ROAD; *DG15*, *JLA87-19*.
Maurandella antirrhiniiflora (Humb. & Bonpl. ex Willd.) Rothm – Roving Sailor. (N) (V) Rare, 2056 ft. AL; WET; *DG215*.
Mimulus guttatus DC. – Seep Monkey Flower. (N) (E) Rare, 2068 ft. AL; WET; *DG385*.
Penstemon eatonii A. Gray ssp. *undosus* (M.E. Jones) D.D. Keck – Firecracker Penstemon (N) (PH) Absent; *JLA97-18*.

Simmondsiaceae

Simmondsia chinensis C.K. Schneid. – Jojoba. (N) (S) Frequent, 1974–2212 ft. AL, LLU; HILL, WET, WASH; *DG05*, *148*, *236*, *314*, *359*.

Solanaceae

Chamaesaracha coronopus A. Gray – Greenleaf Five Eyes. (N) (PH) Rare 2050 ft. LLU; ROAD; *DG229b*.
Datura wrightii Regel – Sacred Datura. (N) (E) Infrequent, 2041 ft. AL; WET; *DG218*.
Lycium berlandieri Dunal. – Berlander's Wolfberry. (N) (S) Rare 2050 ft. LLU; HILL; *DG232*.
Lycium exsertum A. Gray – Arizona Desert Thorn. (N) (S) Infrequent, 2054–2095 ft. AL, LLU; RIDGE, WET; *DG67*, *362*, *563*.
Nicotiana obtusifolia M. Martens & Galeotti var. *obtusifolia* – Desert Tobacco. (N) (E) Infrequent, 1851 ft. AL; WET; *DG37*, *41*.
Physalis crassifolia Benth. – Yellow Nightshade Groundcherry. (N) (E) Infrequent, 2030–2042 ft. AL; WET; *DG157*, *567*.

Physalis hederifolia A. Gray – Ivyleaf Groundcherry. (N) (PH) Rare, 2275 ft. LLU; HILL; DG523.

Solanum douglasii Dunal – Greenspot Nightshade. (N) (E) Locally common in creek, 2030 ft.; AL; WET; DG568.

Solanum elaeagnifolium Cav. – Silver Nightshade. (N) (PH) Rare 2047 ft. AL; WET; DG573.

Sterculiaceae

Ayenia filiformis S. Watson – Trans Pecos Ayenia. (N) (PH) Infrequent, 2056–2366 ft. AL, LLU; RIDGE, WET; DG76, 214.

Tamaricaceae

Tamarix ramosissima Karel. ex Boiss. – Saltcedar. (I) (T) Rare, 1851 ft. AL; WET; DG36.

Ulmaceae

Celtis ehrenbergiana (Klotzsch) Liebm. [Syn. *Celtis pallida* Torr.] – Desert Hackberry. (N) (T) Infrequent, 2120–2254 ft. LLU, MIXED; ROAD; DG14, 522.

Urticaceae

Parietaria hespera Hinton – Rillita Pellitory. (N) (E) Infrequent, 2128 ft. LLU; HILL; DG424.

Parietaria pennsylvanica Muhlenberg ex. Willd. – Pennsylvania Pellitory. (N) (E) Occasional, 2120 ft. LLU; HILL, RIDGE; DG296, 496.

Viscaceae

Phoradendron californicum Nutt. – Mesquite Mistletoe. (N) (P) Infrequent, 1992–2119 ft. AL, LLU; HILL, WET; DG244, 313.

Verbenaceae

Aloysia wrightii A. Heller – Wright's Beebush. (N) (S) Rare, 2254 ft. LLU, HILL; DG10.

Zygophyllaceae

Kallstroemia grandiflora Torr. ex. A. Gray – Arizona Poppy. (N) (E) Rare, 2056 ft. AL; WET; DG578.

Larrea tridentata Coville – Creosote Bush. (N) (S) Frequent, 2131–2294 ft. LLU; RIDGE, ROAD; DG23, 556.

MAGNOLIOPHYTA (ANGIOSPERMS)

LILIOPSIDA (MONOCOTYLEDONS)

Agavaceae

Agave chrysantha Peeples – Golden Flower Century Plant. (N) (LS) Infrequent, 2128–2297 ft. LLU; HILL, RIDGE, WASH; DG187, 206a, 377, 565, WCH 17807, 17808.

Yucca elata (Engelm.) Engelm. var. *elata* – Soaptree Yucca. (N) (LS) Infrequent, 2179–2249 ft. LLU; HILL; DG34, 548, WCH17810.

Liliaceae

Calochortus kennedyi Porter var. *kennedyi* – Desert Mariposa Lily. (N) (PH) Frequent to abundant, 2067–2128 ft. LLU; HILL, RIDGE; DG174, 415, 501, DZD1885-b.

Dichelostemma capitatum (Benth.) Alph. Wood ssp. *pauciflorum* (Torr.) G. Keator – Bluedicks. (N) (PH) Common, 1960–2119 ft. AL, LLU; HILL, ROAD, WET; DG110, 242, 304, 338, 347.

Nolinaceae

Nolina microcarpa S. Watson – Sacahuista. (N) (S) Rare, 2135 ft. LLU; ROAD; DG205.

Poaceae

- Achnatherum speciosum* (Trin. & Rupr.) Barkworth – Desert Needlegrass. (N) (PH) Infrequent, 2118–2220 ft. LLU; HILL; *DG196, 411, 473*.
- Aristida adsencionis* L. – Sixweeks Threawn. (N) (E) Rare, 2094 ft. LLU; HILL; *DG467*.
- Aristida purpurea* Nutt. var. *nealleyi* (Vasey) K.W. Allred – Blue Threawn. (N) (PH) Infrequent, 2119–2275 ft. LLU; HILL, ROAD; *DG184, 301, 528*.
- Aristida purpurea* Nutt. var. *parishii* (Hitchc.) K.W. Allred – Parish’s Threawn. (N) (PH) Rare, 2212 ft. ROAD; *DG17*.
- Aristida purpurea* Nutt. var. *purpurea* – Purple Threawn. (N) (PH) Rare, 2049 ft. LLU; RIDGE; *DG271*.
- Avena fatua* Viv. – Wild Oats. (I) (E) Infrequent, 2042–2069 ft. AL, LLU; WET, HILL; *DG166, 317*.
- Bothriochloa barbinodis* (Lag.) Herter – Cane Bluestem. (N) (PH) Rare, 2055 ft. AL, LLU; RIDGE, WET; *DG231c, 550*.
- Bouteloua aristidoides* Griseb. – Needle Grama. (N) (E) Rare, 2212 ft. ROAD; *DG12*.
- Bouteloua curtipendula* Torr. – Sideoats Grama. (N) (PH) Occasional, 2050–2275 ft. ALL; ROAD, WASH, WET; *DG229, 529, 551*.
- Bouteloua trifida* Thurb. ex S. Watson – Red Grama. (N) (PH) Occasional, 2063–2128 ft. AL, LLU; ROAD, WET; *DG421, 513*.
- Bromus rubens* Desv. ex Willk. & Lange – Red Brome. (I) (E) Abundant, 1994–2212 ft. LLU, MIXED; HILL, RIDGE; ROAD; *DG392, 413, 495, 539, 543*.
- Dasyochloa pulchella* (Kunth) Willd. ex Rydb. – Low Woollygrass. (N) (PH) Frequent, 1983–2094 ft. LLU, MIXED; ROAD, RIDGE, WASH; *DG31, 245, 389, 465*.
- Distichlis spicata* Greene – Saltgrass. (N) (PH) Rare, 1983 ft. LLU; ROAD; *DG29*.
- Elymus elymoides* (Raf.) Swezey – Squirreltail. (N) (PH) Rare, 2128 ft. LLU; RIDGE; *DG412*.
- Eragrostis lehmanniana* Nees – Lehmann’s Lovegrass. (I) (PH) Rare, 2034 ft. AL; WET; *DG70*.
- Hesperostipa neomexicana* (Thurb. & Coult.) Barkworth – New Mexico Feathergrass. (N) (PH) Rare, 2128 ft. LLU; HILL; *DG410*.
- Hilaria belangeri* (Steud.) Nash – Curly-Mesquite. (N) (PH) Abundant, 2045–2231 ft. LLU; HILL, ROAD; *DG11, 183, 383, 519, 537*.
- Hordeum murinum* L. ssp. *glaucum* (Steud.) Tzvelev – Smooth Barley. (I) (E) Rare, 2355 ft. LLU; HILL; *DG434*.
- Hordeum pusillum* Nutt. – Little Barley. (N) (PH) Occasional, 2138–2355 ft. LLU; HILL; *DG435, 498*.
- Leptochloa panicea* (de Retz) Owhi ssp. *brachiata* (Steud.) N. Snow – Mucronate Spangletop. (N) (E) Infrequent, 2260 ft. ROAD; *DG09, 530*.
- Pennisetum setaceum* (Forssk.) Chiov. – Crimson Fountain Grass (I) (PH) Rare, 2051 ft. AL; WET; *DG552*.
- Pleuraphis mutica* Buckley – Tobosagrass. (N) (PH) Rare, 2094 ft. LLU; HILL; *DG466*.
- Pleuraphis rigida* Thurb. – Big Galleta. (N) (PH) Rare, 2060–2275 ft. ROAD; *DG226, 531, DZD1892-b*.
- Poa bigelovii* Vasey & Scribn. – Bigelow’s Bluegrass. (N) (E) Infrequent, 2054–2355 ft. LLU; HILL; *DG361, 447*.
- Schismus arabicus* Nees – Arabian Schismus. (I) (E) Rare, 1979 ft. LLU; RIDGE; *DG261*.
- Schismus barbatus* (L.) Juel – Common Mediterranean Grass. (I) (E) Rare, 2355 ft. LLU; HILL; *DG441*.
- Sporobolus airoides* Torr. – Alkali Sacaton. (N) (PH) Rare, 1978 ft. ROAD; *DG28*.
- Tridens muticus* Nash – Slim Tridens. (N) (PH) Frequent, 2128–2409 ft. LLU; HILL, RIDGE; *DG227, 422, 547, 557*.
- Trisetum interruptum* Buckley – Prairie False-oat. (N) (E) Rare, 2128 ft. LLU; HILL; *DG418*.
- Vulpia octoflora* Rydb. – Sixweeks Fescue. (N) (E) Rare, 1994 ft. MIXED; ROAD; *DG398*.

Typhaceae

- Typha domingensis* Pers. – Southern Cattail. (N) (PH) Rare, 2050 ft. AL; WET; *DG221*.

Abbreviations. The following abbreviations were used in annotating the catalog of vascular plants in the Lime Creek area:

Collectors and herbaria where their specimens are deposited – Adams, Karen (ARIZ) = KRA; Anderson, John (ASU) = JLA; Damrel, Dixie with the Terrestrial Ecological Unit Inventory team (TEUI) = DZD; Doan, Shannon (ASU) = SD; Goldman, Dawn with Joni Ward (DES) = DG; Hodgson, Wendy (DES) = WCH; Spellenberg, Richard (ARIZ) = RS; Welch, John (ARIZ) = JW.

Habitat descriptions – Hills and Slopes = HILL; Ridges = RIDGE; Roads and Trails = ROAD; Rocks = ROCK; Dry Washes = WASH; Wetlands including Lime Creek its borders and the spring = WET.

Life form descriptions – Ephemerals = (E); Leaf Succulents = (LS); Parasites = (P); Perennial Herbs = (PH); Shrubs = (S); Stem Succulents = (SS); Trees = (T); Vines = (V).

Plant status– Introduced = (I); Native = (N).

Soil type descriptions – Alluvial = AL; In all soil types = ALL; Limestone Lacustrine Unit = LLU; Limestone Lacustrine Unit and Basalt = MIXED.

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LITERATURE CITED

ANDERSON, J. 1992. A synthetic analysis of a rare Arizona species, *Purshia subintegra* (Roseaceae). Pp. 205–220. In: R. Sivinski and K. Lightfoot (eds.). *Southwestern rare and endangered plants*. Misc. Pub. No. 2. New Mexico Forestry and Resources Conservation Division Santa Fe.

ANDERSON, J. 1996. Floristic patterns on late tertiary lacustrine deposits in the Arizona Sonoran Desert. *Madroño* 43: 255–272.

ARIZONA RARE PLANT COMMITTEE. 1999. *Arizona Rare Plant Field Guide: A Collaboration of the Agencies and Organizations*. U.S. Government Printing Office, Washington DC.

BOWERS, J.E. and S.P. McLAUGHLIN. 1982. Plant species diversity in Arizona. *Madroño* 29: 227–233.

DOAN, S. 2002. *Flora of the Seven Springs Region, Tonto National Forest, Maricopa County, Arizona*. Masters Thesis, Arizona State University, Tempe.

DIMMITT, M.A. 1999. Bromes and communities of the Sonoran Desert region. Pp. 13–17. In: S.J. Phillips and P. Wentworth Comus (eds.). *A Natural History of the Sonoran Desert: Arizona-Sonora Desert Museum*. University of California Press, Berkeley.

eFLORAS. 2009. *Missouri Botanical Garden, St. Louis, MO and Harvard University Herbaria, Cambridge, MA*. <http://www.efloras.org> (Accessed 2009 February 2).

FERGUSON, C.A., W.G. GILBERT, S.J. SKOTNICKI, C.T. WRUCKE and C.M. CONWAY. 1999. Geological Map of the Horseshoe Dam 7.5' Quadrangle Maricopa County, Arizona [map]. Scale 1:24,000. Open-File report 99-15. Arizona Geological Survey, Tucson.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY. 2008. *Rainfall Information*. <http://www.fcd.maricopa.gov/Rainfall/Raininfo/raininfo.aspx> (Accessed 2008 July 1).

FLORA OF NORTH AMERICA EDITORIAL COMMITTEE (eds.). 1993+. *Flora of North America North of Mexico*. 12+ Vols. Oxford University Press, New York.

HOGAN, S. 2006. Cave Creek Complex Fire: One Year Later. *East Valley Tribune* June 11, p. F1 Mesa.

INTERNATIONAL PLANT NAMES INDEX. 2008. <http://www.ipni.org/> (Accessed 2009 January 2).

JACCARD, P. 1912. The distribution of the flora in the alpine zone. *New Phytologist* 11: 37–50.

KEARNEY, T.H., R.H. PEEBLES and collaborators. 1960. *Arizona Flora*. 2nd edn. University of California Press, Berkeley.

NATIONS, D. and E. STUMP. 1996. Geologic History of Arizona. Pp. 159–178. In: D. Nations and E. Stump (eds.). *Geology of Arizona*. 2nd edn. Kendall/Hunt Publishing Company, Dubuque.

SAN DIEGO COUNTY PLANT ATLAS PROJECT. 2005. <http://www.sdnhm.org/plantatlas/index.html> (Accessed 2008 January 2).

SOUTHWEST ENVIRONMENTAL INFORMATION NETWORK. 2007. SEINet. <http://swbiodiversity.org/seinet/index.php> (Accessed 2007 March 1).

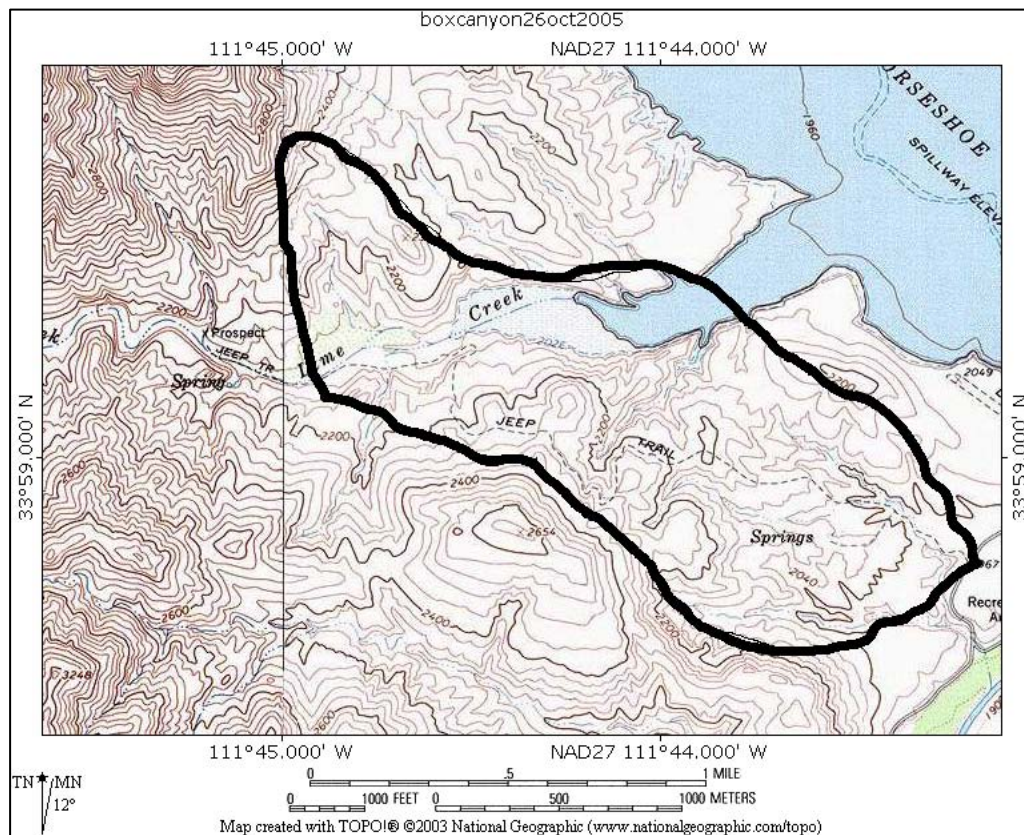
TURNER, R.M. and D.E. BROWN. 1994. Sonoran Desertscrub. Pp. 181–221. In: D.E. Brown (ed.). *Biotic communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

UNITED STATES DEPARTMENT OF AGRICULTURE. 2006. Tonto National Forest Grazing Records File, Code 2760.

UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. 2009. The PLANTS Database. <http://plants.usda.gov/> (Accessed 2009 January 2).

VASCULAR PLANTS OF ARIZONA EDITORIAL COMMITTEE. 1992+. Vascular Plants of Arizona. *Journal of the Arizona-Nevada Academy of Science* and *Canotia* (all contributions are available at www.canotia.org).

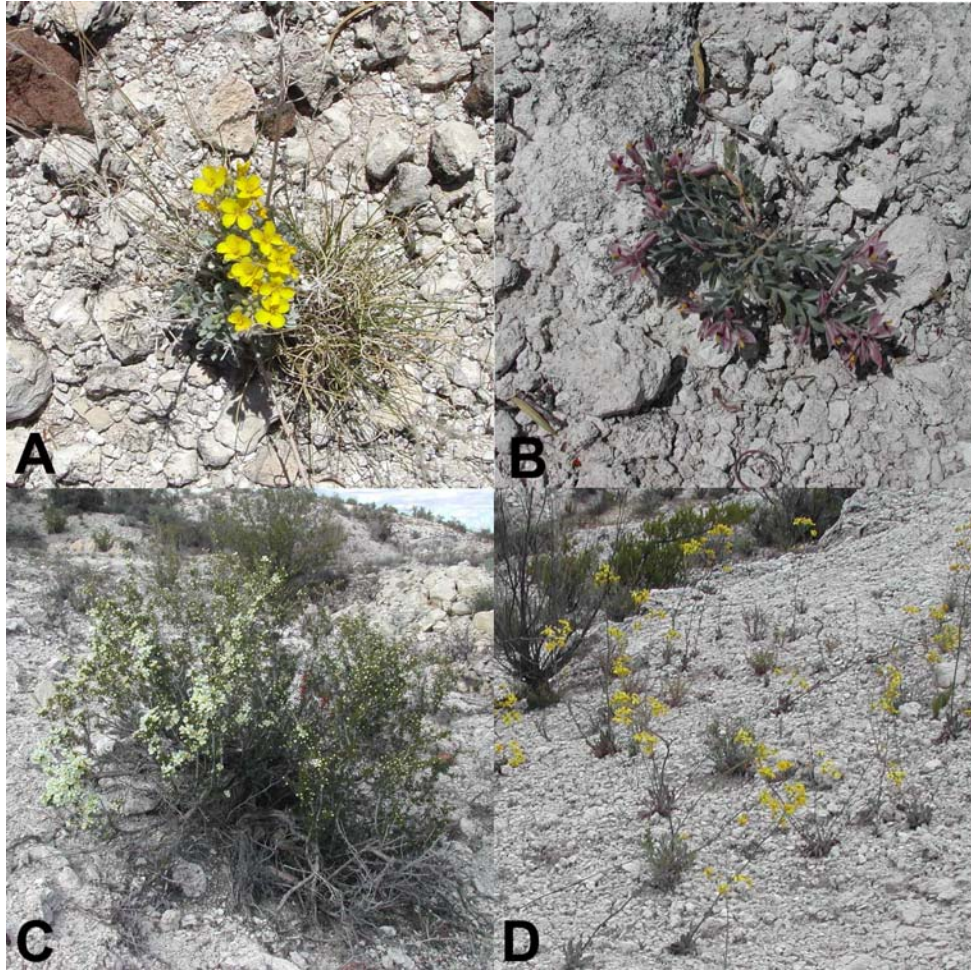
WRUKE. C.T. and C.M. CONWAY. 1987. Geologica Map of the Mazatzal Wilderness and Contiguous Roadless Area, Gila, Maricopa and Yavapai Counties, Arizona [map]. Scale 1:48,000. Open-File Map 664. United States Geological Survey, Tucson.



Lime Creek Flora Figure 1. Map of Lime Creek Site (LCSS) showing survey boundaries, Maricopa County, Arizona.



Lime Creek Flora Figure 2. (A) Rolling hillsides with lacustrine soils and sparse vegetation are very common throughout the study area; (B) Floral display including *Phlox tenuifolia*, *Castilleja lanata*, and *Eriogonum fasciculatum* var. *polifolium* found in one of the areas with mixed soil types.



Lime Creek Flora Figure 3. (A) Bladderpod (*Lesquerella cinerea*), normally found at higher elevations, is seen in abundance on the lacustrine hillsides; (B) *Polygala rusbyi*, a disjunct from the Mohave Desert, has larger flowers than any other Arizona *Polygala*; (C) The only endangered species found in the flora area, *Purshia* \times *subintegra*, appears to thrive in this environment; (D) *Packera neomexicana*, another disjunct, is scattered on this east-facing lacustrine hillside after the winter rains of 2005.