

PRELIMINARY BOTANICAL EXPLORATIONS OF THE PARKER CREEK CANYON, SIERRA ANCHA MOUNTAINS, GILA COUNTY, ARIZONA

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ABSTRACT

This study is a survey of the floristic composition of the Parker Creek watershed located in the Sierra Ancha Mountains of Arizona. This watershed includes ecological communities ranging from the Sonoran Upland Province to Rocky Mountain Montane Conifer Woodlands. The collections were conducted along designated routes within the lower and mid-upper reaches of the creek, including the inner canyon. A checklist was completed using both our new collections and several herbarium queries with the Southwestern Environmental Information Network (SEINet). This study reports the presence of 625 species, representing 335 genera and 94 families of vascular plants. The flora is predominantly comprised of angiosperms (ASU, Flowering plants), but also includes gymnosperms (conifers), lycophytes (club mosses), sphenophytes (horsetails) and pteridophytes (ASU, Ferns). A comparison to the nearby Sierra Ancha Wilderness, also located in the Sierra Ancha Mountains, revealed only 47% similarity to the Parker Creek watershed species.

INTRODUCTION

Floristic inventories are an important component of understanding the composition, biodiversity and ecological features of public and protected lands. This study is a survey of the floristic composition of the Parker Creek watershed within the Sierra Ancha Mountains of Arizona.

The Sierra Ancha Mountains are located in the Tonto National Forest, approximately 30 miles northeast of Globe, Arizona. This mountain range boasts many recreational areas within its boundaries, and contains two U.S. Forest Service Wilderness areas, which were designated to protect the unique, natural character of the land. The Sierra Ancha Experimental Forest was established in 1932 as a research site devoted to studying watershed management (Adams et al. 2004). In 1983, Arizona State University entered into a lease agreement with the Forest Service to use the Parker Creek Headquarters complex within the Experimental Forest. To date, the Experimental Forest and surrounding Tonto National Forest continue to be used for faculty and student ecological research and summer field classes, as well as Forest Service conservation efforts.

Although a number of watershed and ecological studies have been done around the Parker Creek (e.g., Gottfried and Neary 2002, Morehouse et al. 2008) no floristic surveys of this canyon and surrounding watershed have been conducted. This is presumably due to the remote location of the canyon and its rugged topography, which makes the area difficult to access. In addition to providing documentation of the vascular flora, this study provides information that could be useful for future ecological studies. The Globe-Young Highway (AZ

288), which transects the Parker Creek Canyon, was recently paved for the first time. This flora could be helpful to determine potential ecological effects, such as loss of habitat due to over use, that may arise from the recent paving of the area.

STUDY AREA

Physical Area and Boundaries

Parker Creek's highest point (33°48'26"N, 110°57'08"W) is immediately south of Carr Mountain and approximately 2 miles west of Aztec Peak, the Sierra Ancha's highest peak at 7,733 feet. The creek descends southwest down the Sierra Ancha range until it runs into Cottonwood Wash (33°43'25"N, 111°00'40"W), which continues approximately 3 more miles south before it empties into Roosevelt Lake. The northeastern edge of the Parker Creek watershed is bordered by the Sierra Ancha Wilderness Area, which is comprised of 20,850 acres, containing mountain to desert ecosystems, as well as high cliffs and deep box canyons.

The Parker Creek Canyon is identified here as the portion of the Parker Creek watershed downstream of the Sierra Ancha Experimental Station (Arizona State University, Forest Service cabins) and opening into the Sonoran Desert Upland, approximately 2.5 miles upstream from the mouth, as defined by entrance to Cottonwood Wash. This study focused on the flora in the desert area around the mouth of the creek, just into the lower canyon, and includes grassland portions of the experimental forest around the rim of the canyon. The total distance from the lower desert entry point to the farthest end of the canyon (just below the Sierra Ancha Experimental Station) was estimated from topographical maps to be approximately 6 miles. How-

ever, due to dangers from high, fast-flowing water and steep canyon walls, the complete lower canyon was not sampled.

The elevation of the primary study area varies drastically from the desert lowlands (2,800 ft), to the grassland bluffs on the eastern edge of the canyon (4,400 ft), to the highest point of the canyon at the Sierra Ancha Experimental Station (5,000 ft). In addition to the waterways running through the box canyons, the area has several artesian wells. Two large perennial springs were located in this study along the lower Parker Creek just outside of the lower canyon. In a recent publication reviewing this experimental forest, Adams et al. (2004) described the climate, soil and physiography as typical of the southwestern region and similar to the riparian areas of nearby rivers.

Climate

This study was conducted during the fall, winter, and spring seasons of an above-average rainfall year (2007-2008). The climate is typical of that found in the southwestern desert, which receives most of its precipitation in the winter and summer months. The average annual rainfall for the area surrounding the the field station is approximately 25 inches decreasing to 16 inches in the lowest reaches of the creek (Adams et al. 2004).

Vegetation

The vegetation that inhabits the Parker Creek watershed covers a range of ecological zones due to the elevation changes throughout its boundaries. These zones include mixed conifer, deciduous forest, oak woodland, chaparral, desert grassland, pinyon-juniper woodlands, desert scrub, and riparian vegetation types. The predominant type of vegetation in the canyon and lower Parker Creeek study area is classified as the Arizona Upland Sonoran Desert Province (Brown et al. 2007), which stretches from the lowlands up into the mouth of the canyon. From the mouth of the canyon to the cabins there are patches of Southwestern Interior Chaparral, Great Basin Conifer Woodland and Rocky Mountain Montane Conifer as well as Sonoran Upland elements. The rim of the canyon is surrounded by desert grasslands, chaparral, and pinyon-juniper woodlands.

History

The Sierra Anchas were first inhabited approximately 900 years ago by the prehistoric Salado Nation, best known for the cliff dwellings in the canyon walls. Following the Salado, were a group known today as the Hohokam. However, after only a few hundred years, the Hohokam could no longer sustain themselves due to droughts, floods, and war-

fare, which led most to leave the area (U.S. Forest Service 2006). Other Native peoples, including the Apache and Yavapai, later colonized the area. After a 20-year struggle with the U.S. Army (approximately 1866-1886), the Apache and Yavapai were relocated to reservation lands.

Imdorf's thesis (1995) on the flora and vegetation of the Sierra Ancha Wilderness explains that miners and farmers were the first to come into the area after the Native Americans. The next group to settle the area included cattle and sheep ranchers in the late 1800's. In 1933, the Sierra Ancha Wilderness Area was declared a primitive area, which lasted until 1964 when the U.S. Congress reclassified it as wilderness area (Anonymous 2008). In the later part of the 1930s, the U.S. Forest Service established the experimental station to implement watershed management, which included forestry research, experimental land treatments, timber stand improvement, soil erosion, and land surveys.

METHODS

The investigation of the floristic composition of Parker Creek was conducted by collecting along routes between designated points, which were determined using topographical maps. In addition to walking in a zigzag pattern, several routes to a given destination were taken to maximize the area that was surveyed. The surveys and collections were conducted over the course of six trips to the Parker Creek watershed, beginning in October 2007 and continuing once a month through April 2008 (there was no collection in December 2007). Plants were identified using standard taxonomic keys from the Arizona Flora (Kearney and Peebles 1951) as well as publications of the Arizona Flora Project printed in *Canotia* (2005-2007) and the *Journal of the Arizona Nevada Academy of Sciences* (1992-2003). Specimens were verified by comparing collections housed in the Arizona State University Herbarium (ASU). Collections from this project were deposited at ASU, and a partial set was sent to the Willard Sherman Turrell Herbarium (MU), Miami University, Oxford, Ohio. The senior author began his career at MU and continues to contribute his collections to support their efforts in botanical research and education.

Previous collections were inventoried using the vascular plants database on the Southwestern Environmental Information Network (SEINet, <http://swbiodiversity.org/seinet/index.php>). The specified primary search criteria were "Parker Creek, Gila County, Arizona," "Sierra Ancha Experimental Station," "Sierra Ancha" and "Parker Canyon." The identity and locality information provided on the labels of each specimen retrieved by the SEINet search were confirmed in the ASU Herbarium. A

species list was compiled using the results of the SEINet queries, while retaining only those confirmed to be within the study area, as well as the collections obtained by the authors (Appendix).

RESULTS AND DISCUSSION

Collections from the entire Parker Creek watershed, dating from 1935 to the present, have documented the presence of 625 species representing 94 families and 335 genera of vascular plants. The flora is predominantly comprised of angiosperms (ASU, flowering plants), with gymnosperms (conifers), lycophytes (club mosses), sphenophytes (horsetails) and pteridophytes (ASU, ferns) representing only a very small portion of the community diversity (Table 1). Thirty-five percent of the angiosperms are members of only three families, which are expected given their predominance in the Southwest (Kearney and Peebles 1951). The most represented families include Asteraceae and Poaceae, followed by Fabaceae. Other notable families in the Parker Creek Canyon flora are the Euphorbiaceae, Scrophulariaceae, Polemoniaceae, and Brassicaceae (Table 2). The flora also includes a few threatened and endangered species, e.g., *Agave chrysantha*, *Sedum cockerelii*, and *Allium biceptrum* var. *palmeri*.

When comparing the Parker Creek Canyon collection to Imdorf's Sierra Ancha Wilderness collection (1995), a remarkable number of differences were revealed. The greatest variation in species

Table 1. Summary of the distribution of families, species and genera within the Parker Creek watershed.

Group	Families	Genera	Species
Angiosperms	87	312	565
Gymnosperms	2	5	8
Ferns and allies	6	16	32

composition was limited within the angiosperms. Imdorf's collection contained 10 angiosperm families that were not represented in the Parker Creek watershed collection: Bignoniaceae, Cannabaceae, Krameriaceae, Platanaceae, Pyrolaceae, Rutaceae, Saxifragaceae, Ephedraceae, and Blechnaceae. Many of these families are often found in areas of high precipitation or riparian areas. Some of these taxa (e.g., Platanaceae, Krameriaceae and Ephedraceae) are likely to be found within the Parker Creek watershed, but have not yet been collected.

Of the total 96 angiosperm families collected in one or both locations, the majority (87%) was

Table 2. Most common angiosperm families found in the Parker Creek watershed.

Family	Genera	Species	Percent of total species
Asteraceae	50	92	15
Poaceae	29	79	13
Fabaceae	26	45	7
Scrophulariaceae	7	16	3
Brassicaceae	9	15	3
Polemoniaceae	8	14	3
Euphorbiaceae	5	16	3

shared between both locations. The shared number of angiosperm genera was lower at 65%, with only 266 of the total 408 genera found in both locations. The number of unique angiosperm taxa found in the Sierra Ancha Wilderness and the Parker Creek watershed is shown in Table 3. Despite their close proximity and similar elevation, the two study sites only share 47% of angiosperm species when the two species inventories are compared. Gymnosperm and fern diversity were fairly similar across the two study areas. The exception being the Sierra Ancha Wilderness has greater gymnosperm diversity, while Parker Creek contains a greater diversity of fern species (Tables 4 and 5).

Precipitation and mild temperatures throughout winter 2007 and spring 2008 were sufficient to promote abundant growth in the desert and grassland areas. The thick herbaceous growth, which is customary in heavy-rain years, began in late February and continued through the final collection in April. Collections from this study yielded 339 species from 74 families and 219 genera. Although the authors' fieldwork contributed just over half of the total species listed in the appendix, this collection added 200 new records for the Parker Creek watershed.

The remote nature of portions of Parker Creek Canyon, prohibited access for additional collections. Therefore, our efforts focused on the region from the Parker Creek delta to approximately 1 mile within the mouth of the canyon. The difficult terrain prevented the authors from exploring the inner canyon area to its full capacity. While several narrow cavernous spots with unique flora were located, many that were inaccessible appeared to have similar flora but need to be sampled. Species not on this collection list, especially ferns, and cooler climate

Table 3. Comparison of unique and shared angiosperm taxa between the Parker Creek watershed and Sierra Ancha Wilderness.

	Taxa unique to Sierra Ancha Wilderness	Taxa unique to Parker Creek	Taxa shared between the two regions	Number of taxa from the combination of the two regions
Families	10	2	84	96
Genera	90	52	266	408
Species	257	182	395	834

Table 4. Comparison of unique and shared gymnosperm taxa between the Parker Creek watershed and Sierra Ancha Wilderness.

	Taxa unique to Sierra Ancha Wilderness	Taxa unique to Parker Creek	Taxa shared between the two regions	Number of taxa from the combination of the two regions
Families	1	0	2	3
Genera	1	1	4	6
Species	3	2	7	12

Table 5. Comparison of unique and shared fern and fern allies between the Parker Creek watershed and Sierra Ancha Wilderness.

	Taxa unique to Sierra Ancha Wilderness	Taxa unique to Parker Creek	Taxa shared between the two regions	Number of taxa from the combination of the two regions
Families	1	0	6	7
Genera	2	2	14	18
Species	4	12	23	39

taxa, might be found in the deeper recesses of the canyon, as well as in remote pockets along the canyon walls. Future collection efforts should focus on the narrow canyons of the Parker Creek Canyon and remote areas of the uppermost reaches of the watershed.

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- Agave toumeyana* Trel. ex Standl. var. *bella* Breitung (ASU, Farruggia 1500)
- Yucca baccata* Torr. (ASU, Farruggia 1718 & 2008)
- Yucca elata* (Engelm.) Engelm. (ASU, Johnson s.n.)

Amaranthaceae

- Amaranthus blitoides* S. Watson (ARIZ, Gould 3657)
- Froelichia arizonica* Thornb. ex Standl. (ARIZ, Gould 3581)

Anacardiaceae

- Rhus glabra* L. (ASU, Farruggia 1530)
- Rhus ovata* S. Watson (ARIZ, Whitfield s.n.)
- Rhus trilobata* Nutt. var. *pilosissima* Engelm. (ARIZ, Gould 4365; ASU, Hendrix 2095)

Apiaceae

- Bowlesia incana* Ruiz & Pavón (ASU, Farruggia 1757)
- Daucus pusillus* Michx. (ASU, Farruggia 2105, 2111, 2152 & 2185)
- Lomatium nevadense* (S. Wats.) Coult. & Rose var. *nevadense* (ASU, Farruggia 1782 & 1864)
- Osmorhiza brachypoda* Torr. (ASU, Farruggia 2149)
- Pseudocymopterus montanus* (A. Gray) J.M. Coult. & Rose (ASU, Farruggia 2015 & 2071)
- Torilis arvensis* (Hudson) Link (ASU, Farruggia 2109 & 2110)
- Yabea microcarpa* (Hook. & Arn.) Koso-Pol. (ASU, Farruggia 2134)

Apocynaceae

- Apocynum androsaemifolium* L. (ASU, Reichart 90-04)
- Apocynum cannabinum* L. (ASU, Joyal 1707)
- Apocynum* × *floribundum* Greene (ASU, Keil 3511)

Aristolochiaceae

- Aristolochia watsonii* Woot. & Standl. (ASU, Christy 1109b)

Asclepiadaceae

- Asclepias asperula* (Decne.) Woodson ssp. *asperula* (ASU, Lehto 851)
- Asclepias linaria* Cav. (ASU, Farruggia 1495)
- Asclepias nyctaginifolia* A. Gray (ARIZ, Gould 3725)
- Asclepias subverticillata* (A. Gray) Vail (ASU, Little 4019)
- Funastrum cynanchoides* (Decne.) Schltr. ssp. *cynanchoides* (ASU, Farruggia 2096 & 2180)

APPENDIX: CHECKLIST FOR THE PARKER CREEK WATERSHED

This list is a compilation of taxa represented in the Parker Creek Watershed (searched June 1, 2008). Numbers in parentheses represent collection numbers for voucher specimens in the Arizona State University Herbarium (ASU), the Desert Botanical Garden Herbarium (DES), the Deaver Herbarium (ASC), and the University of Arizona Herbarium (ARIZ).

FLOWERING PLANTS

Aceraceae

- Acer negundo* L. var. *interius* (Britton) Sarg (ASU, Imdorf 756).

Agavaceae

- Agave chrysantha* Peebles (ASU, Hodgson et al. 0152)

Asteraceae

- Acourtia wrightii* (A. Gray) Reveal & King (ASU, Farruggia 2007)
- Adenophyllum porophylloides* (A. Gray) Strother (ASU, Farruggia 2178)
- Ageratina herbacea* (Gray) King & H.E. Robins. (ASU, Pase 1735)
- Ageratina paupercula* (A. Gray) King & H. Rob. (ARIZ, Engard 486)
- Ambrosia ambrosioides* (Cav.) Payne (ASU, Farruggia 2113)
- Ambrosia confertiflora* DC. (ASU, Farruggia 1653)
- Ambrosia psilostachya* DC. (ASU, Farruggia 1563)
- Antennaria parvifolia* Nutt. (ASU, Farruggia 1552)
- Artemisia dracunculul* L. (ASU, Farruggia 1551, 1683 & 1733)
- Artemisia ludoviciana* Nutt. (ASU, Farruggia 1617, 1651 & 1720)
- Baccharis pteronioides* DC. (ASU, Little 1967)
- Baccharis salicifolia* (Ruiz & Pavón) Pers. (ASU, Farruggia 1678 & 2165)
- Baccharis sarothroides* A. Gray (ASU, Farruggia 1726)
- Bahia biternata* A. Gray (ARIZ, R.K. Hudson 3834)
- Baileya multiradiata* Harvey & A. Gray ex A. Gray (ASU, Farruggia 1987, 2026 & 2129)
- Bidens bigelovii* A. Gray (ASU, Johnson 18)
- Bidens leptocephala* Sherff (ARIZ, R.K. Hudson 3810)
- Brickellia betonicifolia* A. Gray (ASU, Little 4145)
- Brickellia californica* (Torr. & A. Gray) A. Gray (ASU, Farruggia 1548, 1578, 1615, 1634, 1689, 2122 & 2157)
- Brickellia eupatorioides* (L.) Shinnery var. *chlorolepis* (Woot. & Standl.) B.L. Turner (ASU, Pinkava and Lehto 5520)
- Brickellia grandiflora* (Hook.) Nutt. (ARIZ, Gould 3876)
- Brickellia venosa* (Woot. & Standl.) B.L. Robins. (ASU, Farruggia 1502 & 1560)
- Calycoseris wrightii* A. Gray (ASU, Farruggia 2037 & 2176)
- Carminatia tenuiflora* DC. (ASU, Little 4170)
- Carphochaete bigelovii* A. Gray (ASU, Pase 1598)
- Cirsium arizonicum* var. *arizonicum* (A. Gray) Petr. (ASU, Joyal 1696)
- Cirsium neomexicanum* A. Gray (ASU, Farruggia 2099 & 2137)
- Conyza canadensis* (L.) Cronquist var. *glabarata* (Gray) Cronq. (ASU, Farruggia 1688)
- Dieteria asteroides* Torr. (ASU, Farruggia 1542 & 1655)
- Erigeron divergens* Torr. & A. Gray (ASU, Farruggia 1569, 1993, 2072, 2127 & 2209)
- Erigeron flagellaris* A. Gray (ASU, Little 4096)
- Erigeron oreophilus* Greenm. (ASU, Little 4024)
- Erigeron pringlei* A. Gray (DES, Engard 484)
- Eriophyllum confertiflorum* (DC.) A. Gray (ASU, Farruggia 1494)
- Eriophyllum lanosum* (A. Gray) A. Gray (ASU, Farruggia 1872, 2006, 2035 & 2186)
- Gaillardia pinnatifida* Torr. (ASU, Pase & Keil 3546)
- Gutierrezia microcephala* (DC.) A. Gray (ASU, Farruggia 1584)
- Gutierrezia sarothrae* (Pursh) Britton & Rusby (ASU, Farruggia 1624)
- Helianthus annuus* L. (ASU, Little 4086)
- Heliomeris longifolia* (B.L. Rob. & Greenm.) Cockerell var. *annua* (M.E. Jones) Yates (ASU, Little 4130)
- Heterosperma pinnatum* Cav. (ARIZ, Gould 3729)
- Heterotheca fulcrata* (Greene) Shinnery var. *fulcrata* (ASU, Davidson s.n.)
- Heterotheca subaxillaris* (Lam.) Britton & Rusby (ARIZ, Johnson s.n.)
- Heterotheca villosa* (Pursh) Shinnery (ASU, Farruggia 1561 & 1601)
- Heterotheca villosa* (Pursh) Shinnery var. *scabra* (Eastw.) Semple (ASU, Farruggia 1555)
- Hymenoxys wrightii* A. Gray (ASU, Farruggia 1527)
- Hymenoxys bigelovii* (A. Gray) K.F. Parker (ASU, Little 4278)
- Isocoma acradenia* (Greene) Greene var. *acradenia* (ASU, Little 4142)
- Lactuca graminifolia* Michx. (ASU, Lehto L23162)
- Lactuca ludoviciana* (Nutt.) Riddell (ARIZ, Pase 1222)
- Lactuca serriola* L. (ARIZ, Gould 3730)
- Lasthenia californica* DC. ex Lindl. (ASU, Farruggia 1785, 1786, 1902, 2025, 2028, 2115 & 2132)
- Logfia californica* (Nutt.) Holub. (ASU, Farruggia 2078, 2079 & 2188)
- Machaeranthera asteroides* (Torr.) Greene var. *glandulosa* B.L. Turner (ARIZ, Gould 3798)
- Machaeranthera bigelovii* (A. Gray) Greene (ARIZ, Hudson 3833)
- Machaeranthera canescens* (Pursh) A. Gray ssp. *aristata* (Eastw.) B.L. Turner (ARIZ, Ferguson 113)
- Machaeranthera gracilis* (Nutt.) Shinnery (ASU, Farruggia 1705 & 1737)
- Machaeranthera parviflora* A. Gray (ARIZ, Ferguson 114)
- Machaeranthera tagetina* Greene (ASU, Farruggia 1466)
- Melampodium leucanthum* Torr. & A. Gray var. *leucanthum* (ASU, Farruggia 2131)
- Microseris lindleyi* (DC.) A. Gray (ASU, Farruggia 1819, 1857, 1942, 1945 & 2014)
- Monoptilon bellioides* (A. Gray) H.M. Hall (ASU, Farruggia 1910)

- Packera neomexicana* (A. Gray) W.A. Weber & A. Löve var. *neomexicana* (ASU, Little 4249)
Pectis papposa Harvey & A. Gray var. *papposa* (ASU, Farruggia 1460 & 1697)
Perityle ciliata (L.H. Dewey) Rydb. (ASU, Johnson 77/30)
Perityle emoryi Torr. (ASU, Farruggia 1763)
Porophyllum gracile Benth. (ASU, Farruggia 2097)
Pseudognaphalium canescens (DC.) W.A. Weber (ASU, Farruggia 1501, 1613, 1695, 1735, 1789 & 1884)
Pseudognaphalium stramineum (Kunth) Anderb. (ASU, Farruggia 1818)
Psilostrophe cooperi (A. Gray) Greene (ASU, Farruggia 1969 & 2191)
Rafinesquia neomexicana A. Gray (ASU, Farruggia 1847, 1881, 1959, 2106, 2126 & 2164)
Senecio flaccidus Less. var. *monoensis* (Greene) B.L. Turner & T.M. Barkley (ASU, Farruggia 2116)
Senecio spartioides Torr. & A. Gray var. *multicapitatus* (Greenm. Ex Rydb.) S.L. Welsh
Solidago missouriensis Nutt. (ASU, Farruggia 1572, 1633, 1673 & 1675)
Solidago velutina DC. (ASU, Farruggia 1526)
Solidago wrightii A. Gray (ASU, Farruggia 1544)
Sonchus asper (L.) Hill (ASU, Farruggia 1706, 2058 & 2125)
Sonchus oleraceus L. (ASU, Farruggia 2166)
Stephanomeria exigua Nutt. (ASU, Farruggia 1681)
Stephanomeria pauciflora (Torr.) A. Nelson (ASU, Farruggia 1513, 1640 & 1663)
Symphytotrichum falcatum (Lindl.) G.L. Nesom var. *commutatum* (Torr. & A. Gray) G.L. Nesom (ASU, Farruggia 1628 & 1641)
Trixis californica Kellogg (ASU, Farruggia 1714, 2041 & 2052)
Viguiera parishii Greene (ASU, Farruggia 1480)
Xanthisma spinulosum (Pursh) Morgan (ASU, Farruggia 1471, 1604 & 1716)

Berberidaceae

- Mahonia repens* (Lindl.) G. Don (ASU, Little 87486)

Betulaceae

- Alnus oblongifolia* Torr. (ASU, Johnson s.n.)

Boraginaceae

- Amsinckia intermedia* Fisch. & C.A. Mey. (ASU, Farruggia 1769, 1830, 1866, 1870, 1918 & 2120)
Cryptantha Lehm. Ex G. Don (ASU, Farruggia 1766, 1821 & 2158)
Cryptantha barbiger (A. Gray) Greene (ASU, Farruggia 1905, 2005, 2038 & 2051)

- Cryptantha maritima* (Greene) Greene (ASU, Farruggia 1765)
Cryptantha muricata (Hook. & Arn.) A. Nelson & J.F. Macbr. (ASU, Farruggia 1925)
Cryptantha pterocarya (Torr.) Greene (ASU, Farruggia 1767 & 1979)
Harpagonella palmeri A. Gray (ASU, Farruggia 1770, 1832, 1888 & 1913)
Heliotropium fruticosum L. (ARIZ, Gould 3672)
Lithospermum multiflorum Torr. ex A. Gray (ARIZ, Gould 3452)
Pectocarya platycarpa (Munz & I.M. Johnst.) Munz & I.M. Johnst. (ASU, Pase 1358)
Pectocarya recurvata I.M. Johnston (ASU, Farruggia 1887)
Plagiobothrys arizonicus (A. Gray) Greene ex A. Gray (ASU, Farruggia 1778, 1788, 1801, 1837, 1925, 2031, 2094 & 2208)
Plagiobothrys tenellus (Nutt. ex Hook.) A. Gray (ARIZ, Crooks s.n.)

Brassicaceae

- Arabis perennans* S. Wats. (ASU, Farruggia 1948, 2146 & 2167)
Descurainia pinnata (Walter) Britton (ASU, Farruggia 1756, 1823 & 1877)
Descurainia sophia (L.) Webb ex Prantl (ASU, Little 4275)
Draba cuneifolia Nutt. ex Torr. & A. Gray (ASU, Farruggia 1753)
Draba reptans (Lam.) Fernald (ASU, Little 4275 & 87393)
Erysimum asperum (Nutt.) DC (ASU, Christy 580)
Erysimum capitatum (Douglas ex Hook.) Greene (ASU, Farruggia 1840 & 1944)
Guillenia lasiophylla (Hook. & Arn.) Greene (ASU, Farruggia 1897 & 2171)
Lepidium densiflorum Schrad. (ASU, Farruggia 1820, 1911 & 1922)
Lepidium lasiocarpum Nutt. (ASU, Farruggia 1754, 1764, 1807, 2057 & 2093)
Lepidium medium Greene (ASU, Farruggia 1831, 1886 & 2160)
Lesquerella gordonii (A. Gray) S. Watson (ASU, Farruggia 1768, 1828, 1906 & 2080)
Sisymbrium irio L. (ASU, Farruggia 1748, 1749, 1750, 1871, 1921, 1941 & 2075)
Thysanocarpus curvipes Hook. (ASU, Farruggia 1794 & 2142)

Cactaceae

- Carnegiea gigantea* (Engelm.) Britton & Rose (ASU, Imdorf 310, not collected in canyon but noted as present)
Cylindropuntia acanthocarpa (Engelm. & Bigelow) F.M. Knuth (ASU, Farruggia 1516)

Cylindropuntia leptocaulis (DC.) F.M. Knuth (ASU, Farruggia 1646)

Cylindropuntia spinosior (Engelm.) F.M. Knuth (DES, Rebman 1260)

Cylindropuntia versicolor (Engelm. ex J.M. Coult.) Knuth (ASU, Farruggia 1627 & 1775)

Echinocereus boyce-thompsonii Orcutt (ASU, Pase 1362)

Echinocereus triglochidiatus var. *melanacanthus* (Engelm.) L.D. Benson (ASU, Farruggia 1776)

Opuntia macrorhiza Engelm. var. *macrorhiza* (ASU, Farruggia 1511)

Opuntia phaeacantha Engelm. (ASU, Farruggia 1512 & 1626)

Campanulaceae

Lobelia cardinalis L. (ASU, Johnson 1)

Nemacladus longiflorus A. Gray (ASU, Farruggia 1849 & 1869)

Triodanis perfoliata (L.) Nieuwl. (ASU, Pase 1745)

Capparaceae

Polanisia dodecandra (L.) DC. (ASU, Farruggia 1575)

Polanisia dodecandra (L.) DC. ssp. *trachysperma* (Torr. & A. Gray) Iltis (ASU, Farruggia 1667)

Caprifoliaceae

Lonicera albiflora Torr. & A. Gray var. *dumosa* (A. Gray) Rehder (ASU, Farruggia 1539)

Lonicera arizonica Rehder (ASU, Little 4304)

Lonicera interrupta Benth. (ASU, Lehto 894)

Caryophyllaceae

Arenaria lanuginosa (Michx.) Rohrb. ssp. *saxosa* (A. Gray) Maguire (ASU, Joyal 1699)

Cerastium texanum Britton. (ASU, Pase 1344)

Drymaria effusa A. Gray (ASU, Farruggia 2017, 2036, 2055, 2112, 2183 & 2198)

Herniaria hirsuta L. (ASU, Farruggia 1899, 1973 & 1986)

Herniaria hirsuta L. ssp. *cinerea* (DC.) Coutinho (ASU, Farruggia 1826 & 1885)

Silene antirrhina L. (ASU, Farruggia 1822 & 1998)

Silene laciniata Cav. ssp. *greggii* (A. Gray) C.L. Hitchc. & Maguire (ASU, Johnson 4)

Celastraceae

Canotia holacantha Torr. (ASU, Farruggia 1684)

Paxistima myrsinites (Pursh) Raf. (ASU, Lehto 5601)

Chenopodiaceae

Chenopodium fremontii S. Watson var. *fremontii* (ASU, Farruggia 1478, 1514 & 1554)

Dysphania graveolens (Willd.) Mosyakin & Clemants (ASU, Little 4093)

Commelinaceae

Tradescantia occidentalis (Britton) Smyth (ASU, Farruggia 1708)

Convolvulaceae

Convolvulus equitans Benth. (ARIZ, Little 37)

Evolvulus sericeus Sw. (ARIZ, Gould 3669)

Ipomoea barbatisepala A. Gray (ASU, Farruggia 1490 & 1594)

Ipomoea costellata Torr. (ASU, Farruggia 1484 & 1504)

Ipomoea cristulata Hallier f. (ASU, Farruggia 1474 & 1590)

Ipomoea purpurea (L.) Roth (ASU, Johnson 77106)

Crassulaceae

Crassula connata (Ruiz & Pavón) A. Berger (ASU, Farruggia 1777)

Dudleya saxosa (M.E. Jones) Britton & Rose (ASU, Farruggia 1710)

Graptopetalum rusbyi (Greene) Rose (ASU, Farruggia 1557)

Sedum cockerellii Britton (ASU, Johnson 25)

Cucurbitaceae

Marah gilensis Greene (ASU, Farruggia 1643, 1760 & 1860)

Cuscutaceae

Cuscuta indecora Choisy var. *neuropetala* (Engelm.) Hitchc. (ASU, Farruggia 1889)

Cyperaceae

Bulbostylis juncooides (Vahl) Kük. (ARIZ, Gould 3840)

Carex alma L.H. Bailey (ASU, Keil 3418)

Carex occidentalis L.H. Bailey (ASU, Farruggia 1570)

Carex subfusca W. Boott (ASU, Joyal 1681)

Carex thurberi Dewey (ASU, Little 4172)

Carex vallicola Dewey var. *rusbyi* (Mack.) F.J. Herm. (ASU, Little 4032)

Cyperus esculentus L. (ARIZ, Hudson 3842)

Cyperus retroflexus Buckley (ASU, Pase 1327)

Cyperus squarrosus L. (ASU, Farruggia 1591)

Fuirena simplex Vahl (ASU, Christy 886)

Lipocarpha micrantha (Vahl) G. Tucker (ASU, Keil 3403)

Scirpus microcarpus J. Presl & C. Presl (ASU, Lehto 5595)

Ericaceae

- Arctostaphylos pringlei* Parry (ASU, Little 4050)
Arctostaphylos pungens Kunth (ASU, Farruggia 1629)

Euphorbiaceae

- Acalypha neomexicana* Müll. Arg. (ARIZ, Hudson 38221)
Chamaesyce albomarginata (Torr. & A. Gray) Small (ASU, Farruggia 2059)
Chamaesyce arizonica (Engelm.) Arthur (ASU, Farruggia 1694, 1704 & 1711)
Chamaesyce hyssopifolia (L.) Small (ASU, Farruggia 1623)
Chamaesyce melanadenia (Torr.) Millsp. (ASU, Farruggia 1486, 1648, 1649, 1977, 2144, 2154 & 2161)
Chamaesyce pediculifera (Engelm.) Rose & Standl. (ASU, Farruggia 1751 & 1752)
Chamaesyce polycarpa (Benth.) Millsp. ex Parish (ASU, Farruggia 1868)
Chamaesyce revoluta (Engelm.) Small (ASU, Oxford 169)
Chamaesyce serpyllifolia (Pers.) Small (ASU, Farruggia 1534)
Croton lindheimerianus Scheele (ASU, Little 4038)
Euphorbia brachycera Engelm. (ASU, Farruggia 1931)
Euphorbia davidii Subils (ARIZ, Gould 3679)
Euphorbia palmeri Engelm. ex S. Watson (ASU, Farruggia 1654)
Tragia nepetifolia Cav. (ASU, Farruggia 2170)
Tragia ramosa Torr. (ASU, Farruggia 1657)

Fabaceae

- Acacia angustissima* (Mill.) Kuntze (ASU, Lehto 913)
Acacia constricta Benth. (ASU, Farruggia 1690)
Acacia greggii A. Gray (ASU, Farruggia 2010 & 2090)
Amorpha fruticosa L. (ASU, Engard 945)
Astragalus allochrous A. Gray var. *allochrous* (ARIZ, Gould 4368)
Astragalus nothoxys A. Gray. (ASU, Pase 1354)
Astragalus nuttallianus DC. (ASU, Farruggia 1784, 1803, 1836, 1846, 1928, 1980, 2042 & 2119)
Astragalus tephrodes A. Gray var. *brachylobus* (A. Gray) Barneby (ASU, Pase 1130)
Calliandra eriophylla Benth. (ASU, Farruggia 1875 & 1896)
Calliandra humilus (Schlecht.) Benth. var. *reticulata* (Gray) L. Benson (ASU, Johnson 1958)
Cercis canadensis L. var. *texensis* (S. Watson) M. Hopkins (ASU, Pase & Keil 3406)
Chamaecrista nictitans (L.) Moench (ASU, Farruggia 1461)

- Clitoria mariana* L. var. *mariana* (ARIZ, Gould 3803)
Dalea albiflora A. Gray (ASU, Oxford 125)
Dalea formosa Torr. (ASU, Farruggia 2130)
Desmanthus cooleyi (Eaton) Trel. (ASU, Johnson 1958)
Desmodium grahamii A. Gray (ASU, Johnson 77/22)
Desmodium procumbens (Mill.) Hitchc. (ASU, Farruggia 1609)
Galactia wrightii A. Gray (ASU, Farruggia 1493)
Lathyrus pauciflorus Fernald ASU, Little 87421)
Lotus humistratus Greene (ASU, Farruggia 1797, 1827, 1972, 2042 & 2049)
Lotus rigidus (Benth.) Greene (ASU, Farruggia 1933)
Lotus salsuginosus Greene (ASU, Farruggia 1976)
Lotus wrightii (A. Gray) Greene (ASU, Little 4138)
Lupinus bicolor Lindl. (ASU, Farruggia 2174)
Lupinus concinnus J. Agardh (ASU, Farruggia 2150)
Lupinus palmeri S. Watson (ASU, Hesselberg 1956)
Lupinus sparsiflorus Benth. (ASU, Farruggia 1796, 1903, 1934, 2003, 2086 & 2210)
Lupinus succulentus Douglas ex K. Koch (ASU, Farruggia 1940, 1947 & 2012)
Macroptilium gibbosifolium (Ortega) A. Delgado (ASU, Farruggia 1639, 1685, 1734 & 1736)
Marina parryi (Torr. & A. Gray) Barneby (ASU, Farruggia 2177 & 2189)
Medicago polymorpha L. (ASU, Farruggia 1945 & 2163)
Melilotus indicus (L.) All. (ASU, Farruggia 1546, 1652, 1907 & 2108)
Melilotus officinalis (L.) Lam. (ASU, Farruggia 1701)
Mimosa aculeaticarpa Ortega var. *biuncifera* (Benth.) Barneby (ASU, Pinkava & Lehto 5573)
Phaseolus angustissimus A. Gray (ASU, Hendrix 2084)
Prosopis velutina Woot. (ARIZ, Johnson s.n.)
Psoralea tenuiflora (Pursh) Rydb. (ASU, Hendrix 2054)
Robinia neomexicana A. Gray (ASU, Christy 586)
Senna bauhiniioides (A. Gray) Irwin & Barneby (ASU, Farruggia 1473)
Trifolium albopurpureum Torr. & A. Gray (ASU, Farruggia 2204, 2029 & 2145)
Trifolium gracilentum Torr. & A. Gray (ASU, Farruggia 2032 & 2151)

Fagaceae

- Quercus emoryi* Torr. (ASU, Rebman 1253)
Quercus grisea Liebm. (ASU, Farruggia 1540 & 1700)
Quercus turbinella Greene (ASU, Rebman 1259)

Fouquieriaceae

Fouquieria splendens Engelm. (ASU, Farruggia 1650)

Fumariaceae

Corydalis aurea Willd. ssp. *aurea* (ASU, Farruggia 1930)

Garryaceae

Garrya flavescens S. Watson ssp. *flavescens* (ASU, Bliss 7)
Garrya wrightii Torr. (ASU, Farruggia 1549)

Gentianaceae

Centaurium calycosum (Buckley) Fernald
Centaurium exaltatum (Griseb.) W. Wight ex Piper (ASU, Farruggia 1863)

Geraniaceae

Erodium cicutarium (L.) L'Hér. ex Aiton (ASU, Farruggia 1740, 1805, 1838 & 1883)
Erodium texanum A. Gray (ASU, Farruggia 1781, 1804, 1808 & 1810)
Geranium caespitosum James (ASU, Farruggia 1529)
Geranium carolinianum L. (ASU, Farruggia 1547)

Hydrangeaceae

Fendlera rupicola A. Gray (ASU, Berkenkamp s.n.)

Hydrophyllaceae

Emmenanthe penduliflora Benth. (ASU, Farruggia 1813, 1838 & 1852)
Eriodictyon angustifolium Nutt. (ASU, Johnson 1958)
Eucrypta micrantha (Torr.) A. Heller (ASU, Farruggia 1779)
Phacelia distans Benth. (ASU, Farruggia 1834, 1890, 1891, 1926, 2143, 2169 & 2187)
Phacelia egena (Greene ex Brand) Greene ex J.T. Howell (ASU, Farruggia 2024)
Phacelia heterophylla Pursh (ASU, Joyal 1689)
Phacelia ramosissima Dougl. ex Lehm. (ASU, Farruggia 1802)
Phacelia vallis-mortae J. Voss (ASU, Farruggia 1904)
Pholistoma auritum (Lindl.) Lilja (ASU, Farruggia 1815 & 1952)

Juglandaceae

Juglans major (Torr.) A. Heller (ASU, Lehto 3815)

Juncaceae

Juncus bufonius L. (ASU, Christy 575)
Juncus interior Wiegand (ASU, Keil 3397)

Juncus marginatus Rostk. (ASU, Christy 887)
Juncus saximontanus A. Nelson (ASU, Keil 3410)
Juncus torreyi Coville (ASU, Joyal 1680)

Lamiaceae

Hedeoma drummondii Benth. (ASU, Little 4270)
Hedeoma hyssopifolia A. Gray (ASU, Hendrix 2033)
Hedeoma nana (Torrey) Briq. (ASU, Farruggia 1579)
Hedeoma oblongifolia (A. Gray) A. Heller
Hyptis emoryi Torr. (ASU, Farruggia 1709 & 2103)
Lamium amplexicaule L. (ASU, Farruggia 1817, 1848 & 2153)
Marrubium vulgare L. (ASU, Farruggia 1573, 2019 & 2123)
Monarda fistulosa L. var. *menthifolia* (Graham) Fernald (ASU, Keil 3661)
Salvia columbariae Benth. (ASU, Farruggia 1867, 1984 & 2083)
Scutellaria potosina Brandegees (ARIZ, Gould 4366)
Stachys coccinea Ortega (ASU, Little 4268)

Liliaceae

Allium bisceptrum S. Watson var. *palmeri* (S. Watson) Cronquist (ASU, Pase 1360)
Calochortus ambiguus (M.E. Jones) Ownbey (ASU, Farruggia 1968 & 2089)
Dichelostemma capitatum (Benth.) Wood (ASU, Farruggia 1746 & 1878)
Maianthemum racemosum (L.) Link (ASU, Little 4261)

Linaceae

Linum lewisii Pursh (ASU, Pase 1337)
Linum neomexicanum Greene (ASU, Johnson s.n.)

Loasaceae

Mentzelia multiflora (Nutt.) A. Gray (ASU, Hendrix 2063)
Mentzelia pumila Nutt. ex Torr. & A. Gray (ASU, Farruggia 1487)

Lythraceae

Lythrum californicum Torr. & A. Gray (ASU, Keil K-3405)

Malvaceae

Abutilon mollicomum (Willd.) Sweet (ASU, Farruggia 1636)
Abutilon parvulum A. Gray (ASU, Farruggia 1475 & 1665)
Sida abutifolia Mill. (ASU, Farruggia 1476 & 1497)
Sphaeralcea ambigua A. Gray (ASU, Farruggia 2053, 2077 & 2098)

- Sphaeralcea coccinea* (Nutt.) Rydb. (ASU, Farruggia 1464 & 2000)
Sphaeralcea incana Torr. ex A. Gray (ASU, Farruggia 1839)
Sphaeralcea laxa Woot. & Standl. (ASU, Farruggia 1672)
Sphaeralcea rusbyi A. Gray ssp. *gilensis* Kearney (ASU, Baker 8166)

Molluginaceae

- Mollugo cerviana* (L.) Ser (ASU, Little 4048)
Mollugo verticillata L. (ASU, Forbes 1815)

Monotropaceae

- Pterospora andromedea* Nutt. (ASU, Little 4001)

Moraceae

- Morus microphylla* Buckley (ASU, Little 4173)

Nolinaceae

- Dasyilirion wheeleri* S. Watson (ASU, Farruggia 1491)
Nolina microcarpa S. Watson (ASU, Farruggia 1571)

Nyctaginaceae

- Allionia incarnata* L. (ASU, Farruggia 1958, 2021 & 2175)
Boerhavia coccinea Mill. (ASU, Farruggia 1713)
Boerhavia erecta L. (ASU, Farruggia 1521 & 1606)
Boerhavia intermedia M.E. Jones (ASU, Farruggia 1470 & 1607)
Boerhavia spicata Choisy (ASU, Little 4074)
Mirabilis albida (Walter) Heimerl (ASU, Little 4064)
Mirabilis coccinea (Torr.) Benth. & Hook. f. (ASU, Joyal 1692)
Mirabilis laevis (Benth.) Curran var. *villosa* (Kellogg) Spellb. (ASU, Farruggia 1482, 1829, 1851, 1858, 1924, 2039 & 2050)
Mirabilis linearis (Pursh) Heimerl (ARIZ, Gould & Hudson 3812)
Mirabilis multiflora (Torr.) A. Gray var. *multiflora* (ARIZ, Johnson s.n.)
Mirabilis oxybaphoides (A. Gray) A. Gray (ASU, Farruggia 1533)

Oleaceae

- Menodora scabra* A. Gray (ASU, Farruggia 1483 & 1597)

Onagraceae

- Camissonia californica* (Nutt. ex Torr. & A. Gray) P.H. Raven (ASU, Farruggia 1816, 1853, 1974, 2047, 2048 & 2100)

- Epilobium canum* (Greene) P.H. Raven ssp. *latifolium* (Hook.) P.H. Raven (ASU, Keil 3540)

- Gaura hexandra* Ortega (ASU, Farruggia 2030)
Oenothera albicaulis Pursh (ASU, Farruggia 1966)
Oenothera caespitosa Nutt. (ASU, Farruggia 1844)
Oenothera caespitosa Nutt. ssp. *marginata* (Nutt. ex Hook. & Arn.) Munz
Oenothera elata Kunth (ASU, Farruggia 1630)
Oenothera flava (A. Nelson) Garrett (ASU, Farruggia 2022)

Orobanchaceae

- Conopholis alpina* Liebm. var. *mexicana* (A. Gray ex S. Watson) Haynes (ASU, Christy 563)
Orobanche cooperi (A. Gray) A. Heller (ASU, Little 4004)
Orobanche fasciculata Nutt. (ASU, Little 4016)

Oxalidaceae

- Oxalis albicans* Kunth ssp. *pilosa* (Nutt.) Eiten (ASU, Farruggia 1531)
Oxalis alpina (Rose) Rose ex R. Knuth (ASU, Little 4099)

Papaveraceae

- Argemone pleiacantha* Greene ssp. *ambigua* G.B. Ownbey (ASU, Johnson s.n.)
Eschscholzia californica Cham. (ASU, Farruggia 1843, 1960, 1961, 2088, 2091 & 2092)
Eschscholzia californica Cham. ssp. *mexicana* (Greene) C. Clark (ASU, Farruggia 1962)
Platystemon californicus Benth. (ASU, Farruggia 1842 & 1893)

Martyniaceae

- Proboscidea parviflora* (Woot.) Woot. & Standl. (ARIZ, Hudson 3847)

Plantaginaceae

- Plantago eriopoda* Torr. (ASU, Farruggia 1862)
Plantago ovata Forsk. (ASU, Farruggia 1762, 1982 & 2182)
Plantago patagonica Jacq. (ASU, Farruggia 1656, 1873, 1932, 1981, 2016, 2117, 2179 & 2196)
Plantago rhodosperma Decne. (ASU, Farruggia 1880, 2084 & 2168)

Poaceae

- Agrostis exarata* Trin. (ASU, Joyal 1686)
Aristida adscensionis L. (ASU, Farruggia 1481, 1488, 1520, 1611 & 1691)
Aristida divaricata Humb. & Bonpl. ex Willd. (ASU, Farruggia 1509 & 1614)
Aristida californica Thurb. ex S. Watson var. *glabrata* Vasey (ASU, Pase 1228)

- Aristida laxa* Cav. (ARIZ, Gould 3859)
Aristida pansa Woot. & Standl. (ASU, Pase 1146)
Aristida purpurea Nutt. var. *longiseta* (Steud.) Vasey (ARIZ, Gould 3860)
Aristida purpurea Nutt. var. *nealleyi* (Vasey) Allred (ASU, Farruggia 1728)
Aristida purpurea Nutt. var. *purpurea* (ASU, Farruggia 1659, 1666, 1727 & 2018)
Aristida schiedeana Trin. & Rupr. var. *orcuttiana* (Vasey) Allred & Valdés-Reyna (ASU, Farruggia 1583)
Aristida ternipes Cav. var. *gentilis* (Henr.) Allred (ASU, Little 4156)
Avena fatua L. (ASU, Farruggia 1790)
Bothriochloa barbinodis (Lag.) Herter (ASU, Farruggia 1596, 1638 & 1658)
Bouteloua aristidoides (Kunth) Griseb (ARIZ, Gould 3674)
Bouteloua barbata Lag. (ASU, Farruggia 1674)
Bouteloua curtipendula (Michx.) Torr. (ASU, Farruggia 1498, 1582, 1668 & 1759)
Bouteloua eriopoda (Torr.) Torr. (ASU, Keil 3562)
Bouteloua hirsuta Lag. (ASU, Farruggia 1499, 1515 & 1625)
Bouteloua repens (Kunth) Scribn. & Merr.
Bromus arizonicus (Shear) Stebbins (ASU, Farruggia 2172)
Bromus carinatus Hook & Arn. (ASU, Farruggia 1553, 1581, 1588 & 1955)
Bromus rubens L. (ASU, Farruggia 1602, 1741, 1795, 1915 & 2046)
Dactylis glomerata L. (ASU, Johnson s.n.)
Danthonia intermedia Vasey (ASU, Joyal 1685)
Dasyochloa pulchella (Kunth) Willd. ex Rydb. (ASU, Little 4159)
Dichantherium acuminatum (Sw.) Gould & C.A. Clark (ASU, Joyal 1684)
Digitaria californica (Benth.) Henr. (ASU, Little 4117)
Digitaria ciliaris (Retz.) Koeler (ARIZ, Gould 3740)
Digitaria eriantha Steud. (ASU, Farruggia 1492)
Elymus canadensis L. (ASU, Farruggia 1729)
Elymus elymoides (Raf.) Swezey (ASU, Farruggia 1586)
Elymus glaucus Buckley (ASU, Joyal 1698)
Elymus trachycaulus (Link) Gould ex Shinnars (ASU, Farruggia 1558 & 1565)
Enneapogon desvauxii Desv. ex P. Beauv. (ASU, Farruggia 1503)
Eragrostis cilianensis (All.) Vign. ex Janchen (ASU, Farruggia 1485, 1537 & 1732)
Eragrostis curvula (Schrad.) Nees (ASU, Farruggia 1747 & 1791)
Eragrostis intermedia Hitchc. (ASU, Farruggia 1507, 1519, 1523, 1538 & 1564)
Eragrostis lehmanniana Nees (ASU, Farruggia 1603, 1661, 1676, 1677 & 1712)
Eragrostis mexicana (Hornem.) Link (ASU, Farruggia 1593)
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. (ASU, Farruggia 1522 & 1730)
Hilaria belangeri (Steud.) Nash (ASU, Farruggia 1994)
Hordeum marinum Huds. (ASU, Farruggia 2009)
Hordeum pusillum Nutt. (ASU, Christy 568)
Lamarckia aurea (L.) Moench (ASU, Farruggia 1814, 2085 & 2194)
Leptochloa dubia (Kunth) Nees (ASU, Farruggia 1559)
Leptochloa panicea (Retz.) Ohwi (ASU, Farruggia 1715)
Lycurus phleoides Kunth (ASU, Farruggia 1517)
Lycurus setosus (Nutt.) C.G. Reeder (ASU, Farruggia 1562 & 1619)
Muhlenbergia appressa C.O. Goodding (ASU, Farruggia 1995 & 1999)
Muhlenbergia emersleyi Vasey (ASU, Farruggia 1524, 1587, 1595, 1990 & 2197)
Muhlenbergia fragilis Swallen (ASU, Farruggia 1592)
Muhlenbergia longiligula Hitchc. (ASU, Farruggia 1574)
Muhlenbergia pauciflora Buckley (ASU, Little 4176)
Muhlenbergia porteri Scribn. ex Beal (ASU, Little 4181)
Muhlenbergia rigens (Benth.) Hitchc. (ASU, Farruggia 1660 & 1731)
Panicum bulbosum Kunth (ASU, Joyal 1708)
Panicum capillare L. (ASU, Farruggia 1566)
Panicum hirticaule J. Presl (ASU, Farruggia 1565, 1605 & 1612)
Panicum miliaceum L. (ASU, Farruggia 1671)
Poa bigelovii Vasey & Scribn. (ASU, Farruggia 1956, 1992 & 2190)
Poa fendleriana (Steud.) Vasey (ASU, Farruggia 1780 & 2202)
Poa fendleriana (Steud.) Vasey ssp. *longiligula* (Scribn. & T.A. Williams) Soreng (ASU, Little 4260)
Polypogon monspeliensis (L.) Desf. (ASU, Pase 3414)
Polypogon viridis (Gouan) Breistr. (ASU, Joyal 1687)
Schismus barbatus (Loefl. ex L.) Thellung (ASU, Farruggia 1753, 1895, 1912 & 2045)
Schizachyrium cirratum (Hack.) Woot. & Standl. (ASU, Farruggia 1620)
Sorghum halepense (L.) Pers. (ASU, Farruggia 1717)
Sporobolus contractus Hitchc. (ASU, Keil 3554)

- Sporobolus cryptandrus* (Torr.) A. Gray (ASU, Keil 3555)
Vulpia microstachys (Nutt.) Munro (ASU, Farruggia 1879, 1991, 1997 & 2200)
Vulpia octoflora (Walter) Rydb. var. *hirtella* (Piper) Henr. (ASU, Farruggia 1859 & 2043)
Vulpia octoflora (Walter) Rydb. var. *octoflora* (ASU, Farruggia 1916)

Polemoniaceae

- Allophyllum gilioides* (Benth.) A.D. Grant & V.E. Grant (ASU, Pase 1348)
Eriastrum diffusum (A. Gray) H. Mason (ASU, Farruggia 1908, 1978, 2121 & 2155)
Eriastrum eremicum (Jepson) H. Mason (ASU, Farruggia 2173)
Gilia flavocincta A. Nelson (ASU, Farruggia 1811, 1824, 1833, 1841, 1861, 1894, 1946, 1975, 2044 & 2074, 2124, 2131 & 2140)
Gilia scopulorum M.E. Jones (ASU, Farruggia 1809)
Gilia sinuata Douglas ex Benth. (ASU, Farruggia 1833)
Ipomopsis aggregata (Pursh) V.E. Grant (ASU, Farruggia 1525)
Ipomopsis longiflora (Torr.) V.E. Grant (ASU, Farruggia 1927)
Ipomopsis multiflora (Nutt.) V.E. Grant (ASU, Keil 3530)
Leptosiphon aureus (Nutt.) J.M. Porter & L.A. Johnson ssp. *aureus* (ASU, Farruggia 2211)
Linanthus bigelovii (A. Gray) Greene (ASU, Farruggia 1825)
Microsteris gracilis (Hook.) Greene (ASU, Farruggia 2148 & 2199)
Phlox cluteana A. Nelson (ASU, Farruggia 1680 & 1692)
Phlox tenuifolia E.E. Nelson (ASU, Farruggia 1664, 1845, 1938, 2138 & 2141)

Polygalaceae

- Polygala obscura* Benth. (ASU, Farruggia 1472)

Polygonaceae

- Chorizanthe brevicornu* Torr. (ASU, Farruggia 1909, 2076, 2193 & 2207)
Eriogonum abertianum Torr. (ARIZ, Gould 3906)
Eriogonum arizonicum S. Stokes ex M.E. Jones (ASU, Farruggia 2181)
Eriogonum davidsonii Greene (ASU, Pase 1277)
Eriogonum fasciculatum Benth. (ASU, Farruggia 2004 & 2087)
Eriogonum inflatum Torr. & Frém. (ASU, Farruggia 1971, 1988 & 2020)
Eriogonum jamesii Benth. var. *jamesii* (ASU, Johnson 15)
Eriogonum polycladon Benth. (ASU, Keil 3520)

- Eriogonum wrightii* Torr. ex Benth. (ASU, Farruggia 1543 & 1698)
Polygonum douglasii Greene ssp. *johnstonii* (Munz) J.C. Hickman (ASU, Lehto 13350)
Pterostegia drymarioides Fisch. & C.A. Mey. (ASU, Farruggia 1874 & 1898)
Rumex hymenosepalus Torr. (ASU, Farruggia 1806 & 2162)

Portulacaceae

- Calandrinia ciliata* (Ruiz & Pavón) DC. (ASU, Farruggia 1787, 1792, 1800, 1900, 1929, 1949, 1950, 2027, 2147 & 2192)
Claytonia lanceolata Pursh var. *rosea* (Rydb.) R. J. Davis (ASU, Pase 1343)
Claytonia perfoliata Donn ex Willd. (ASU, Farruggia 1783, 1799, 1892, 1917, 1953 & 2195)
Phemeranthus parviflorus (Nutt.) Kiger (ASU, Farruggia 1468 & 1621)
Portulaca halimoides L. (ASU, Farruggia 1496 & 1608)
Portulaca oleracea L. (ASU, Farruggia 1469)
Portulaca suffrutescens Engelm. (ARIZ, Hudson 3636)
Portulaca umbraticola Kunth (ASU, Little 4065)

Primulaceae

- Androsace occidentalis* Pursh (ASU, Farruggia 1755, 1856 & 1914)

Ranunculaceae

- Anemone tuberosa* Rydb. (ASU, Farruggia 1835, 1855, 1951, 1970 & 2184)
Aquilegia chrysantha A. Gray (ASU, Pase 1743)
Clematis ligusticifolia Nutt. (ASU, Little 4010)
Delphinium parishii A. Gray (ASU, Farruggia 1963, 1964, 1965 & 2013)
Delphinium scaposum Greene (ASU, Christy 1123)
Myosurus apetalus C. Gay var. *montanus* (G.R. Campb.) Whitemore (ASU, Little 4053)
Thalictrum fendleri Engelm. ex A. Gray (ASU, Keil 3412)

Rhamnaceae

- Ceanothus greggii* A. Gray (ASU, Farruggia 1541 & 1937)
Ceanothus integerrimus Hook. & Arn. (ASU, Lehto 901)
Rhamnus ilicifolia Kellogg (ASU, Farruggia 1723)

Rosaceae

- Cercocarpus montanus* Raf. (ASU, Farruggia 1585)
Fallugia paradoxa (D. Don) Endl. ex Torr. (ASU, Damrel V-136)
Prunus serotina Ehrh. (ASU, Lehto L-19854)

Rosa woodsii Lindl. (ASU, Johnson s.n.)
Rubus arizonensis Focke (ASU, Farruggia 1635)
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke
 (ASU, Lehto 5594)
Rubus neomexicanus A. Gray (ASU, Damrel
 V-156)
Sanguisorba annua (Nutt. ex Hook.) Nutt. ex Torr.
 & A. Gray (ASU, Farruggia 2060 & 2139)

Rubiaceae

Galium aparine L. (ASU, Farruggia 1923, 2023 &
 2081)
Galium fendleri A. Gray (ARIZ, Hudson 3815)
Galium mexicanum Kunth (ASU, Farruggia 1532)
Galium microphyllum A. Gray (ASU, Little 4069)
Galium stellatum Kellogg (ASU, Farruggia 1725 &
 2104)
Galium wrightii A. Gray (ASU, Farruggia 1536,
 1568 & 1738)
Houstonia wrightii A. Gray (ASU, Little 4279)

Salicaceae

Populus fremontii S. Watson ssp. *fremontii* (ASU,
 Little 4070)
Populus tremuloides Michx. (ASU, Imdorf 745)
Salix gooddingii C.R. Ball (ASU, Farruggia 1721 &
 1936)
Salix laevigata Bebb (ARIZ, Pase 1608)
Salix lasiolepis Benth. (ASU, Little 4171)

Santalaceae

Comandra umbellata (L.) Nutt. ssp. *pallida* (A.
 DC.) Piehl (ASU, Joyal 1700)

Sapindaceae

Dodonaea viscosa (L.) Jacq. (ASU, Farruggia 1722)
Sapindus saponaria L. var. *drummondii* (Hook. &
 Arn.) L.D. Benson (ASU, Little 4066)

Scrophulariaceae

Castilleja exserta (A. Heller) T.I. Chuang &
 Heckard ssp. *exserta* (ASU, Farruggia 1812,
 1901, 1983, 2040, 2056, 2070, 2118 & 2206)
Castilleja integra A. Gray (ASU, Little 4034)
Castilleja linariifolia Benth. (ASU, Gentry 2265)
Castilleja miniata Douglas ex Hook. (ARIZ, Gould
 3627)
Castilleja minor (A. Gray) A. Gray ssp. *spiralis*
 (Jeps.) T.I. Chuang & Heckard (ASU, Joyal
 1678)
Collinsia parviflora Lindl. (ASU, Christy 1124-b)
Maurandella antirrhiniflora (Humb. & Bonpl. ex
 Willd.) Rothm. (ASU, Farruggia 1459)
Mimulus floribundus Lindl. (ASU, Christy 572)
Mimulus guttatus DC. (ASU, Farruggia 1854, 1967,
 2054 & 2073)

Penstemon barbatus (Cav.) Roth ssp. *barbatus*
 (ASU, Joyal 1699)
Penstemon linarioides A. Gray (ASU, Farruggia
 1550)
Penstemon pseudospectabilis M.E. Jones ssp.
connatifolius (A. Nelson) D.D. Keck (ASU,
 Little 4266)
Penstemon rostriflorus Kellogg (ASU, Little 4097)
Penstemon thurberi Torr (ASU, Pase 1032)
Schistophragma intermedia (A. Gray) Pennell
 (ARIZ, Hudson 3861)
Veronica peregrina L. var. *xalapensis* (Kunth)
 Pennell (ASU, Farruggia 2201)

Simmondsiaceae

Simmondsia chinensis (Link) Schneid. (ASU,
 Farruggia 1724, 1744, 1745 & 1865)

Solanaceae

Calibrachoa parviflora (Juss.) D'Arcy (ASU,
 Farruggia 1876)
Datura wrightii Regel (ASU, Farruggia 1528)
Lycium exsertum A. Gray (ASU, Farruggia 1761 &
 1798)
Lycium fremontii A. Gray (ASU, Farruggia 1742,
 2002 & 2136)
Nicotiana glauca Graham (ARIZ, Johnson s.n.)
Nicotiana obtusifolia M. Martens & Galeotti (ASU,
 Farruggia 1631, 1743, 1793, 2082 & 2128)
Physalis hederifolia A. Gray (ASU, Little 4059)
Physalis latiphysa Waterf. (ASU, Farruggia 1510)
Solanum douglasii Dunal (ASU, Johnson 19)
Solanum fendleri A. Gray ex Torr. (ASC, Bamberg
 & Fernandez 92.00)
Solanum stoloniferum Schltld. & Bouché (ASU,
 Johnson 28)
Solanum xanti A. Gray (ASU, Little 4285)

Sterculiaceae

Ayenia filiformis S. Watson (ASU, Farruggia 1477
 & 1699)

Tamaricaceae

Tamarix chinensis Lour. (ASU, Farruggia 1679)

Typhaceae

Typha latifolia L. (ASU, Farruggia 1662)

Ulmaceae

Celtis laevigata Willd. var. *reticulata* (Torr.) L.D.
 Benson (ASU, Farruggia 1682 & 2156)
Celtis pallida Torr. (ASU, Farruggia 1696, 1985,
 2095, 2101 & 2107)

Urticaceae

Parietaria hespera Hinton (ASU, Farruggia 1632 & 1850)

Urtica gracilentata Greene (ASU, Little 4043)

Valerianaceae

Plectritis ciliosa (Greene) Jepson (ASU, Farruggia 1989 & 2033)

Valeriana arizonica A. Gray (ASU, Little 4229)

Verbenaceae

Aloysia wrightii (A. Gray) A. Heller (ARIZ, Gould 3890)

Glandularia bipinnatifida (Nutt.) Nutt. (ASU, Farruggia 1462, 1535, 1610, 1996, 2001 & 2034)

Violaceae

Viola canadensis L. (ASU, Johnson 20)

Viola nuttallii Pursh (ASU, Farruggia 1943)

Viscaceae

Phoradendron californicum Nutt. (ASU, Farruggia 1645)

Phoradendron coryae Trel. (ASU, Farruggia 1545 & 1693)

Phoradendron juniperinum Engelm. ex Gray ssp. *juniperinum* (ASU, Lehto 5510)

Phoradendron serotinum ssp. *tomentosum* (DC.) Engelm. ex Gray (ARIZ, Gould & Hudson 3825)

Phoradendron villosum (Nutt.) Nutt. ssp. *coryae* (Trel.) Wiens (ASU, Little 4024)

Vitaceae

Parthenocissus quinquefolia (L.) Planch. (ASU, Little 4028)

Vitis arizonica Engelm. (ASU, Farruggia 1686)

Zygophyllaceae

Kallstroemia grandiflora Torr. ex A. Gray (ASU, Little 4088)

Kallstroemia parviflora J.B.S. Norton (ARIZ, Gould 3850)

Larrea tridentata (DC.) Coville (Present but not collected)

Tribulus terrestris L. (ASU, Farruggia 1508)

GYMNOSPERMS**Cupressaceae**

Cupressus arizonica Greene ssp. *arizonica* (ASU, Keil 3508)

Juniperus coahuilensis (Martinez) Gausson ex R.P. Adams (ASU, Farruggia 1707)

Juniperus deppeana Steud. (ASU, Little 4033)

Juniperus scopulorum Sarg. (ASU, Farruggia 1467 & 1598)

Pinaceae

Abies concolor (Gord. & Glend.) Lindl. ex Hildebr. var. *concolor* (ASU, Lehto 5600)

Pinus monophylla Torr. & Frém. var. *fallax* (Little) Silba (ASU, Farruggia 1600)

Pinus ponderosa P. & C. Lawson (ASU, Ganz s.n.)

Pseudotsuga menziesii (Mirb.) Franco var. *glauca* (Beissn.) Franco (ASU, Little 4091)

FERNS**Aspleniaceae**

Asplenium resiliens Kunze (ARIZ, Little 4189)

Dennstaedtiaceae

Pteridium aquilinum (L.) Kuhn (ARIZ, Little 4013)

Dryopteridaceae

Dryopteris arguta (Kaulf.) Watt. (ARIZ, Little 4221)

Phanerophlebia auriculata Underw. (ASU, Keil 3047)

Polystichum scopulinum (DC. Eaton) Maxon (ASC, Windham 108-B)

Woodsia neomexicana Windham (ARIZ, Little 4042)

Pteridaceae

Adiantum capillus-veneris L. (ASU, Little 4310)

Adiantum pedatum L. (ASU, Farruggia 2114)

Astrolepis cochisensis (Goodding) Benham & Windham ssp. *cochisensis* (ASU, Little 4296)

Astrolepis integerrima (Hook.) Benham & Windham (ARIZ, Little 4213)

Astrolepis windhamii Benham (ASU, Farruggia 1647)

Bommeria hispida (Mett. ex Kuhn) Underwood (ASU, Farruggia 1556)

Cheilanthes bonariensis (Willd.) Proctor (ARIZ, Little 4220)

Cheilanthes covillei Maxon (ASU, Little 4292)

Cheilanthes eatonii Baker (ASU, Little 4297)

Cheilanthes feei T. Moore (ASU, Little 4291)

Cheilanthes fendleri Hook. (ASU, Little 4041)

Cheilanthes lindheimeri Hook. (ASU, Reeves 7131)

Cheilanthes wootonii Maxon (ASU, Farruggia 1580 & 1939)

Cheilanthes wrightii Hook. (ASU, Farruggia 1489, 1505, 1618 & 1622)

Notholaena californica D.C. Eaton (ASU, Farruggia 1670)

Notholaena standleyi Maxon (ARIZ, Little 4198)

Pellaea atropurpurea (L.) Link (ASU, Farruggia 1567 & 1576)

Pellaea intermedia Mett. ex Kuhn (ARIZ, Little 4212)

Pellaea truncata Goodding (ASU, Farruggia 1479, 1577, 1599 & 1935)

Pellaea wrightiana Hook. (ASU, Keil 3396)

Pentagramma triangularis (Kaulf.) Yatsk., Windham & E. Wollenw. ssp. *triangularis* (ASU, Farruggia 1465)

HORSETAILS

Equisetaceae

Equisetum arvense L. (ASU, Oxford 145)

Equisetum hyemale L. (ASU, Farruggia 1637)

CLUB-MOSSES

Selaginellaceae

Selaginella arizonica Maxon (ASU, Little 4196)