VASCULAR PLANT CHECKLIST OF COAL MINE CANYON, SANTA CRUZ COUNTY, ARIZONA

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ABSTRACT: A checklist of vascular plants is provided for Coal Mine Canyon and lower Ash Canyon in central Santa Cruz County, Arizona. The documented flora includes 584 species (plus 5 additional infraspecific taxa) in 360 genera and 93 families. The largest families are Asteraceae, Poaceae, and Fabaceae; the largest genera are *Muhlenbergia*, *Euphorbia*, *Cyperus*, *Bouteloua*, and *Dalea*. Non-native plants number 28, of which 18 are grasses. *Heliotropium hartwegianum* (Heliotropiaceae) is a new record for the United States.

STUDY AREA

The study area comprises 1,743 hectares (17.43 sq km; 4,307 acres) in the Grosvenor Hills in central Santa Cruz County, Arizona (Figure 1). The property was purchased by Arizona Game and Fish Department (AZGFD) between 2004 and 2006 (Trust for Public Land 2006). It is managed by Arizona State Parks for threatened and endangered species habitat, as well as recreation, as part of Sonoita Creek State Natural Area (SCSNA). The approximate center of the Coal Mine Canyon property lies at 31.54, -110.89, about 23.5 km (14.6 mi) north of the U.S.–Mexico border. It is bordered to the west, north, and east by Salero Ranch; its southern boundary meets SCSNA on the west and private land on the east. Patagonia Lake State Park is located 2.5 km (1.6 mi) to the south-southeast.

The landscape is heavily dissected, with rocky ridges and hills and numerous drainages. Coal Mine Canyon originates in the Grosvenor Hills and bends in a broad arc east, south, and southwestward before entering SCSNA, where it joins with Fresno Canyon and flows south to Sonoita Creek. Ash Canyon originates in the southern Santa Rita Mountains and runs down the east side of the study area, eventually emptying into Patagonia Lake, a dammed reservoir along Sonoita Creek. There are three named perennial springs—Coal Mine Spring along Coal Mine Canyon and George Wise and Mata Siete springs along Ash Canyon—and several unnamed and unmapped springs. Two cement-dammed ponds and a few dirt-dammed ponds were formerly used for cattle. Vehicular access is limited to two unmaintained roads entering from private land on Salero Ranch.

Elevations range from 1,200 m (3,940 ft) to 1,666 m (5,466 ft), a difference of 466 m (1,529 ft). The lowest elevations occur in Ash and Coal Mine canyons where they drain southward out of the study area.

Vascular Plant Checklist of Coal Mine Canyon, Santa Cruz County, Arizona. Canotia 19: 39–64. 2023.

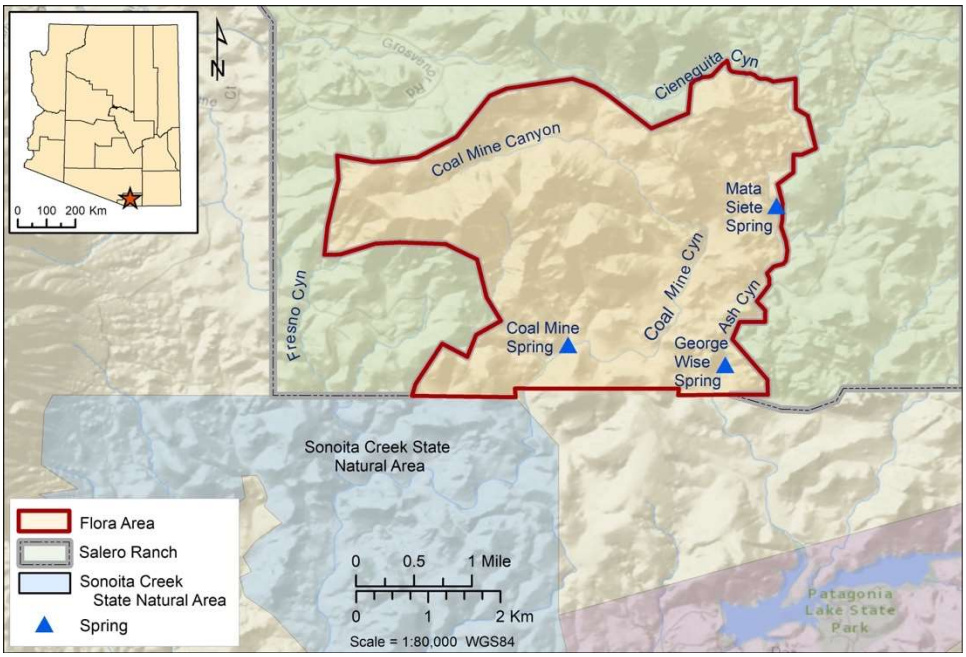

Figure 1. Study area showing major canyons and springs. Map by Sue Rutman.

GEOLOGY

The geology of the Coal Mine Canyon property is volcanic in origin, composed primarily of rhyolite and rhyodacite, along with tuff, breccia, conglomerate, agglomerate, and pyroclastic sandstone (Drewes 1968, 1972a). Squaw Gulch Granite, dating to 145–160 million years ago, underlies the area. The Salero Formation (late Cretaceous, 72 million years ago) consists of tuffaceous sandstone, conglomerate and tuffaceous breccia; it overlies Squaw Gulch Granite and can be seen in the northeast part of the study area near Cieneguita Canyon (Drewes 1968).

Most of the visible rocks on the Coal Mine Canyon property are part of the Grosvenor Hills Volcanics, formed in the Oligocene (about 25 million years ago) when a large volcano erupted west of the Coal Mine area near the present-day San Cayetano Mountains (Drewes 1972a). These volcanics include layers of rhyolite tuff and tuff breccia, on top of which lie ridges of rhyodacite agglomerates and tuff (Drewes 1972a). The Grosvenor Hills, which dominate the study area, are notable for a series of laccoliths, erosion-resistant lenses of rhyodacite vitrophyre that intruded into the volcanic layers from below; the southernmost of these laccoliths lies near George Wise Spring in the southeast corner of the study area (Drewes 1972b).

The study area is part of a large block or graben that was displaced downward 450–750 m relative to the San Cayetano Mountains. In addition, a single graben about 1 km wide runs across the middle of the Coal Mine property; it is bordered to the north by the Sheuy Fault and to the south by the George Wise Fault (Drewes 1972b). Many small, north-south faults occur near Coal Mine Spring in the southwest part of the property (Drewes 1972a). These faults and associated fracturing likely contributed to the presence of numerous natural springs.

Figure 2. Satellite imagery of Coal Mine Spring along Coal Mine Canyon; image date 29 Jul 2021.

Figure 3. Satellite imagery of George Wise Spring along Ash Canyon; image date 29 Jul 2021.

CLIMATE

The study area has a semiarid climate with bimodal (winter–spring and summer–fall) precipitation. Long-term climate data from a station in Rio Rico, six miles southwest of the study area, show an average annual rainfall of 409 mm (16.1 in) between 1991 and 2020 (https://www.ncei.noaa.gov/access/us-climate-normals/). Sixty percent of this precipitation occurred in monsoonal thunderstorms during July, August, and September. Winter precipitation usually derives from Pacific frontal systems and is less reliable but more widespread. The driest months are April and May. The 30-year average maximum temperature for June, July, and August is 34.7ºC (94.4ºF); the average minimum temperature for December, January, and February is -1.7ºC (28.9ºF).

HISTORY AND LAND USE

Coal Mine Canyon and surrounding lands have been inhabited for several millennia. Prehistoric artifacts and occupation sites from the Late Archaic (2000 BC) and Hohokam (1–1400 AD) periods were documented at Coal Mine and George Wise springs (Moss 2010, Moss et al. 2010). By the sixteenth century, the Santa Cruz River Valley was inhabited by the O'odham (Sheridan 2004). In the late seventeenth century, Jesuit missionaries arrived in the area, bringing with them cattle and other livestock.

In 1860, the U.S. Congress established Baca Float No. 3 (one of five 100,000-acre land grants to a New Mexico sheep ranching family) between the Santa Cruz River Valley and the southern Santa Rita Mountains. The northeast corner of the float, including the Grosvenor Hills and Ash and Coal Mine canyons, would become the Salero Ranch (Sheridan 2004, Carnahan 2020). Between 2004 and 2006, the 1,734-hectare Coal Mine Canyon property was purchased by Arizona Game and Fish Department with the goal of preserving native grassland and aquatic habitat for threatened and endangered species such as the Gila topminnow (*Poeciliopsis occidentalis* [S.F. Baird & Girard, 1853]). See Trust for Public Land (2006) for details about the acquisition.

As part of the Salero Ranch, the Coal Mine Canyon property was grazed seasonally by cattle. After the purchase by AZGFD, perimeter fencing was installed, but trespass cattle began entering via breaks in the fence, especially along the southern boundary. Rigid pipe fencing was erected to protect George Wise and Coal Mine springs from cattle, but the unpermitted grazing continued elsewhere until AZGFD and the Arizona Attorney General's office intervened in 2021. By summer 2022, several hundred trespass cattle had been removed from the study area.

I found no record of herbarium specimens from the Coal Mine Canyon property prior to this study. The nearest collections are represented in floras of Sonoita Creek State Natural Area (McLaughlin 2006) and Salero Ranch (Carnahan 2020).

VEGETATION

The dominant vegetative community is scrub or semi-desert grassland, which is characterized by perennial grasses, herbaceous plants, stem succulents, and woody shrubs and trees. Common grasses include cane beardgrass (*Bothriochloa barbinodis*), grama grasses (*Bouteloua* species), Lehmann lovegrass (*Eragrostis lehmanniana*), and muhly grasses (*Muhlenbergia* species). Characteristic shrubs are desert hackberry (*Celtis pallida*), kidneywood (*Eysenhardtia orthocarpa*), ocotillo (*Fouquieria splendens*), catclaw and velvetpod mimosas (*Mimosa aculeaticarpa* and *M. dysocarpa*), and graythorn

(*Sarcomphalus obtusifolius*). Velvet mesquite (*Prosopis velutina*) occurs throughout the study area. Emoryi oak (*Quercus emoryi*) and Arizona juniper (*Juniperus arizonicus*) are occasional in the grassland; Mexican blue oak (*Quercus oblongifolia*) is found on north-facing slopes, where the grassland gives way to pockets of oak woodland. Canyons, perennial springs, and cattle ponds support riparian species such as seep willow (*Baccharis salicifolia*), velvet ash (*Fraxinus velutina*), deergrass (*Muhlenbergia rigens*), Fremont cottonwood (*Populus fremontii*), and Goodding willow (*Salix gooddingii*).

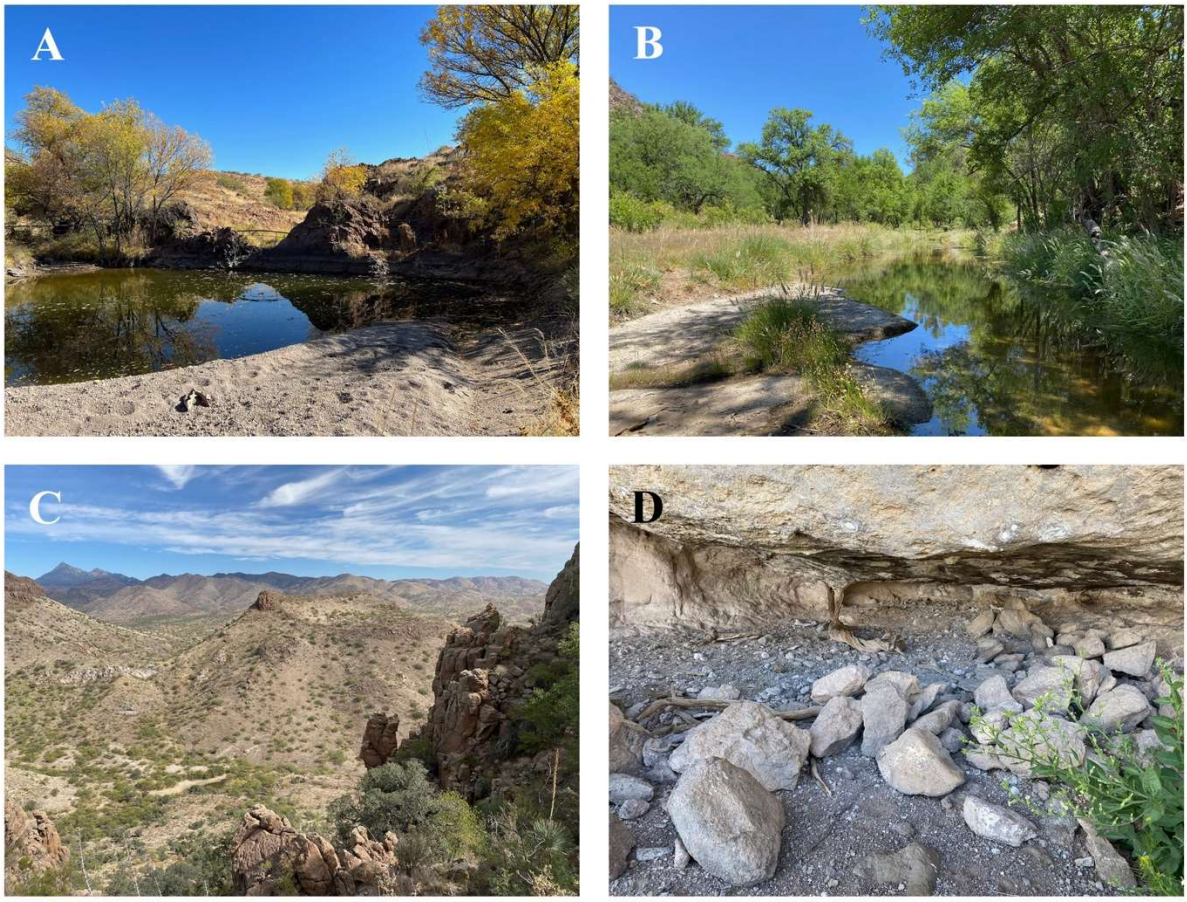

Figure 4. (A) Coal Mine Spring, 18 Nov 2021; (B) George Wise Spring, 27 May 2020; (C) Grosvenor Hills between Cieneguita and Coal Mine canyons, 15 Oct 2020; (D) Rock overhang shelter near unmapped spring in Grosvenor Hills; the blackened ceiling suggests prehistoric use, but this remote site was probably not surveyed by Moss et al. (2010); 1 Apr 2020.

Figure 5. (A) *Asclepias linaria* (Apocynaceae), 20 Apr 2022; (B) *Mammillaria macdougalii* (Cactaceae), 5 Apr 2020; (C) *Tephrosia leiocarpa* (Fabaceae), 20 Aug 2021; (D) *Heteranthera limosa* (Pontederiaceae), 31 Aug 2021.

FLORISTICS

The vascular flora of the study area comprises 584 species (plus 5 additional infraspecific taxa) in 360 genera and 93 families. There are 20 pteridophytes, 2 gymnosperms, 1 magnoliid, 433 eudicots, and 128 monocots. The largest families are Asteraceae (96 taxa at or below species level), Poaceae (86), Fabaceae (54), Euphorbiaceae (20), and Pteridaceae (17). The most species-rich genera are *Muhlenbergia* (14 species), *Euphorbia* (13), *Cyperus* (12), *Bouteloua* (11), and *Dalea* (8). Non-natives number 28 (5% of the total flora); 18 of these are grasses.

COMPARISON WITH NEARBY FLORAS

Table 1 compares the taxa counts, study area size and elevation, vegetative communities, and survey effort for the floras of Coal Mine Canyon, Salero Ranch (Carnahan 2020), and Sonoita Creek State Natural Area (SCSNA; McLaughlin 2006). The Coal Mine Canyon property is surrounded on three sides by Salero Ranch, so the two floras have much in common botanically. The higher taxa count of Salero Ranch is likely due to the larger study area, greater elevation range (reaching into oak-pinyon woodland), and collecting effort. At least fifty species found on Salero and not on Coal Mine occur primarily in oak woodland or higher; examples are *Pinus discolor* (Pinaceae), *Verbesina longifolia*

(Asteraceae), and *Arctostaphylos pungens* (Ericaceae). Salero also had a higher percentage of non-native plants, probably because of its long history of human use, including custom home development since 1998 (Carnahan 2020).

Flora	*Total taxa**	*Non-native %*	*Study area size (ha)*	*Elevation range (m)*	*Vegetative community*	*Effort (yrs)*	*Effort (trips)*	*Public/ private*
Salero Ranch[1]	796**	9.8**	6541	784	Grassland to oak-pinyon woodland	6.5	360+	private
Coal Mine Canyon	**589**	**4.8**	**1743**	**466**	**Grassland**	**3**	**72**	**public**
Sonoita Creek State Natural Area[2]	561	6.4	1990	230	Grassland	1.4	34	public

Table 1. Comparison of the floras of Coal Mine Canyon, Salero Ranch, and Sonoita Creek State Natural Area.
[1]Carnahan 2020; [2]McLaughlin 2006.
*species plus additional infraspecific taxa
**updated (since publication) with the addition of 6 native and 2 non-native species

Coal Mine shares many species with SCSNA, which borders it to the southwest. The two floras are similar in total number of taxa, study area size, and vegetative communities; they differ in elevation range and collecting effort.

Six species found on the Coal Mine Canyon property were not documented on either Salero Ranch or SCSNA: *Myriopteris yavapensis* (Pteridaceae), *Euphorbia stictospora* (Euphorbiaceae), *Anagallis minima* (Primulaceae), *Lemna minuta* (Araceae), *Eleocharis parishii* (Cyperaceae), and *Paspalum setaceum* (Poaceae). In contrast, five species that occurred on both Salero Ranch and SCSNA were not found for Coal Mine: *Echinocereus fendleri* (Cactaceae), *Croton pottsii* (Euphorbiaceae), *Senna bauhinioides* (Fabaceae), *Lythrum californicum* (Lythraceae), and *Sorghum halepense* (Poaceae). Floras are always incomplete; many of these species might eventually be documented in all three study areas.

RARE AND INTERESTING PLANTS

Heliotropium hartwegianum [*Tournefortia hartwegiana*] (Heliotropiaceae) is a new record for the United States (Figure 6). This shrub-sized herbaceous perennial is otherwise endemic to Mexico. Approximately 200 plants were found on rocky, grassland slopes in the southwest part of the study area and on adjacent Salero Ranch. Several hundred more were found in nearby Fresno Canyon in SCSNA (*Carnahan 5065*, SEINet). Flowering was observed from December to February, but many of the plants had frost-killed leaves and inflorescences. These populations may be a relatively recent arrival, as McLaughlin (2006) did not report them for SCSNA. See Halse and Feuillet (2022) for nomenclature.

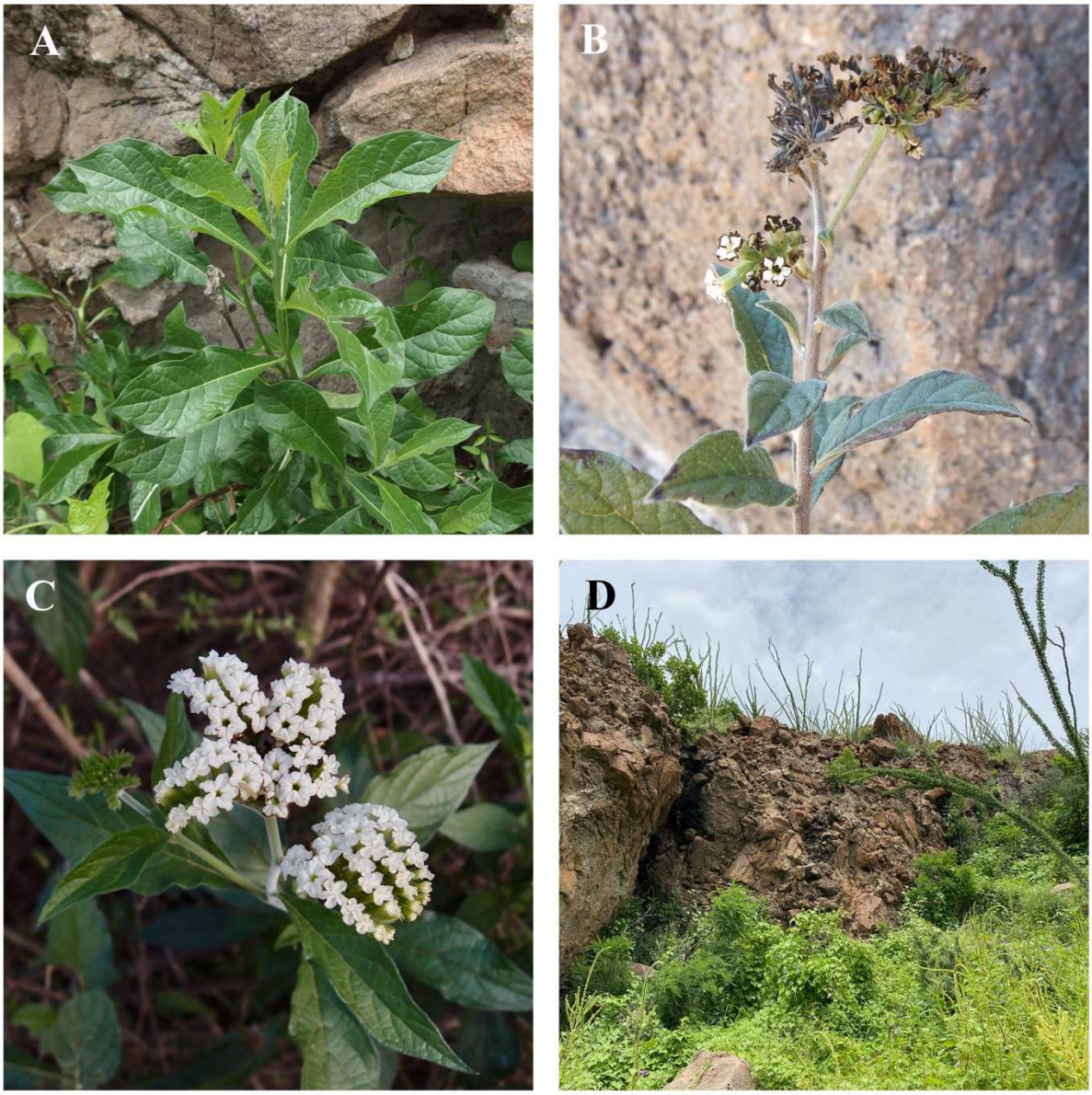

Figure 6. *Heliotropium hartwegianum* (Heliotropiaceae): (A) Vegetative growth, 17 August 2021; (B) Frost-nipped flowering stem, 17 February 2022; (C) Flowering in Álamos, Sonora, 18 Dec 2015; (D) Habitat in study area, 17 Aug 2021.

New localities were also found for regionally rare or uncommon species: *Matelea tristiflora* (Apocynaceae), *Phacelia sonoitensis* (Hydrophyllaceae), *Rotala ramosior* (Lythraceae), *Sida glabra* (Malvaceae), *Phyllanthus polygonoides* (Phyllanthaceae), *Houstonia prostrata* (Rubiaceae), and *Muhlenbergia palmeri* (Poaceae). See Figure 7.

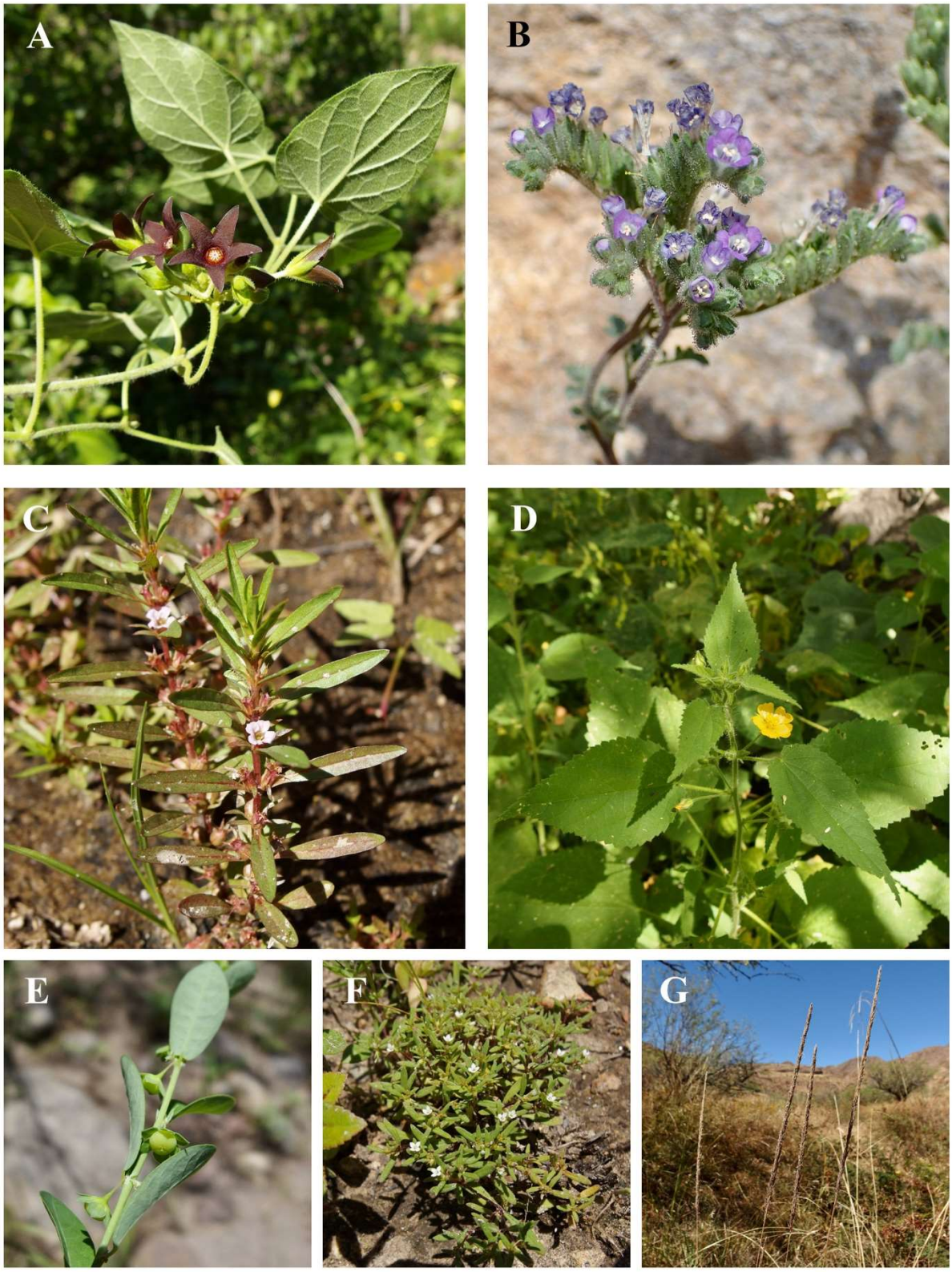

Figure 7. (A) *Matelea tristiflora* (Apocynaceae); (B) *Phacelia sonoitensis* (Hydrophyllaceae); (C) *Rotala ramosior* (Lythraceae); (D) *Sida glabra* (Malvaceae); (E) *Phyllanthus polygonoides* (Phyllanthaceae); (F) *Houstonia prostrata* (Rubiaceae); (G) *Muhlenbergia palmeri* (Poaceae).

METHODS

Most fieldwork took place between fall 2019 and fall 2022, under permits from Arizona Game and Fish Department and Arizona State Parks. I visited the property 72 times and made more than 700 collections. Specimens were deposited in the University of Arizona Herbarium (ARIZ), with duplicates when available sent to regional herbaria in Arizona and Sonora, Mexico, including ASC, ASU, DES, and USON (Thiers 2023). A duplicate of *Heliotropium hartwegianum* (*Carnahan 5067*) was sent to Oregon State University Herbarium (OSC) for verification by Richard Halse. Two cactus species, *Echinocereus santaritensis* and *Mammillaria grahamii*, were documented with image vouchers on the SEINet Portal Network (SEINet 2023); all collection records and many photographs can be viewed on SEINet. Two additional species were observed but not found in collectible condition during the study period: *Asclepias elata* (Apocynaceae) and *Rumex* cf. *hymenosepalus* (Polygonaceae); they are excluded from the checklist and taxa counts.

Identifications were supported by information from SEINet (2023), Vascular Plants of Arizona (Vascular Plants of Arizona Editorial Committee 1992+), Flora of North America (Flora of North America Editorial Committee 1993+), and *Flora Neomexicana III* (Allred et al. 2020). Native status was obtained from The PLANTS Database of the U.S. Department of Agriculture (https://plants.usda.gov/home), with adjustments for Mexican species such *Macroptilium gibbosifolium* (Fabaceae) that are considered native to Arizona by regional botanists.

VASCULAR PLANT CHECKLIST

The following checklist includes selected synonyms. Non-native species are marked with an asterisk (*). Italicized numerals following each taxon name are Carnahan collection numbers.

PTERIDOPHYTES

MARSILEACEAE

Marsilea mollis B. L. Rob. & Fernald. *4216*

PTERIDACEAE

Argyrochosma incana (C. Presl) Windham. *4010*
Argyrochosma limitanea (Maxon) Windham subsp. *limitanea*. *4981*
Astrolepis cochisensis (Goodd.) D. M. Benham & Windham. *4415*
Astrolepis integerrima (Hook.) D. M. Benham & Windham. *4826*
Astrolepis sinuata (Lag. ex Sw.) D. M. Benham & Windham subsp. *sinuata. 4310*
Bommeria hispida (Mett. ex Kuhn) Underw. *4208*
Myriopteris fendleri E. Fourn. *4581*
Myriopteris lindheimeri J. Sm. *4084*
Myriopteris rufa Fée. *4064*
Myriopteris wootonii (Maxon) Grusz & Windham. *4207*
Myriopteris wrightii (Hook.) Grusz & Windham. *3956*
Myriopteris yavapensis (T. Reeves ex Windham) Grusz & Windham. *4545*
Notholaena grayi Davenp. *4103*
Notholaena standleyi Maxon. *4097*
Pellaea intermedia Mett. ex Kuhn. *4544*
Pellaea truncata Goodd. *3957*
Pellaea wrightiana Hook. *4011*

SELAGINELLACEAE
Selaginella rupincola Underw. *4062*

WOODSIACEAE
Woodsia cochisensis Windham. *4180, 4940*

GYMNOSPERMS
CUPRESSACEAE
Juniperus arizonica (R. P. Adams) R. P. Adams. *4658, 5071*
Juniperus deppeana Steud. *4344*

MAGNOLIIDS
ARISTOLOCHIACEAE
Aristolochia watsonii Wooton & Standl. *4600*

EUDICOTS
ACANTHACEAE
Anisacanthus thurberi (Torr.) A. Gray. *4190, 5101*
Carlowrightia arizonica A. Gray. *5112*
Elytraria imbricata (Vahl) Pers. *4184*
Tetramerium nervosum Nees. *4271*

ADOXACEAE (*Sambucus*), see **VIBURNACEAE**

AIZOACEAE
Trianthema portulacastrum L. *4784*

AMARANTHACEAE
Amaranthus palmeri S. Watson. *4371*
Amaranthus torreyi (A. Gray) Benth. ex S. Watson. *3965*
Atriplex canescens (Pursh) Nutt. *4843, 4860*
Atriplex elegans (Moq.) D. Dietr. *4804*
Chenopodium arizonicum Standl. *3955*
Froelichia arizonica Thornber ex Standl. *4627*
Gomphrena caespitosa Torr. *4182*
Gomphrena nitida Rothr. *4450*
Gomphrena sonorae Torr. *4395*
Guilleminea densa (Willd. ex Roem. & Schult.) Moq. *4338*
Iresine heterophylla Standl. *3952*
**Salsola tragus* L. *4535*

ANACARDIACEAE
Rhus aromatica Aiton var. *trilobata* (Nutt.) A. Gray. *4243*
Rhus virens Lindh. ex A. Gray var. *choriophylla* (Wooton & Standl.) L. D. Benson. *4549*
Toxicodendron radicans (L.) Kuntze. *4244*

APIACEAE
Bowlesia incana Ruiz & Pav. *4052*
Daucus pusillus Michx. *4099, 5359*
Lomatium nevadense (S. Watson) J. M. Coult. & Rose var. *parishii* (J. M. Coult. & Rose) Jeps. *4065*
Spermolepis lateriflora G. L. Nesom. *4108, 5354*
Yabea microcarpa (Hook. & Arn.) Koso-Pol. *4075, 5355*

APOCYNACEAE
Apocynum cannabinum L. *4241*
Asclepias asperula (Decne.) Woodson. *4119*

Asclepias linaria Cav. *4125*
Asclepias nummularia Torr. *4341*
Asclepias nyctaginifolia A. Gray. *4803*
Funastrum crispum (Benth.) Schltr. *4830, 5189*
Funastrum heterophyllum (Engelm. ex Torr.) Standl. *5104*
Gonolobus arizonicus (A. Gray) Woodson. *4123*
Haplophyton cimicidum A. DC. *4302*
Mandevilla brachysiphon (Torr.) Pichon. *4418*
Matelea tristiflora (Standl.) Woodson. *4798*

ARALIACEAE
Aralia humilis Cav. *4601*

ASTERACEAE
Acourtia nana (A. Gray) Reveal & R. M. King. *5113*
Acourtia thurberi (A. Gray) Reveal & R. M. King. *4291*
Adenophyllum porophyllum (Cav.) Hemsl. *4567*
Aldama cordifolia (A. Gray) E. E. Schill. & Panero. *4603, 4642*
Ambrosia confertiflora DC. *4589*
Ambrosia monogyra (Torr. & A. Gray) Strother & B. G. Baldwin. *4383*
Artemisia dracunculus L. *4980*
Artemisia ludoviciana Nutt. subsp. *ludoviciana*. *4628*
Artemisia ludoviciana subsp. *mexicana* (Willd. ex Spreng.) D. D. Keck. *3945*
Baccharis pteronioides DC. *4282*
Baccharis salicifolia (Ruiz & Pav.) Pers. *3941*
Baccharis sarothroides A. Gray. *3942*
Baccharis thesioides Kunth. *3943, 5016*
Bahia absinthifolia Benth. *4213*
Baileya multiradiata Harv. & A. Gray. *4232, 4889*
Barkleyanthus salicifolius (Kunth) H. Rob. & Brettell. *4090*
Bebbia juncea (Benth.) Greene var. *aspera* Greene. *4898*
Bidens aurea (Aiton) Sherff. *4629*
Bidens leptocephala Sherff. *4499*
Brickellia amplexicaulis B. L. Rob. *4622*
Brickellia baccharidea A. Gray. *4654*
Brickellia californica (Torr. & A. Gray) A. Gray. *4602*
Brickellia coulteri A. Gray var. *brachiata* (A. Gray) B. L. Turner. *3947*
Brickellia floribunda A. Gray. *4625*
Brickellia venosa (Wooton & Standl.) B. L. Rob. *4505, 4969*
Calycoseris wrightii A. Gray. *4049*
Carminatia tenuiflora DC. *4573*
Carphochaete bigelovii A. Gray. *5070*
Chaetopappa ericoides (Torr.) G. L. Nesom. *4155*
Cirsium neomexicanum A. Gray. *4177*
Coreocarpus arizonicus (A. Gray) Blake. *4643*
Diaperia verna (Raf.) Morefield. *4114*
Encelia farinosa A. Gray ex Torr. *4096*
Ericameria laricifolia (A. Gray) Shinners. *3940*
Erigeron arisolius G. L. Nesom. *4820*
Erigeron canadensis L. [*Conyza canadensis* (L.) Cronquist]. *4402*
Erigeron divergens Torr. & A. Gray. *4138*
Erigeron incomptus A. Gray. *3970*
Erigeron neomexicanus A. Gray. *4512*
Erigeron sceptrifer G. L. Nesom. *4364*
Erigeron tracyi Greene. *4214*
Eriophyllum lanosum (A. Gray) A. Gray. *4201*

Fleischmannia sonorae (A. Gray) King & H. E. Rob. *4978*
Gaillardia pinnatifida Torr. *4839*
Gamochaeta stagnalis (I. M. Johnst.) Anderb. *4143, 5092*
Guardiola platyphylla A. Gray. *4267*
Gutierrezia microcephala (DC.) A. Gray. *4528*
Helenium thurberi A. Gray. *4261, 5114*
Heliomeris longifolia (B. L. Rob. & Greenm.) Cockerell var. *annua* (M. E. Jones) Yates. *3944*
Heliomeris multiflora Nutt. *5019*
Heterosperma pinnatum Cav. *4579*
Heterotheca subaxillaris (Lam.) Britton & Rusby subsp. *latifolia* (Buckley) Semple. *4531*
Hymenothrix wislizeni A. Gray. *4905*
Hymenothrix wrightii A. Gray. *3963*
Isocoma tenuisecta Greene. *4537*
**Lactuca serriola* L. *4314*
Laennecia coulteri (A. Gray) G. L. Nesom. *4488*
Laennecia sophiifolia (Kunth) G. L. Nesom. *4487*
Lasianthaea podocephala (A. Gray) K. M. Becker. *4520*
Logfia filaginoides (Hook. & Arn.) Morefield. *4112*
Machaeranthera tagetina Greene. *4426*
Malacothrix fendleri A. Gray. *4130*
Malacothrix stebbinsii W. S. Davis & P. H. Raven. *4141*
Melampodium longicorne A. Gray. *4496*
Melampodium strigosum Stuessy. *4523*
Parthenice mollis A. Gray. *4399*
Pectis cylindrica (Fernald) Rydb. *4827*
Pectis filipes Harvey & A. Gray var. *subnuda* Fernald. *4494*
Pectis longipes A. Gray. *4134*
Pectis prostrata Cav. *4404*
Porophyllum ruderale (Jacq.) Cass. var. *macrocephalum* (DC.) Cronquist. *4413*
Pseudognaphalium canescens (DC.) Anderb. *4534*
Pseudognaphalium leucocephalum (A. Gray) Anderb. *4518*
**Pseudognaphalium luteoalbum* (L.) Hilliard & B. L. Burtt. *4210*
Pseudognaphalium stramineum (Kunth) W. A. Weber. *4148*
Rafinesquia californica Nutt. *4235*
Rafinesquia neomexicana A. Gray. *4116*
Sanvitalia abertii A. Gray. *4541*
Schkuhria pinnata (Lam.) Kuntze ex Thell. *4498*
Senecio flaccidus Less. var. *flaccidus. 4283*
Solidago velutina DC. *4656*
**Sonchus asper* (L.) Hill. *4150*
**Sonchus oleraceus* L. *4193*
Stephanomeria pauciflora (Torr.) A. Nelson. *4538*
Stylocline micropoides A. Gray. *4196*
Symphyotrichum subulatum (Michx.) G. L. Nesom var. *parviflorum* (Nees) S.D. Sundb. *4386*
Thelesperma megapotamicum (Spreng.) Kuntze. *4416*
Thymophylla concinna (A. Gray) Strother. *4200*
Thymophylla pentachaeta (DC.) Small var. *belenidium* (DC.) Strother. *4939*
Tithonia thurberi A. Gray. *4526*
Trixis californica Kellogg. *4258*
Uropappus lindleyi (DC.) Nutt. *4139*
Viguiera dentata (Cav.) Spreng. var. *lancifolia* S. F. Blake. *3954*
Xanthisma gracile (Nutt.) D. R. Morgan & R. L. Hartm. *4519*
Xanthium strumarium L. *4373*
Zinnia acerosa (DC.) A. Gray. *4744*

BIGNONIACEAE

Chilopsis linearis (Cav.) Sweet subsp. *arcuata* (Fosberg) Henrickson. *4259*
Tecoma stans (L.) Juss. ex Kunth var. *angustata* Rehder. *4458, 5191*

BORAGINACEAE (see also HELIOTROPIACEAE, HYDROPHYLLACEAE, and NAMACEAE)
Cryptantha barbigera (A. Gray) Greene. *4082*
Cryptantha pterocarya (Torr.) Greene. *4106*
Eremocarya micrantha (Torr.) Greene. *4085, 5116*
Johnstonella pusilla (Torr. & A. Gray) Hasenstab & M.G. Simpson. *4199*
Pectocarya heterocarpa (I. M. Johnst.) I. M. Johnst. *4158*
Pectocarya recurvata I. M. Johnst. *4109*
Plagiobothrys arizonicus (A. Gray) Greene ex A. Gray. *4136*

BRASSICACEAE
Boechera perennans (S. Watson) W. A. Weber. *4053*
Descurainia pinnata (Walter) Britton. *4046, 5099, 5356*
Dryopetalon runcinatum A. Gray. *4073*
Hesperidanthus linearifolius (A. Gray) Rydb. *3959*
Lepidium oblongum Small. *4070, 5360*
Lepidium virginicum L. *4071, 4844, 5001*
**Nasturtium officinale* Aiton. *5069*
Pennellia micrantha (A. Gray) Nieuwl. *4550*
**Sisymbrium irio* L. *4047*
Streptanthus carinatus C. Wright ex A. Gray subsp. *arizonicus* (S. Watson) Kruckeb., Rodman & Worth. *4098*
Thysanocarpus curvipes Hook. *4013*

CACTACEAE
Carnegiea gigantea (Engelm.) Britton & Rose. *4317*
Coryphantha vivipara (Nutt.) Britton & Rose var. *bisbeeana* (Orcutt) L. D. Benson. *4319*
Cylindropuntia spinosior (Engelm.) Knuth. *4293*
Echinocereus rigidissimus (Engelm.) Engelm. ex Haage. *4320*
Echinocereus santaritensis W. Blum & Rutow. *5077* (SEINet), *5086* (SEINet)
Ferocactus wislizeni (Engelm.) Britton & Rose. *4367, 5064*
Mammillaria grahamii Engelm. *5075* (SEINet)
Mammillaria macdougalii Rose. *4159*
Mammillaria wrightii Engelm. var. *wilcoxii* (Toumey ex K. Schum.) W. T. Marshall. *4747*
Opuntia engelmannii Salm-Dyck ex Engelm. var. *engelmannii*. *4316*
Opuntia laevis J. M. Coult. *4312*
Opuntia santa-rita (Griffiths & Hare) Rose. *4290, 4292*

CAMPANULACEAE
Triodanis biflora (Ruiz & Pav.) Greene. *4202*
Triodanis holzingeri McVaugh. *4246*

CANNABACEAE
Celtis pallida Torr. *3979*
Celtis reticulata Torr. *3980*

CARYOPHYLLACEAE
Cerastium texanum Britton. *4063*
Drymaria molluginea (Ser.) Didr. *4813*
Silene antirrhina L. *4078, 5352*

CLEOMACEAE
Polanisia dodecandra (L.) DC. subsp. *trachysperma* (Torr. & A. Gray) Iltis. *5188*

COCHLOSPERMACEAE

Amoreuxia palmatifida DC. *4396*

CONVOLVULACEAE
Convolvulus equitans Benth. *4340*
Cuscuta erosa Yunck. *4834, 4970*
Evolvulus alsinoides (L.) L. *4459*
Evolvulus arizonicus A. Gray. *4318, 5176*
Evolvulus sericeus Sw. *4321*
Ipomoea barbatisepala A. Gray. *4375*
Ipomoea capillacea (Kunth) G. Don. *4508*
Ipomoea costellata Torr. *4414*
Ipomoea cristulata Hallier f. *4525*
Ipomoea hederacea Jacq. *4578*
Ipomoea ternifolia Cav. var. *leptotoma* (Torr.) J. A. McDonald. *4840*
Ipomoea thurberi A. Gray. *4836*

CUCURBITACEAE
Apodanthera undulata A. Gray. *4465*
Cucurbita digitata A. Gray. *4821*
Echinopepon wrightii (A. Gray) S. Watson. *4464*
Sicyosperma gracile A. Gray. *4522*

EUPHORBIACEAE
Acalypha neomexicana Müll. Arg. *3966*
Acalypha ostryifolia Riddell ex J. M. Coult. *4783, 4824*
Cnidoscolus angustidens Torr. *4309*
Euphorbia albomarginata Torr. & A. Gray. *4203*
Euphorbia arizonica Engelm. *4105, 4424*
Euphorbia capitellata Engelm. *4897*
Euphorbia exstipulata Engelm. *4809*
Euphorbia heterophylla L. *4447, 4564*
Euphorbia hirta L. *3951*
Euphorbia hyssopifolia L. *3953*
Euphorbia indivisa (Engelm.) Tidestr. *4403*
Euphorbia pediculifera Engelm. var. *pediculifera*. *4247*
Euphorbia revoluta Engelm. *4509, 4825*
Euphorbia serpillifolia Pers. *4943*
Euphorbia setiloba Engelm. *4873*
Euphorbia stictospora Engelm. *4808*
Jatropha macrorhiza Benth. *4332*
Manihot angustiloba (Torr.) Müll. Arg. *4427, 4805*
Tragia laciniata (Torrey) Müll. Arg. *4644*
Tragia nepetifolia Cav. *4189, 4586*

FABACEAE
Acaciella angustissima (Mill.) Britton & Rose. *4306*
Acmispon brachycarpus (Benth.) D. D. Sokoloff. *4132, 5106*
Acmispon greenei (Wooton & Standl.) Brouillet. *4135, 5081*
Acmispon oroboides (Kunth) Brouillet. *4206*
Amorpha fruticosa L. *4374*
Astragalus arizonicus A. Gray. *4197*
Astragalus nothoxys A. Gray. *4074*
Astragalus nuttallianus DC. *4079*
Calliandra eriophylla Benth. *4118*
Calliandra humilis Benth. var. *humilis*. *4582*
Calliandra humilis var. *reticulata* (A. Gray) L. D. Benson. *4517*

Chamaecrista nictitans (L.) Moench var. *leptadenia* (Greenm.) Gandhi & S. L. Hatch. *3958, 4975*
Cologania angustifolia Kunth. *5017*
Coursetia caribaea (Jacq.) Lavin var. *sericea* (A. Gray) Lavin. *4268*
Crotalaria pumila Ortega. *4527*
Dalea albiflora A. Gray. *4645*
Dalea formosa Torr. *4144, 4195*
Dalea grayi (Vail) L. L. Williams. *4315*
Dalea nana Torr. ex A. Gray. *4152, 4937, 4971*
Dalea pogonathera A. Gray. *4151*
Dalea pulchra Gentry. *4110, 5079*
Dalea versicolor Zucc. var. *sessilis* (A. Gray) Barneby. *4068*
Dalea wrightii A. Gray. *4902, 4972*
Desmanthus cooleyi (Eaton) Branner & Coville. *4408*
Desmodium batocaulon A. Gray. *4872*
Desmodium cinerascens A. Gray. *4869*
Desmodium neomexicanum A. Gray. *4584, 4933, 4997*
Desmodium psilocarpum A. Gray. *4817*
Desmodium rosei B. G. Schub. *4547*
Erythrina flabelliformis Kearney. *4294*
Eysenhardtia orthocarpa (A. Gray) S. Watson. *4270, 5192*
Galactia wrightii A. Gray. *4397*
Lupinus concinnus J. G. Agardh. *4086*
Lupinus sparsiflorus Benth. *4174*
Macroptilium gibbosifolium (Ortega) A. Delgado. *4497*
Marina calycosa (A. Gray) Barneby. *4153*
Mariosousa millefolia (S. Watson) Seigler & Ebinger. *4303, 4423*
Mimosa aculeaticarpa Ortega var. *biuncifera* (Benth.) Barneby. *4266*
Mimosa dysocarpa Benth. *4305*
Mimosa grahamii A. Gray. *4288*
Nissolia schottii (Torr.) A. Gray. *4425, 4795*
Parkinsonia florida (Benth. ex A. Gray) S. Watson. *4899*
Phaseolus acutifolius A. Gray var. *latifolius* G. F. Freeman. *4887*
Phaseolus acutifolius var. *tenuifolius* A. Gray. *3978*
Prosopis velutina Wooton [*Neltuma velutina* (Wooton) Britton & Rose]. *4260*
Rhynchosia edulis Griseb. *4871*
Rhynchosia minima (L.) DC. *3972*
Rhynchosia senna Gillies ex Hook. & Arn. var. *texana* (Torr. & A. Gray) M. C. Johnst. *4289*
Senegalia greggii (A. Gray) Britton & Rose [*Acacia greggii* A. Gray]. *4263*
Senna hirsuta (L.) H. S. Irwin & Barneby var. *glaberrima* (M. E. Jones) H. S. Irwin & Barneby. *4384*
Sphinctospermum constrictum (S. Watson) Rose. *4799, 4903*
Tephrosia leiocarpa A. Gray. *4419*
Tephrosia tenella A. Gray. *4790, 4979*
Vicia ludoviciana Nutt. ex Torr. & A. Gray. *4080, 5102*

FAGACEAE
Quercus emoryi Torr. *4343*
Quercus oblongifolia Torr. *4536*

FOUQUIERIACEAE
Fouquieria splendens Engelm. *4308*

GARRYACEAE
Garrya wrightii Torr. *4460*

GENTIANACEAE
Zeltnera arizonica (A. Gray) G. Mans. *4278*

Zeltnera nudicaulis (Engelm.) G. Mans. *4279, 5100*

GERANIACEAE
**Erodium cicutarium* (L.) L'Hér.. *4077*
Erodium texanum A. Gray. *4156*

HELIOTROPIACEAE
Euploca fruticosa (L.) J. I. M. Melo & Semir. *4516, 4838*
Heliotropium hartwegianum (Steud.) Halse & Feuillet [*Tournefortia hartwegiana* Steud.]. *4845, 4846, 5066, 5067*

HYDRANGEACEAE
Fendlera rupicola A. Gray. *4128, 5084*
Philadelphus microphyllus A. Gray. *4463*

HYDROPHYLLACEAE
Eucrypta micrantha (Torr.) A. Heller. *4072*
Phacelia affinis A. Gray. *4093*
Phacelia arizonica A. Gray. *4055*
Phacelia bombycina Wooton & Standl. *4173*
Phacelia caerulea Greene. *4087, 5358*
Phacelia distans Benth. *4113, 5357*
Phacelia sonoitensis S. P. McLaughlin. *4083, 4191, 5363*

JUGLANDACEAE
Juglans major (Torr.) A. Heller. *4281*

KRAMERIACEAE
Krameria erecta Willd. *4212*

LAMIACEAE
Clerodendrum coulteri (A. Gray) Govaerts [*Tetraclea coulteri* A. Gray]. *4874*
Hedeoma dentata Torr. *4652*
**Lamium amplexicaule* L. *4091*
Salvia parryi A. Gray. *4801*
Salvia subincisa Benth. *4380*
Stachys coccinea Ortega. *4081, 5085*
Trichostema arizonicum A. Gray. *4930*

LINACEAE
Linum puberulum (Engelm.) A. Heller. *4411, 4565*

LOASACEAE
Mentzelia albicaulis (Douglas) Douglas ex Torr. & A. Gray. *4054, 5362*
Mentzelia aspera L. *4816*
Mentzelia isolata Gentry. *4585*

LYTHRACEAE
Ammannia auriculata Willd. *4904*, *4942, 4999, 5031*
Cuphea wrightii A. Gray. *4941*
Rotala ramosior (L.) Koehne. *5002*

MALPIGHIACEAE
Aspicarpa hirtella Rich. *4818*
Cottsia gracilis (A. Gray) W. R. Anderson & C. Davis. *3946*

MALVACEAE
Abutilon abutiloides (Jacq.) Garcke ex Hochr. 4901
Abutilon incanum (Link) Sweet. *3961, 4886*
Abutilon mollicomum (Willd.) Sweet. *3968*
Abutilon reventum S. Watson. *4313*
Anoda abutiloides A. Gray. *3969*
Anoda cristata (L.) Schltdl. *4548*
Ayenia filiformis S. Watson. *3960*
Gossypium thurberi Tod. *4307*
Herissantia crispa (L.) Brizicky. *3948*
Hibiscus biseptus S. Watson. *4462*
Rhynchosida physocalyx (A. Gray) Fryxell. *4175*
Sida abutilifolia Mill. *4204*
Sida glabra Mill. *4976*
Sida spinosa L. *4513*
Sphaeralcea laxa Wooton & Standl. *3962, 5048*

MARTYNIACEAE
Proboscidea parviflora (Wooton) Wooton & Standl. *4269*

MENISPERMACEAE
Cocculus diversifolius DC. *4124, 4702*

MOLLUGINACEAE
Glinus radiatus (Ruiz & Pav.) Rohrb. *4361*
Mollugo verticillata L. *4353*

MONTIACEAE
Calandrinia ciliata (Ruiz & Pav.) DC. var. *menziesii* (Hook.) Macbr. *4057*
Cistanthe monandra (Nutt.) Hershk. *4060, 5115*
Phemeranthus aurantiacus (Engelm.) Kiger. *4394*
Phemeranthus parviflorus (Nutt.) Kiger. *4409*

MORACEAE
Morus microphylla Buckley. *4122*

NAMACEAE
Nama hispida A. Gray. *4211*

NYCTAGINACEAE
Allionia incarnata L. *4183*
Boerhavia coccinea Mill. *4378*
Boerhavia coulteri (Hook. f.) S. Watson. *4407*
Boerhavia erecta L. *4376, 4794*
Boerhavia intermedia M.E. Jones. *4793*
Boerhavia megaptera Standl. *4393, 4539, 4780, 4785*
Boerhavia purpurascens A. Gray. *4938*
Boerhavia wrightii A. Gray. *4377*
Commicarpus scandens (L.) Standl. *4272*
Mirabilis albida (Walter) Heimerl. *4574*
Mirabilis linearis (Pursh) Heimerl. *4262*
Mirabilis longiflora L. *4781*

OLEACEAE
Fraxinus gooddingii Little. *4543, 4829, 5087*
Fraxinus velutina Torr. *4147*

Menodora scabra A. Gray. *4336, 4868*

ONAGRACEAE
Epilobium canum (Greene) P. H. Raven subsp. *latifolium* (Hook.) P. H. Raven. *3974*
Eremothera chamaenerioides (A. Gray) W. L. Wagner & Hoch *4100*
Eulobus californicus Nutt. ex Torr. & A. Gray. *4094*
Oenothera primiveris A. Gray. *4050*
Oenothera rosea L'Hér. ex Aiton. *4275*

OROBANCHACEAE
Brachystigma wrightii (A. Gray) Pennell. *4542*
Castilleja minor (A. Gray) A. Gray var. *minor. 5105*
Castilleja tenuiflora Benth. *4209*

OXALIDACEAE
Oxalis albicans L. *4406, 4746*
Oxalis latifolia Kunth. *4389*

PAPAVERACEAE
Argemone pleiacantha Greene. *4240*
Corydalis aurea Willd. subsp. *occidentalis* (A. Gray) G. B. Ownbey. *4045*
Eschscholzia californica Cham. subsp. *mexicana* (Greene) C. Clark. *4067*

PETIVERIACEAE
Rivina humilis L. *4370*

PHRYMACEAE
Erythranthe floribunda (Lindl.) G. L. Nesom. *5097*
Erythranthe guttata (DC.) G. L. Nesom. *4126, 5091*
Erythranthe rubella (A. Gray) N. S. Fraga. *4092*

PHYLLANTHACEAE
Phyllanthus polygonoides Nutt. ex Spreng. *4789*

PHYTOLACCACEAE (*Rivina*), see **PETIVERIACEAE**

PLANTAGINACEAE
Maurandella antirrhiniflora (Humb. & Bonpl. ex Willd.) Rothm. *4237*
Mecardonia procumbens (Mill.) Small. *4137*
Nuttallanthus texanus (Scheele) D. A. Sutton. *4149*
Penstemon barbatus (Cav.) Roth. *5382*
Penstemon parryi A. Gray. *4117*
Plantago patagonica Jacq. *4111*
Plantago virginica L. *4186*
Sairocarpus nuttallianus (Benth. ex A. DC.) D. A. Sutton. *4102*
Schistophragma intermedium (A. Gray) Pennell. *4515*
Stemodia durantifolia (L.) Sw. *4984*
Veronica anagallis-aquatica L. *4701, 4708*
Veronica peregrina L. subsp. *xalapensis* (Kunth) Pennell. *4076, 5089*

PLUMBAGINACEAE
Plumbago zeylanica L. *4192*

POLEMONIACEAE
Eriastrum diffusum (A. Gray) H. Mason. *4154*
Gilia flavocincta A. Nelson. *4056*

Gilia mexicana A. D. Grant & V. E. Grant. *4115*
Ipomopsis thurberi (A. Gray) V. E. Grant. *4503*
Linanthus bigelovii (A. Gray) Greene. *4142*
Microsteris gracilis (Hook.) Greene. *4051*

POLYGALACEAE
Hebecarpa barbeyana (Chodat) J. R. Abbott [*Polygala barbeyana* Chodat]. *4592*
Hebecarpa obscura (Benth.) J. R. Abbott [*Polygala obscura* Benth.]. *4334, 5175*
Polygala hemipterocarpa A. Gray. *4819*

POLYGONACEAE
Eriogonum abertianum Torr. *4140*
Eriogonum polycladon Benth. *4379*
Eriogonum wrightii Torr. ex Benth. *3967*
**Polygonum aviculare* L. *4285*

PORTULACACEAE
Portulaca oleracea L. *4495*
Portulaca suffrutescens Engelm. *4398, 4810*
Portulaca umbraticola Kunth. *4405*

PRIMULACEAE
Anagallis minima (L.) E. H. L. Krause. *5108*
Androsace occidentalis Pursh. *4048*

RANUNCULACEAE
Anemone tuberosa Rydb. *4066*
Clematis drummondii Torr. & A. Gray. *4335*
Delphinium scaposum Greene. *4238*
Myosurus cupulatus S. Watson. *5090, 5361*
Myosurus minimus L. *4145, 5074*
Thalictrum fendleri Engelm. ex A. Gray. *4540*

RHAMNACEAE
Condalia correllii M. C. Johnst. *4342*
Sarcomphalus obtusifolius (Hook. ex Torr. & A. Gray) Hauenschild [*Ziziphus obtusifolia* (Hook. ex Torr. & A. Gray) A. Gray]. *4107*

RUBIACEAE
Bouvardia ternifolia (Cav.) Schltdl. *4311*
Galium aparine L. *4157*
Galium microphyllum A. Gray. *4239*
Galium wrightii A. Gray. *4577*
Hexasepalum teres (Walter) J. H. Kirkbr. [*Diodia teres* Walter]. *4502*
Houstonia prostrata Brandegee [*Hedyotis vegrandis* W. H. Lewis]. *4788*
Mitracarpus hirtus (L.) DC. *4811*

RUTACEAE
Ptelea trifoliata L. *4828*

SALICACEAE
Populus fremontii S. Watson. *4089, 4659*
Salix bonplandiana Kunth. *4711*
Salix gooddingii Ball. *4245, 5109*

SANTALACEAE (*Phoradendron*), see **VISCACEAE**

SAPINDACEAE
Dodonaea viscosa (L.) Jacq. *4120*
Sapindus saponaria L. *4304*

SAXIFRAGACEAE
Heuchera sanguinea Engelm. *4604*

SCROPHULARIACEAE
Limosella acaulis Sessé & Moc. *4287*

SOLANACEAE
Calibrachoa parviflora (Juss.) D'Arcy. *4331, 5093*
Datura quercifolia Kunth. *4870*
Datura wrightii Regel. *4392*
Lycium berlandieri Dunal. *4796*
Nicotiana obtusifolia M. Martens & Galeotti. *4127*
Physalis pubescens L. *4511*
Physalis solanacea (Schltdl.) Axelius. *4822*
Solanum adscendens Sendtn. *4524*
Solanum elaeagnifolium Cav. *4745*
Solanum lumholtzianum Bartlett. *4807*
Solanum nigrescens M. Martens & Galeotti. *4265*

TALINACEAE
Talinum paniculatum (Jacq.) Gaertn. *4410*

URTICACEAE
Parietaria pensylvanica Muhl. ex Willd. *4146*

VERBENACEAE
Aloysia wrightii (A. Gray ex Torr.) A. Heller. *4451*
Bouchea prismatica (L.) Kuntze. *4802*
Verbena xylopoda (L. M. Perry) G. L. Nesom. *4179, 5353*

VIBURNACEAE
Sambucus cerulea Raf. *4280*

VISCACEAE
Phoradendron californicum Nutt. *4363*
Phoradendron capitellatum Torr. ex Trel. *4242*
Phoradendron leucarpum (Raf.) Reveal & M. C. Johnst. *4345, 4655*

VITACEAE
Vitis arizonica Engelm. *4867, 5189*

ZYGOPHYLLACEAE
Kallstroemia californica (S. Watson) Vail. *4787*
Kallstroemia grandiflora Torr. ex A. Gray. *4390*

MONOCOTS
AMARYLLIDACEAE
Allium rhizomatum Wooton & Standl. *4500*
Habranthus longifolius (Hemsl.) Flagg, G. Lom. Sm. & Meerow [*Zephyranthes longifolia* Hemsl.]. *4786*
Nothoscordum bivalve (L.) Britton. *4532*

ARACEAE
Lemna aequinoctialis Welw. *5005*
Lemna gibba L. *3976, 4712*
Lemna minuta Kunth. *4707*

ASPARAGACEAE
Agave palmeri Engelm. *4400*
Agave schottii Engelm. var. *schottii. 4295, 4461*
Dasylirion wheeleri S. Watson. *4368*
Dipterostemon capitatus (Benth.) Rydb. subsp. *pauciflorus* (Torr.) R. E. Preston. *4061*
Echeandia flavescens (Schult. & Schult. f.) Cruden. *4572*
Milla biflora Cav. *4506*
Nolina microcarpa S. Watson. *4264, 5174*
Yucca baccata Torr. var. *brevifolia* L. D. Benson & Darrow. *5076*
Yucca elata (Engelm.) Engelm. *5080*
Yucca cf. *schottii* [*Y. schottii* Engelm., *nomen illegitimum. Y.* x *schottii* (Engelm.) pro. sp. Lenz & Hanson. Nomenclature of this yucca is unresolved; see Lenz & Hanson 2000, 2001; Hess & Robbins 2002]. *4333*

COMMELINACEAE
Commelina dianthifolia Delile. *4823*
Commelina erecta L. *4446*

CYPERACEAE
Bulbostylis capillaris (L.) Kunth ex C. B. Clarke. *4510, 4812*
Cyperus dentoniae G. C. Tucker. *4841*
Cyperus dipsaceus Liebm. *4575, 4936*
Cyperus esculentus L. *4782, 4982*
Cyperus flavicomus Michx. *4569, 4895, 4896*
Cyperus hemidrummondii Goetgh. [*Lipocarpha drummondii* (Nees) G. C. Tucker]. *4985, 4986, 4998*
Cyperus hermaphroditus (Jacq.) Standl. *4631*
Cyperus niger Ruiz & Pav. *4387*
Cyperus odoratus L. *3975, 4385, 4466*
Cyperus pallidicolor (Kük.) G. C. Tucker. *4546, 4588*
Cyperus sphaerolepis Boeckeler. *4884*
Cyperus squarrosus L. *4570, 4983*
Cyperus subsquarrosus (Muhl.) Bauters [*Lipocarpha micrantha* (Vahl) G. C. Tucker]. *4934*
Eleocharis montevidensis Kunth. *4215, 5107*
Eleocharis parishii Britton. *4277, 4365*
Fimbristylis annua (All.) Roem. & Schult. *4514, 4571*

JUNCACEAE
Juncus bufonius L. *4187, 5098*
Juncus interior Wiegand. *4273*
Juncus marginatus Rostk. *4366*
Juncus saximontanus A. Nelson. *4248, 4274*

LILIACEAE
Calochortus ambiguus (M. E. Jones) G. B. Ownbey. *4194*
Calochortus kennedyi Porter. *4131*

NAJADACEAE
Najas guadalupensis (Spreng.) Magnus. *5006*

POACEAE
Alopecurus carolinianus Walter. *5072, 5088*

Aristida adscensionis L. *4412*
Aristida schiedeana Trin. & Rupr. var. *orcuttiana* (Vasey) Allred & Valdés-Reyna. *4583*
Aristida ternipes Cav. var. *gentilis* (Henrard) Allred. *4530*
Aristida ternipes var. *ternipes. 4382*
Bothriochloa barbinodis (Lag.) Herter. *4339*
Bouteloua aristidoides (Kunth) Griseb. *4417*
Bouteloua barbata Lag. var. *barbata*. *4806*
Bouteloua barbata var. *rothrockii* (Vasey) Gould. *4590, 4835*
Bouteloua chondrosioides (Kunth) Benth. ex S. Watson. *4401*
Bouteloua curtipendula (Michx.) Torr. *4449*
Bouteloua eludens Griffiths. *4529, 4842*
Bouteloua eriopoda (Torr.) Torr. *4888*
Bouteloua gracilis (Kunth) Lag. ex Griffiths. *4591, 4900*
Bouteloua hirsuta Lag. *4486*
Bouteloua radicosa (E. Fourn.) Griffiths. *4490, 4563*
Bouteloua repens (Kunth) Scribn. & Merr. *4372*
Bromus frondosus (Shear) Wooton & Standl. *4624*
**Bromus rubens* L. *4012*
**Cenchrus ciliaris* L. *4837*
Cenchrus spinifex Cav. *4381*
Chloris virgata Sw. *4454*
Cottea pappophoroides Kunth. *3949*
**Cynodon dactylon* (L.) Pers. *4188*
Dasyochloa pulchella (Kunth) Willd. ex Rydb. *4198*
Digitaria californica (Benth.) Henrard. *4599*
Digitaria insularis (L.) Fedde. *3971*
**Digitaria sanguinalis* (L.) Scop. *4347*
Dinebra panicea (Retz.) P. M. Peterson & N. Snow. *4448, 4489*
Dinebra viscida (Scribn.) P. M. Peterson & N. Snow. *4348*
Diplachne fusca (L.) P. Beauv. ex Roem. & Schult. subsp. *fascicularis* (Lam.) P. M. Peterson & N. Snow. *4456*
Disakisperma dubium (Kunth) P. M. Peterson & N. Snow. *3950*
**Echinochloa colona* (L.) Link. *4284*
**Echinochloa crus-galli* (L.) P. Beauv. *4354, 4521*
Elionurus barbiculmis Hack. *4457*
Elymus elymoides (Raf.) Swezey. *4121, 4709*
Enneapogon desvauxii P. Beauv. *4885*
**Eragrostis cilianensis* (All.) Vignolo ex Janch. *4301*
**Eragrostis curvula* (Schrad.) Nees var. *conferta* Stapf. *4181*
Eragrostis intermedia A. S. Hitchc. *4388*
**Eragrostis lehmanniana* Nees. *4185*
Eragrostis pectinacea (Michx.) Nees. *4346*
**Eragrostis superba* Peyr. *5032*
Eriochloa acuminata (J. Presl) Kunth. *4453*
**Hackelochloa granularis* (L.) Kuntze. *4566, 4931*
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. *4493*
Heteropogon melanocarpus (Elliott) Benth. *4576*
Hilaria belangeri (Steud.) Nash. *4133*
Hopia obtusa (Kunth) Zuloaga & Morrone. *4491*
**Hordeum murinum* L. *4176*
**Melinis repens* (Willd.) Zizka subsp. *repens. 4104*
Muhlenbergia alopecuroides (Griseb.) P. M. Peterson & Columbus [*Lycurus setosus* (Nutt.) C. Reeder]. *4492*
Muhlenbergia arizonica Scribn. *3964*
Muhlenbergia dumosa Scribn. ex Vasey. *4337, 5078, 5103*
Muhlenbergia emersleyi Vasey. *4504*
Muhlenbergia fragilis Swallen. *4501*
Muhlenbergia longiligula Hitchc. *5000*

Muhlenbergia microsperma (DC.) Trin. *4088*
Muhlenbergia minutissima (Steud.) Swallen. *4507, 4893*
Muhlenbergia palmeri Vasey. *5034*
Muhlenbergia porteri Scribn. *4797*
Muhlenbergia rigens (Benth.) Hitchc. *4626, 5007*
Muhlenbergia rigida (Kunth) Trin. *5018*
Muhlenbergia sinuosa Swallen. *4935*
Muhlenbergia tenuifolia (Kunth) Trinius. *4533*
Panicum hirticaule J. Presl. *4455*
Paspalum distichum L. *5004*
Paspalum setaceum Michx. *4814*
**Phalaris minor* Retz. *4234*
Piptochaetium fimbriatum (Kunth) Hitchc. *5003*
**Poa annua* L. *5073*
Poa bigelovii Vasey & Scribn. *4069*
**Polypogon monspeliensis* (L.) Desf. *4178, 4710*
**Polypogon viridis* (Gouan) Breistr. *4276*
**Schismus barbatus* (L.) Thell. *4059*
Schizachyrium cirratum (Hack.) Wooton & Standl. *4932*
Schizachyrium sanguineum (Retz.) Alston var. *hirtiflorum* (Nees) S. L. Hatch. *4568*
Setaria grisebachii Fourn. *4580*
Setaria macrostachya Kunth. *3973, 4452*
Sphenopholis obtusata (Michx.) Scribn. *4330*
Sporobolus cryptandrus (Torr.) A. Gray. *4630*
Sporobolus wrightii Munro ex Scribn. *5033*
Trachypogon spicatus (L.) Kuntze. *4391*
Urochloa arizonica (Scribn. & Merr.) Morrone & Zuloaga. *4445*
Vulpia octoflora (Walter) Rydb. *4058*
Zuloagaea bulbosa (Kunth) Bess. *4587, 4623*

PONTEDERIACEAE
Heteranthera limosa (Sw.) Willd. *4894*

POTAMOGETONACEAE
Potamogeton pusillus L. *4286*

TYPHACEAE
Typha domingensis Pers. *4653*

Figure 8. Coal Mine Canyon, 6 Aug 2021.

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