FLORA OF THE APPLEGTON-WHITTLELL RESEARCH RANCH, 
NORTHEASTERN SANTA CRUZ COUNTY, ARIZONA

STEVEN P. MCLAUGHLIN, University of Arizona, Office of Arid Lands Studies, Tucson AZ 85721, 
ERIKA L. GEIGER, University of Arizona, School of Renewable Natural Resources, Tucson AZ 85721, and 
JANICE E. BOWERS, U.S. Geological Survey, 1675 W. Anklam Road, Tucson AZ 85745

ABSTRACT

The Appleton-Whittell Research Ranch, operated by the National Audubon Society, covers 3160 ha in northeastern 
Santa Cruz County. Elevations range from 1417 to 1570 m. The known vascular flora comprises 81 families, 290 
genera, 473 native species, and 38 exotic species. One species, Lygodesium ramosissimum, is new to the flora of Arizona. 
Floristic affinities, based on a comparison with 40 other local floras from the western United States, 32 local floras from 
Mexico, and 40 floras from the central United States, are strongest towards the southeast into Chihuahua and Coahuila.

INTRODUCTION

The Appleton-Whittell Research Ranch occupies 3160 ha southeast of Elgin in northeastern 
Santa Cruz County (31° 35' N, 110° 30' W). A cooperative partnership operated by the 
National Audubon Society, the Research Ranch includes private land as well as lands owned by the 
Colorado National Forest and the Bureau of 
Land Management (Bock and Bock 2000). The Research Ranch was established in 1967 when the 
Appleton family removed cattle from their property, the Elgin Hereford Ranch, with the goal of 
creating an environmental preserve (Bahre 1977, Bock and Bock 2000). The Appeltons sold 
the property to the National Audubon Society in 1980. The current objectives of the Research 
Ranch are to maintain a wildlife sanctuary, host 
and conduct ecological research, and provide 
education about sustainable land management 
(Bock and Bock 1986b). Projects have included 
ecology of grassland birds and insects, vegetation 
dynamics, and exotic species. Here, we provide 
the first comprehensive checklist of the vascular 
plants of the Research Ranch.

The grasslands at the Research Ranch are 
described by Bock and Bock (2000) as “Madrean 
Mixed-Grass Prairie,” implying a floristic 
relationship with the grasslands of northern Mexico. However, the area is mapped as “Plains and Great 
Basin Grasslands” by Brown and Lowe (1994), 
implying a closer relationship with grasslands of 
the central United States, Great Basin, and 
Colorado Plateau. Thus, a second objective of this paper is to provide an evaluation of the floristic 
affinities of the plants occurring in the flora of the 
Research Ranch.

STUDY AREA

Elevation increases across the Research Ranch 
(Fig. 1) from north to south, ranging from 1417 m 
along the northern boundary where the O’Donnell 
Canyon drainage enters the Babocomari Land 
Grant, to 1541 m at Bald Hill in the northwestern corner and to 1570 m on a hilltop near 
the southern boundary on the west side of Lyle 
Canyon. Most of the area lies between 1450 and 
1530 m. Three convergent watersheds drain most 
of the Research Ranch; from west to east they are 
Post Canyon, O’Donnell Canyon, and Turkey 
Creek. The only other major watershed is Lyle 
Canyon in the southeastern corner of the Research 
Ranch; the northwestern corner is in the Vaughn 
Canyon watershed.

Vegetation of the Research Ranch is primarily 
grassland in the northern part and along ridge 
crests and mesa tops, and Madrean evergreen oak 
woodlands in the higher elevations of the southern 
part and in canyon bottoms. The grasslands are 
dominated by sideoats grama (Bouteloua 
curtipendula), blue grama (B. gracilis), and plains 
lovegrass (Eragrostis intermedia), except on 
certain mesa tops where Boer’s lovegrass 
(Eragrostis curvula var. conferta) was planted in 
the 1940s and 1950s (Bahre 1977). Riparian 
forests of ash (Fraxinus velutina), sycamore 
(Platanus wrightii), willows (Salix gooddingii, S. 
taxifolia, S. laevigata, and S. exigua), and 
cottonwood (Populus fremontii) occur in the major 
drainages. Permanent water provides important 
wetland habitats in Post Canyon, O’Donnell 
Canyon, and at Finley Tank. The lower part of the 
Turkey Creek drainage contains one of the best 
examples of sycamon (Populus fremontii) flats 
remaining in southeastern Arizona (Bock and 
Bock 1986a).

Sellers et al. (1985) provide climatic data from 
four weather stations in eastern Santa Cruz County 
and northwestern Cochise County close to the 
Research Ranch and at comparable elevations: 
Elgin (1494 m, precipitation only), Canelo 
(1528 m), Fort Huachuca (1422 m), and San 
Rafael Ranch (1490 m). Monthly precipitation 
data from the Research Ranch from 1968–1997 are 
available on their website (www.audubon.org/
local/sanctuary/appleton/). These stations have 
very similar climates (Fig. 2). The area has a 
“monsoon” climate with a pronounced peak in 
monthly precipitation in July and August 
following a period of minimum rainfall from April 
through June. The winter rainy season (December– 
February) has about one-fourth to one-third of the 
rainfall received during the summer rainy season. 
Mean annual precipitation is somewhat higher at 
the Research Ranch (1430 mm) than San 
Rafael Ranch (441 mm) and Canelo (453 mm).
than at Fort Huachuca (391 mm) and Elgin (381), reflecting a pattern of increasing summer precipitation from north to south across the Research Ranch. Mean monthly maximum temperatures are similar at all locations (Fig. 2); mean monthly minimum temperatures are about 5°C higher at Fort Huachuca than at Canelo, suggesting a gradient of decreasing temperature with increasing elevation across the Research Ranch.

Soils of the Research Ranch are described in the soil survey for Santa Cruz County (Richardson et al. 1979). Silt and clay loams of the Pima series...
occur along the floodplain of O’Donnell Canyon in the northeastern quarter of the Research Ranch; these soils support dense stands of sacaton. Canyon bottoms above the confluence of Post and O’Donnell Canyons, Arkansas and Turkey Creek have sandy loams in the Grabe-Comoroc complex; similar soils are also found in Lyle Canyon. Soils on slopes adjacent to the major drainages are mostly gravelly clay to sandy loams of the Bernardino-Hathaway and Hathaway associations. Mesa tops between drainages are mapped as White House gravelly loams. Soils on the higher hills and slopes on the southern part of the Research Ranch are shallow cobbly sandy loams of the Faraway-Rock outcrop complex.

METHODS

Plant collections were made from all habitats at the Research Ranch from September 1997 through October 1999. Voucher specimens have been deposited in a herbarium maintained at the Research Ranch, and at the University of Arizona (ARIZ). All specimens in the Research Ranch herbarium were examined and verified. Other than ourselves, major collectors have included Thomas Elias and his students and collaborators, who made several trips to the Research Ranch in the 1990s. Nomenclature in the checklist follows Kearney and Peebles (1960), except for recent revisions in the following taxa: pteridophytes and gymnosperms (Flora of North America Committee 1993); Asclepiadaceae (Sundell 1994), Convolvulaceae (Austin 1998), Cylindropuntia (Pinkava 1999), Gentianaceae (Maun 1988), Loasaceae (Christy and Terrell 1995), Populus (Eckenwalder 1992), Salix (Argus 1995), and Viscaceae (Hawkesworth and Wiens 1994). Where we use names reflecting recent taxonomic revisions in other taxa, the names found in Kearney and Peebles (1960) are provided in brackets following the names we have accepted.

All native species in the flora were classified into floristic elements based on an analysis of their occurrence in local floras from the western United States (McLaughlin 1992). Unpublished data bases of species distributions in 32 local floras from Mexico and 40 local floras from the central United States were used to characterize the distributions and range sizes of all species in flora of the Research Ranch in the western United States, Mexico, and the central United States. The extent of distribution of a species (range size) within a region can be estimated as its percentage incidence (number of floras in which the species is recorded) in a sample of local floras from that region. Many local floras for different parts of Mexico have been published in recent years, and although the coverage is still sparse in comparison to the United States, there are now enough to give a preliminary indication of how species found in the United States are distributed south of the international border. Similarities (Otsuka Index, Simpson 1980) between each of these floras and the flora of the Research Ranch were calculated and mapped to illustrate the geographic affinities of the flora. References for local floras used in this analysis are available from the senior author.

RESULTS AND DISCUSSION

The flora of the Research Ranch includes 81 families, 290 genera, 473 native species, and 38 exotic species. Exotics account for 7.4% of the total flora. The largest families are the composites (Asteraceae), grasses (Poaceae), and legumes (Fabaceae), which together account for nearly half (45.7%) of the total flora (Table 1). Over half of the exotic species are grasses. The majority of the families in the flora are represented by three or fewer species (Table 2), a pattern which probably is typical for local floras. The largest genera are Dalea (12 spp.), Bouteloua (9 spp.), Muhlenbergia (8 spp.), Asclepias (7 spp.), Chloa (7 spp.), and Baccharis, Atriplex, Arctida, and Erigon, each with 6 species.

A new species for the flora of Arizona, Lygodium fasciculatum, was found during this study. This species is sparsely distributed from west Texas to Durango (Correll and Johnston 1970). Several plants were found in a stand of vegetation on markedly calcareous Bernardino-Hathaway soils in the northeastern portion of the Research Ranch.
Table 1. Largest families in the flora of the Appleton-Whittell Research Ranch.

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
<th>Native species</th>
<th>Exotic species</th>
<th>Total species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteraceae</td>
<td>54</td>
<td>91</td>
<td>4</td>
<td>94</td>
</tr>
<tr>
<td>Poaceae</td>
<td>40</td>
<td>65</td>
<td>19</td>
<td>84</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>24</td>
<td>51</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>7</td>
<td>19</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>5</td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Adiantaceae</td>
<td>5</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Cactaceae</td>
<td>5</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Convolvulaceae</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Onagraceae</td>
<td>4</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Amaranthaceae</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

A permanent spring at Finley Tank provides habitat for several species not found elsewhere on the Research Ranch, including Lobelia cardinalis, Carex lanuginosa, and Stylinchium demissum. An aggressive exotic blackberry, Rubus discolor, is firmly established at Finley Tank and is likely to displace the native taxa if not controlled or eliminated. Permanent water in O'Donnell Canyon also supports species not encountered elsewhere in the study area, including Apocynum cannabinum, Centaurium calycosum, Ranunculus macranthus, and Parthenocissus quinquefolia.

Table 2. Distribution of family sizes in the flora of the Appleton-Whittell Research Ranch.

<table>
<thead>
<tr>
<th>Species per family</th>
<th>Number of families</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>2-3</td>
<td>20</td>
</tr>
<tr>
<td>4-8</td>
<td>17</td>
</tr>
<tr>
<td>≥9</td>
<td>13</td>
</tr>
</tbody>
</table>

Over half of the native species in the flora are herbaceous perennials (Table 3). Annuals constitute over one quarter of the native flora. At the Research Ranch, the majority of these are summer annuals rather than winter (spring) annuals. Woody species account for less than 15% of the flora, and succulents (Cactaceae, Agavaceae, Nolinaceae) account for less than 3%. Trees and shrubs in the flora of the western United States have wider distributions than annual or perennial herbs (McLaughlin 1986). In the flora of the Research Ranch, however, the average ranges of species in these different lifeforms do not differ greatly (Table 3). Trees and shrubs found at the Research Ranch occur in 23-25% of the floras of the western United States, 12-13% of the floras of Mexico, and 9% of the floras of the central United States. Compared to the woody plants, annual and perennial herbs are relatively less widely distributed in the western United States and more widely distributed in the central United States. The succulents are least widely distributed in Mexico and the central United States.

Floristic affinities of native species at the Research Ranch are presented in Table 4 and Figures 3 and 4. The designation of grasslands at the Research Ranch as "Plains and Great Basin Grasslands" (Brown and Lowe 1994) suggests that their floristic affinities should be closest to the

Table 3. Distribution of life forms in the flora of the Appleton-Whittell Research Ranch with their mean percentage incidence in samples of 40 local floras from the western U.S., 32 local floras from Mexico, and 40 local floras from the central United States.

<table>
<thead>
<tr>
<th>Habit</th>
<th>Number of native species</th>
<th>Percent of total flora</th>
<th>Percent incidence in western U.S.</th>
<th>Percent incidence in Mexico</th>
<th>Percent incidence in central U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees</td>
<td>21</td>
<td>4.4</td>
<td>25.1</td>
<td>13.2</td>
<td>9.4</td>
</tr>
<tr>
<td>Shrubs</td>
<td>49</td>
<td>10.4</td>
<td>22.6</td>
<td>12.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Succulents</td>
<td>13</td>
<td>2.7</td>
<td>15.6</td>
<td>3.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Herbaceous perennials</td>
<td>253</td>
<td>53.5</td>
<td>19.4</td>
<td>12.9</td>
<td>13.7</td>
</tr>
<tr>
<td>Annuals</td>
<td>137</td>
<td>29.0</td>
<td>18.5</td>
<td>14.8</td>
<td>14.0</td>
</tr>
</tbody>
</table>
Table 6. Floristic elements in the flora of the Appleton-Whitell Research Ranch, with their mean percentage incidence in samples of 40 local florals from the western US, 32 local florals from Mexico, and 40 florals from the central United States.

<table>
<thead>
<tr>
<th>Floristic element</th>
<th>Number of native species</th>
<th>Percent of total flora</th>
<th>Percent incidence in western U.S.</th>
<th>Percent incidence in Mexico</th>
<th>Percent incidence in central U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madrean Widespread</td>
<td>167</td>
<td>35.3</td>
<td>23.1</td>
<td>15.2</td>
<td>19.3</td>
</tr>
<tr>
<td>Apachian Chihuahuan</td>
<td>166</td>
<td>35.1</td>
<td>9.1</td>
<td>13.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Sonoran</td>
<td>41</td>
<td>8.7</td>
<td>11.0</td>
<td>9.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Californian</td>
<td>18</td>
<td>3.8</td>
<td>27.5</td>
<td>16.1</td>
<td>21.0</td>
</tr>
<tr>
<td>Cordilleran</td>
<td>19</td>
<td>4.0</td>
<td>42.5</td>
<td>10.4</td>
<td>33.4</td>
</tr>
<tr>
<td>Intermountain</td>
<td>20</td>
<td>4.2</td>
<td>44.5</td>
<td>9.1</td>
<td>40.0</td>
</tr>
</tbody>
</table>

Figure 3. Map showing the similarities (Otsuka Index) of the flora of the Appleton-Whitell Research Ranch with other local florals, including 40 from the western United States, 32 from Mexico, and 40 from the central United States. Y axis gives the latitude, X axis gives longitude.
north and east in the Colorado Plateau and Great Plains, but in fact nearly 80% of the native species belong to floristic elements characteristic of the American Southwest (Table 4). The largest elements in the flora are the Widespread Madrean and Apachian elements. The former includes species found from western Texas through southern New Mexico and southern Arizona, whereas the latter are more narrowly distributed in southeastern Arizona and southwestern New Mexico.

The Chihuahuan element is small for a southeastern Arizona flora—just 9% of the native species. This is related to the paucity of limestone on the Research Ranch, because species with Chihuahuan affinities are most commonly found in this region on limestone. In addition to the often calcareous Bernardino-Hathaway soils, there is a single, narrow outcropping of limestone on the west side of Turkey Creek in the southern part of the Research Ranch. This outcrop, dominated by cliffrose (Purshia stansburiana), has few characteristic Chihuahuan species.

The floristics categories developed by McLaughlin (1992) and used in Table 4 are based only on distributions north of the international border and west of the Great Plains. It is possible that the species that make up the Apachian element, although narrowly distributed in the southwestern United States, are more widespread in Mexico or in the Central United States, reaching the northern and western limits of their ranges in southeastern Arizona. "Widespread Madrean" species in the flora of the Research Ranch are as widely or more widely distributed in the Central United States (19% incidence) than in Mexico (15% incidence), but species of the Apachian element are comparatively widespread in Mexico (13% incidence) and comparatively rare in the Central United States (2.5% incidence), mostly found only in floras of the Edwards Plateau region of central Texas.

Species in the Research Ranch flora classified as Californian, Apachian, or Widespread Madrean penetrate somewhat further into Mexico than those classified as Chihuahuan, Sonoran, Cordilleran, or Intermountain, but the differences are not large. On the other hand, the Research Ranch species with Cordilleran and Intermountain distributions are widespread in the Central United States, while species with Apachian, Chihuahuan, and Sonoran distributions are uncommon in the prairies and plains.

The overall affinities of the Research Ranch flora are shown in Figure 3, which maps the Otsuka Index (OI) of similarity between the Research Ranch flora and the 40 selected floras for the western United States, the 32 selected floras from Mexico, and the 40 selected floras from the Central United States. Floras with a high similarity (OI > 0.40) are restricted to southeastern Arizona, southwestern New Mexico, and adjacent areas in northern Mexico—the "core" Apachian area. Similarity decreases with distance, but not uniformly in all directions. Similarity decreases most rapidly to the southwest and east rapidly to the southeast, despite the fact that species classified as Chihuahuan do not constitute a large proportion of the flora (Table 4). Similarities with floras from north-central Mexico (Chihuahua, Coahuila, Durango) are similar to those with the southwestern Great Plains and Edwards Plateau, and somewhat greater than those from the central and northern Great Plains.

The Research Ranch shares species with both the Great Plains and northern Mexico. Figure 4 provides frequency distributions for the shared species in these two areas, demonstrating that
similarities with floras from the Central United States are due primarily to a small number of widespread species (those with high incidence), many of which also occur in the Cordilleran and Intermountain regions of the western United States. However, the similarities of the Research Ranch with floras from northern Mexico are mostly due to a larger number of species with narrower ranges (lower incidence), found mostly in the Apachian floristic district of the southwestern United States. The sharing of species of narrower range suggests a closer floristic relationship, analogous to the sharing of more derived characters among taxa. The floristic affinities of the Research Ranch with the grassland and semi-desert regions on the east side of the Sierra Madre Occidental are somewhat stronger than those with the Great Plains (Fig. 3), consistent with Rzedowski’s (1993) concept of a floristic “mega-Mexico” which includes the Apachian and Chihuahuan regions of the southwestern United States. Thus we agree more with Bock and Bock (2000) in characterizing these grasslands as “Madrean Mixed-grass Prairies” rather than as “Plains and Great Basin Grasslands” (Brown and Lowe 1994).

THE FLORA OF THE RESEARCH RANCH

Voucher citations represent collections made by the senior author and coworkers unless otherwise noted, and are mostly housed at the Research Ranch. Approximately 94% of the flora is represented by voucher specimens. Annotations of species as “abundant,” “common,” “uncommon,” or “rare,” although necessarily subjective, are defined as follows: (1) abundant species are dominants of grasslands, oak woodlands, or riparian areas; (2) common species are subdominants in these habitats or dominants in less extensive habitats, such as springs or limestone outcrops; (3) uncommon species are less frequently encountered but still known from several localities, and (4) rare species are those found only a few times in particular habitats. Exotic species are indicated by an asterisk (*). “Washes” refers to broad sections of Post Canyon, Turkey Creek, and O’Donnell Canyon in the northern half of the Research Ranch that are dominated by sacaton, desert willow (Chilopsis linearis), rabbitbrush (Chrysothamnus nauseosus), ash and other deciduous, riparian trees. “Canyons” refers to narrower drainages and their tributaries, dominated by oaks and junipers, in the southern half of the Research Ranch.

PTERIDOPHYTES

Equisetaceae

Equisetum laevigatum A. Braun. Elias 8441. Rare along stretches of upper Turkey Creek.

Pteridaceae


Rare, limestone outcrop adjacent to upper Turkey Creek.

Astrolepis cochlensis (Gooding) Benham & Windham [Nototheca sinuata (Lag.) Kaulf. var. cochlensis (Gooding) Weatherby]. 7864B. Rare, limestone outcrops.

Astrolepis integrerrima (Hooker) Benham & Windham [Nototheca sinuata (Lag.) Kaulf. var. integrerrima Hooker]. 7864A. Rare, limestone outcrops.

Astrolepis sinuata (Lag. ex Sw.) Benham & Windham ssp. sinuata [Nototheca sinuata (Lag.) Kaulf.]. Geiger 12. Rare, canyons.

Bommeria hispida (Mett. ex Kuhn) Underw. Rare, rock outcrops in Lyle Canyon.

Cheilanthes eatoni Baker. 7799. Rare, rock outcrops in Lyle Canyon.

Cheilanthes fendleri Hooker. 7794, 7798. Uncommon, oak woodlands.

Cheilanthes lindei Hooker. 7793. Uncommon, oak woodlands.

Pellaea atropurpurea (L.) Link. 7880. Rare, oak woodland in Lyle Canyon.

GYMNOSPERMS

Cupressaceae


Ephedraceae

Ephedra trifurca Torrey ex S. Watson. Elias 8465. Rare, calcareous grasslands.

Pinaceae


ANGIOSPERMS — DICOTYLEDONS

Acanthaceae


Amaranthaceae

*Amaranthus albus L. 8030. Rare, disturbed areas.

Amaranthus palmeri S. Watson. 7852. Common, washes and disturbed areas.


Flora of the Appleton-Whittell Research Ranch

Gomphrena nitida Roebuck. 7791. Uncommon, grasslands and woodlands.
Gomphrena sonorae Torrey. 7765. Common in grasslands, uncommon in woodlands.
Guillenia densa (Humb. & Bonpl. ex Willd.)
Moq. var. densa [Brayulina densa (Humb. & Bonpl. ex Willd.)] 7649. Common, grasslands, disturbed sites.

Anacardiaceae
Rhhus microphylla Engelm. ex A. Gray. Elías 8943. Rare, grasslands.
Rhus triebata Nutt. var. anisophylla (Greene) Tappan. Elías 8392. Uncommon, woodlands.
Rhhus virens Lindl. ex A. Gray var. choriophylla (Wooton & Standley) L. D. Benson [R. choriophylla (Wooton & Standley) Elías 9313. Uncommon, grasslands and woodlands.
Toxicodendron rydbergii (Small ex Rydberg.) Greene [Rhhus radicans L. var. rydbergii (Small ex Ryd.) Rehder] 8801. Uncommon, canyons.

Aplacaceae
Eryngium heterophyllum Engelm. 7625. Uncommon, grasslands, woodlands, and washes.

Apocynaceae
Apocynum cannabinum L. 7889. Rare, along stream in upper O'Donnell Canyon.
Macrosiphon brachysiphon (Torrey) A. Gray. Uncommon on steep, calcareous slopes adjacent to O'Donnell Canyon.

Asclepiadaceae
Asclepis involucrata Engelm. ex Torrey. 7433. Rare, grasslands and woodlands.
Asclepis nyctaginifolia A. Gray. 7607. Uncommon, grasslands, woodlands, and washes.
Asclepis quinquedentata A. Gray. 7991. Rare, oak woodland in Post Canyon.
Asclepis subverticillata (A. Gray) Vail. 7579. Uncommon, grasslands, woodlands, and washes.
Asclepis uncialis Greene ssp. uncialis. Peterson et al. s.n. (ARIZ.). Rare, grasslands.
Sarcostemma crispum Bentham [Funaxastrum crispum (Bentham) Schlechter.] 7557. Rare, grasslands.

Asteraceae
Accuria nana (A. Gray) Reveal & King [Perezia nana A. Gray]. Anonymous, August 27, 1987. Rare, below mesquites in grasslands.
Accuria wrightii (A. Gray) Reveal & King [Perezia wrightii A. Gray]. 7359. Rare, several plants in grassland adjacent to lower O'Donnell Canyon, flowering in both spring and fall.
Ambrosia psilostachya DC. 7667. Common, grasslands and woodlands.
Artemisia campestris L. ssp. pacifica (Nutt.) Hall & Clements. [A. pacifica Nutt.] 7788. Rare, along creek in Post Canyon.
Artemisia ludoviciana Nutt. ssp. albula (Woot.) Keck. 7351. Uncommon, woodlands.
Artemisia ludoviciana Nutt. ssp. sulcata (Ryd.) Keck. 7693. Common, canyons.
Aster falcatus Lindl. var. grussulhus (Ryd.) Cronq. [Aster commutatus (Torrey & A. Gray) A. Gray var. grussulhus (Ryd.) Blake] 7365. Rare, Finley Tank.
Aster subulatus Michx. var. ligulatus Shinn. [Aster exilis Ell.] 7635. Rare, along stream in Lyle Canyon.
Baccharis neglecta Britton. 8798. Rare, in wash below Finley Tank.
Baccharis thesioides Kunth. 7789. Rare, below oaks.
Baha absinthifolia Bentham var. dealbata (A. Gray) A. Gray. 7325. Uncommon, calcarious grasslands.
Bident aurora (Aiton) Sherff. 7875. Rare, along stream in Lyle Canyon.
Bident bigelovii A. Gray. 7802. Uncommon, oak woodlands in Lyle Canyon.
Bident ferulifolia Jacq.] DC. 7874. Rare, along stream in Lyle Canyon.
Bident leptocephala Sherff. 7320. Abundant below oaks.
Brickellia californica (Torrey & A. Gray) A. Gray var. californica. 8604. Uncommon, canyons.
Brickellia eupatorioides (L.) Shinn. var. chlorolepis (Wooton & Standley) B.L. Turner [Kuhnia rosmarinifolia Bent var. chlorolepis (Wooton and Standley) Blake] 7536. Common, oak woodlands and grasslands.
Brickellia floribunda A. Gray. 8127. Common late-fall bloomer in washes.
Brickellia venosa (Woot. & Standl.) B.L. Robins. 7853. Uncommon, calcarious grasslands.
Carminatia tenuiflora DC. 7776. Uncommon below oaks in woodlands and riparian areas.

Carpobrotus giganteus A. Gray. 7465. Rare, found on rocks in Post Canyon.


Cirrhium neomexicanum A. Gray. Uncommon, grasslands.


Coryza canadensis (L.) Cronq. [Erigeron canadensis L.]. 7833. Common, washes, canyons, grasslands, disturbed sites.


Dysosa papposa (Vent.) Hitchc. 8129. Locally common, washes.


Erigeron flagellaris A. Gray. 7454. Uncommon, oak woodlands.

Erigeron neomexicanus A. Gray. 7712. Rare, oak woodlands.

Gaillardia pinnatiflora Torrey. 7486. Uncommon, oak woodlands, riparian areas.


*Gnaphalium luteoalbus L. 7510. Rare, found below cottonwoods above reservoir in Post Canyon.

Gnaphalium stramineum Kunth [Gnaphalium chilense Spengl.]. 7374B. Rare, springs.

Guardiola platypylla A. Gray. Geiger 18. Rare, Post Canyon.

Gutierrezia microcephala (DC.) A. Gray. 7761. Uncommon, grasslands.

Helenium thurberi A. Gray. 7569. Rare, along stream in Lyle Canyon.

Helenium annuus L. Elias 9110. Abundant, larger washes, disturbed sites.

Helenium petalosus Nutt. ssp. petalosus. 8067. Uncommon, adjacent to stream in Lyle Canyon.

Helianthemis longifolia (Robins. & Greenm.) Cockerell var. annua (M. E. Jones) Yates [Viguiera annua (Jones) Blake]. 7353. Common, mostly in oak woodlands.

Helianthemis multiflora Nutt. var. multiflora [Viguiera multiflora (Nutt.) Blake var. multiflora]. 7861. Locally abundant in washes.

Heliopsis parvifolia A. Gray. 7617. Uncommon, canyons and oak woodlands.

Heterosperma pinnatum Cav. 7314. Common, oak woodlands.

Heterotheca subaxillaris (Lam.) Britt. & Rusby. 7288. Uncommon, washes, grasslands, disturbed sites.

Hymenoclea monogyna Torrey & A. Gray ex A. Gray. 7884. Rare, O'Donnell Canyon in northeast corner of the Research Ranch.


Isocoma tenuefascia Greene [Aplotopappus tenuefascia (Greene) Blake]. 7524. Common to abundant in grasslands.


Lygodium ramosissima Greene. 7340. Rare, calcareous grasslands east of lower O'Donnell Canyon.


Machaeranthera pinnatifida (Hooker) Shinners ssp. pinnatifida var. pinnatifida [Aplotopappus spinulosus (Pursh) DC. var. gooddingii (A. Nels.) Blake]. 8799. Uncommon, grasslands.

Machaeranthera tagesiensis Greene [Aster tagesiensis (Greene) Blake]. 7301. Common, grasslands and riparian areas.


Malacothrix fendleri A. Gray. 7489. Uncommon spring annual, grasslands.


Pectis filipes Harvey & A. Gray. 7701. Uncommon, woodlands and canyons.

Pectis imberbis A. Gray. 8047. Rare, in a single tributary of upper O'Donnell Canyon.

Pectis longipes A. Gray. 7464. Uncommon, grasslands.

Pectis prostrata Cav. 8037. Rare, grasslands.

Porphyrophyllum ruderale (Jacq.) Cass. ssp. macrocephalum (DC.) R. R. Johnson [P. macrocephalum DC.]. 8044. Rare, canyons.

Santolina abertii A. Gray. 7276. Uncommon, woodlands and canyons.


Solidago velutina DC. [S. sparsiflora A. Gray]. 7787. Rare, in Post Canyon south of Headquarters.
*Sonchus asper* (L.) Hill. 7891. Uncommon, mostly in riparian areas.


*Stephanomeria thurberi* A. Gray. 7457. Uncommon, grasslands.

*Thelaster longipes* A. Gray. 7709. Rare, canyons.


*Thymophylla acerosa* (DC.) Strother [Dysodia acerosa DC]. Elias 8486. Locally common on ridgetops in calcareous grasslands adjacent to lower O'Donnell Canyon.

*Tragopogon dubius* Scop. 7536. Uncommon, oak woodlands.

*Verbena exserta* (Cav.) Bentham & Hooker f. ex A. Gray ssp. exserta (Robins. & Greenm.) J. R. Coleman. 7604. Common, washes, seasonally wet depressions.

*Verbena rothrockii* Robins. & Greenm. Elias 12550. Rare, oak woodlands.

*Viguiera cordifolia* A. Gray. 7785. Rare, oak woodlands.

*Viguiera dentata* (Cav.) Spreng. var. dentata. 7792. Common, oak woodlands and canyons.

*Xanthium strumarium* L. var. canadense (P. Hill) Torrey & A. Gray [X. saccharatum Wallr.]. 7812. Locally abundant in washes, along streams in canyons.


*Zinnia acerosa* (DC.) A. Gray [Z. pumila A. Gray]. Elias 8488. Rare, limestone outcrop adjacent to Turkey Creek, calcareous grasslands.

*Zinnia grandiflora* Nutt. 7284. Uncommon, grasslands.

*Zinnia peruviana* (L.) L. 7808. Rare, adjacent to stream bottom in Lyle Canyon.

**Bignoniaceae**

*Chilopsis linearis* (Cav.) Sweet ssp. arctata (Fosb.) Héntzsch. 7571. Common in lower O'Donnell Canyon.

**Boraginaceae**


**Brassicaceae**

*Cardaria draba* (L.) Desv. ssp. draba. Rare, one population along road near junction of Turkey Creek and O'Donnell Canyon.

*Descurainia pinnata* (Walt.) Britton ssp. hallicitorum (Cockerill) Delisting. 7459. Common winter annual, grasslands, disturbed areas.

*Draba cuneifolia* Nutt. ex Torrey & A. Gray var. cuneifolia. Elias 9324. Rare, on rocks in Post Canyon above reservoir.

*Lepidium lasiocarpum* Nutt. var. lasiocarpum. Uncommon, mostly in disturbed areas.


*Lesquerella fendleri* (A. Gray) S. Watson. 7452. Rare, calcareous grasslands.


*Stylosanthes altissima* L. Anonymous, April 19, 1987. Rare, disturbed sites.

*Stylosanthes tria* L. 7986. Uncommon, disturbed sites.

**Cactaceae**

*Cylindropuntia spinosior* (Engelm.) Knuth [Opuntia spinosior (Engelm. & Bigel.) Tourneux]. Common, grasslands and woodlands.


*Echinocereus rigidissimus* (Engelm.) Haage f. [E. pectinatus (Scheidw.) Engelm. var. rigidissimus (Engelm.) Engelm.]. Common, grasslands.

*Escarobaria xiphiopora* (Nutt.) Buxb. var. bisbeeana (Orcutt) D. R. Hunt [Mammillaria aggregata Engelm., in part]. Common, grasslands.

*Mammillaria heyderi* Meuenpforter var. macdougalii (Rose) L. D. Benson [M. macdougalii Rose]. Rare, grasslands, rock outcrops.


*Opuntia engelmannii* Salm-Dyck ex Engelmann var. engelmannii. Uncommon, grasslands.

*Opuntia macrocentra* Engelm. var. macrocentra. Uncommon, grasslands.


**Campanulaceae**

*Lonoloba cardinalli* L. ssp. cardinalli [L. cardinalli L. ssp. graminea (Lam.) McVaugh]. Geiger 7. Rare, spring at Finley Tank.

**Capparaceae**

Caprifoliaceae

Sambucus mexicana K. Presl ex DC. 1790. Rare, Post Canyon.

Drymaria glandulosa K. Presl [Drymaria fendleri S. Watson]. 8188. Rare, oak woodland in Post Canyon.

Drymaria molluginea (Lag.) Didd. [Drymaria sperguloides A. Gray]. 8050. Uncommon, oak woodlands.

Silene antirrhina L. 7515. Rare, oak woodlands.

Chenopodiaceae


Chenopodium berlandieri Moq. var. sinuatum (J. Murr) H. A. Wahl. 7854. Uncommon, mostly in washes.

Chenopodium fremontii S. Watson var. fremontii. 7860. Uncommon, grasslands and oak woodlands.

Chenopodium graveolens Willd. [C. incisum Poir. var. neomexicanum Aellen]. 8117. Rare, oak woodland in Post Canyon.


*Salsola kali L. Williams s.n., October 2, 1971. Common in disturbed areas, uncommon in washes.

Convolvulaceae


Dichondra brachypoda Wooton & Standley. 8800. Locally abundant under oaks, but rare in flowering.

Evolutus arizonicus A. Gray. 7295. Common, grasslands and woodlands.


Ipomoea capillacea (Kunth) G. Don [I. muricata Cav.]. 8022. Rare, oak woodlands.

Ipomoea costellata Torrey. 8034. Common, grasslands and woodlands.

Ipomoea cristata Hallier f. Elías 9021. [I. cocinea L.]. Locally common, twining up through shrubs in washes.


Cucurbitaceae


Cucurbita digitata A. Gray. Uncommon, grasslands.

Cucurbita foetidissima Kunth. Uncommon, grasslands.

Ericaceae


Euphorbiaceae

Acalypha linheimeri Muell. Arg. 7612. Uncommon, washes and canyons.


Acalypha ostryfolia Riddell. 7783. Uncommon, mostly in washes.


Chamaesyce dioica (Kunth) Millsp. [Euphorbia indiusa (Engelm.) Tidestrom]. 8796. Locally abundant in washes.


Chamaesyce revoluta (Engelm.) Small [Euphorbia revoluta Engelm.]. 7310. Rare, calcareous grasslands.


Euphorbia biloba (Engelm. 7355. Rare, washes.

Euphorbia estupulata Engelm. Rare, calcareous grasslands.


Poinsettia dentata (Michx.) Klotzsch & Garcke [Euphorbia dentata Michx.]. Uncommon, grasslands and woodlands.

Poinsettia radians (Bentham) Klotzsch & Garcke [Euphorbia radians Bentham]. Elías 8412. Common, washes. Leafless, flowering stems appear in the spring; sterile vegetative stems are produced following the onset of summer rains.


Tragia lacticia (Torrey) Muell. Arg. Rare, Lyle Canyon.

Fabaceae

Acacia angustissima (P. Miller) Kunze var. suffrutescens (Rose) isley. 8062. Uncommon, mostly in grasslands.

Amorpha fruticosa L. 7567. Rare, Post Canyon.

Astragalus allobrochos A. Gray. Elías 8317. Uncommon winter annual, mostly in grasslands.

Astragalus arizonicus A. Gray. 7447. Uncommon, grasslands.


Astragalus nothoxyx A. Gray. 7441. Abundant in grasslands and woodlands following wet winters.

Astragalus nuttallianus DC. var. nuttallianus. Liston 739-5. Uncommon, grasslands.


Calliandra eriophylla Bentham var. eriophylla. Common, grasslands.


Chamaecrista nictitans (L.) Moench spp. nictitans var. leptadenia (Greenm.) Gandhi & Hatch [Cassia leptadenia Greenm.]. 7282. Common, grasslands and woodlands.

Cologania angustifolia Kunth [C. longifolia A. Gray]. 8176. Rare, Post Canyon.

Coursetia cariabae (Jacq.) Lavin var. sericea (A. Gray) Lavin [Craccoa edwardii A. Gray]. 8049. Rare, canyons.


Dalea albiflora A. Gray. 7348. Uncommon, grasslands and woodlands.


Dalea candida Willd. var. oligophylla (Torrey) Shinners [Petalostemon candidum (Willd.) Michx. var. oligophyllum (Torrey) Hermann]. 7563. Rare, oak woodlands.

Dalea exigua Barneby [Petalostemon exilis A. Gray]. Elías 8945. Rare, along stream in Lyle Canyon.

Dalea formosa Torrey. 7497. Locally common in calcareous grasslands.

Dalea grayi (Vail) L. O. Williams. 8063. Uncommon, grasslands.

Dalea jamesii (Torrey) Torrey & A. Gray. 7564. Rare, grasslands.

Dalea laevisstachys A. Gray. 8038. Uncommon, grasslands.

Dalea nanca Torrey ex A. Gray var. canescens Kearney & Peebles. 7632. Common, grasslands.

Dalea neomexicana (A. Gray) Cory var. neomexicana. 7500. Rare, calcareous grasslands.

Dalea pagonathera A. Gray. 7535. Uncommon, grasslands.

Dalea versicolor-Zucc. ssp. versicolor var. sessilis (A. Gray) Barneby [D. wistsizensii A. Gray]. 7350. Rare, oak woodlands.

Desmanthus cooley (Eaton) Trel. 7293. Common, grasslands.

Desmodium batocalon A. Gray, Geiger 37. Uncommon, oak woodlands and canyons.

Desmodium carpospermum A. Gray. 7809. Rare, on rock walls in Lyle Canyon.

Desmodium grahamii A. Gray. 8041. Rare, oak woodlands and canyons.

Desmodium neomexicanum A. Gray. 7806. Common, oak woodlands.

Desmodium rosei Schubert. 7797. Uncommon, oak woodlands.

Indigofera spathocarpa A. Gray. 8046. Rare, oak woodlands.

Lotus greenii Ortle ex Kearney & Peebles. Elías 8303. Abundant in grasslands and woodlands after wet winters.

Lotus humistratus Greene. 7451. Uncommon, grasslands, woodlands, and washes.


Lupinus breviculatus S. Watson. 7450. Uncommon spring annual, grasslands and washes.


Macropodium gibbosifolium (Ortega) A. Delgado [Phaseolus heterophyllus Willd.]. 7703. Uncommon, grasslands and woodlands.

Marina calycosa (A. Gray) Barneby [Dalea calycosa A. Gray]. 7545. Rare, washes.


Mimosa aculeaticarpa Ortega var. biuncifera (Bentham) Barneby [Mimosa biuncifera Bentham], Williams & Ogden s.n., October 2, 1971. Locally abundant in grasslands, common in woodlands and canyons.


Mimosa grahamii A. Gray. 7538. Uncommon, oak woodlands.


Phaseolus rutensis M. E. Jones. 7859. Rare, grasslands.

Prosopis glandulosa Torrey var. torreyana (L. D. Benson) M. C. Johnston. [P. juliflora (Swartz) DC. var. torreyana L. D. Benson]. Rare, grasslands.

Prosopis velutina Wooton [P. juliflora (Swartz) DC. var. velutina (Wooton) Sarg.]. Elías 8341. Abundant in grasslands in northern part of the Research Ranch, common elsewhere in grasslands and woodlands.


Rhynchosia senna Gillies ex Hook var. texana (Torrey & A. Gray) M. C. Johnston [R. texana...
Senna bauhinoides (A. Gray) Irwin & Barneby
[Cassia bauhinoides A. Gray]. Geiger 2. Uncommon, grasslands.
Tephrosia tenella A. Gray. Geiger 50. Rare, rock outcrops in Post Canyon.

Fagaceae
Quercus oblongifolia Torrey. 8805. Uncommon, grassland on Bald Hill.
Quercus turbinella Greene. 7885. Rare, one plant noted along drainage east of lower O'Donnell Canyon.

Fouquieriaceae
Fouquieria splendens Engelm. ssp. splendens. Elias 8489. Locally common, calcaeous grassland.

Fumariaceae

Garryaceae
Garrya wrightii Torrey. Elias 9023. Rare, woodlands and canyons.

Gentianaceae
Centaurium calycosum (Buckl.) Fern. var. calycosum. 7887. Rare, in stream, upper O'Donnell Canyon.

Geraniaceae

Grossulariaceae
Ribes aureum Pursh var. aureum. 7461. Rare, a few shrubs in Post Canyon above the reservoir.

Hydrophyllaceae
Phacelia coerulea E. L. Greene. 7485. Uncommon, grasslands and woodlands.

Juglandaceae

Krameria erecta Wild. ex J. A. Schultes [K. parviflora Bentham], 7492. Locally common in calcaeous grasslands.

Lamiaceae
Hedeoma dentatum Torrey. 7638. Uncommon, canyons.
Hedeoma drummondii Bentham. 7609. Rare, Post Canyon.
Scutellaria potosina T. S. Brandeg. ssp. platyphylla Epling. Geiger 19. Rare, along stream bottom in Post Canyon below reservoir.
Trichostema arizonicum A. Gray. Geiger 43. Rare, on rock walls in Lyle Canyon.

Linaceae
Linum puberulum (Engelm.) Heller. 7494. Uncommon, grasslands.

Loasaceae
Mentzelia albicaulis Hooker. 7573. Common, washed and disturbed areas.
Mentzelia isalata Getty [M. asperula Wooton & Standley]. 7772. Uncommon, oak woodlands
Mentzelia multiflora (Nutt.) A. Gray. 7350. Uncommon, disturbed sites.

Lythraceae
Cuphea wrightii A. Gray. 7804. Rare, oak woodlands in Lyle Canyon.
Lythrum californicum Torrey & A. Gray. 7558 Rare, found in Post Canyon and at Finley Tank.

Malpighiaceae
Aspicarpa hirtella L. C. Richard. 7796 Uncommon, oak woodlands.

Malvaceae
Anoda cristata (L.) Schltdl. 7708. Uncommon canyons.
Rhynchosida physocarpa (A. Gray) Fryxell. 7555 Uncommon, grasslands.
Sida abietifolia P. Mill [S. procumbens Sw.], 7338 Common, grasslands.
Sida neomexicana A. Gray. 7324. Common, grasslands.
Sida spinosa L. 7322. Common, grasslands.
Sphaeralcea angustifolia (Cav.) G. Don ssp. cuspidata (A. Gray) Kearney. 7372.
Uncommon, mostly in washes.

Molluginaceae
*Mollugo verticillata L. 7281. Abundant, grasslands and woodlands.

Nyctaginaceae
Allionia incarnata L. Geiger 29. Common, grasses, washes, disturbed sites.
Boerhavia coulteri (Hooker f.) S. Watson. 7851.
Uncommon, washes.
Boerhavia purpurascens A. Gray. 7693.
Uncommon, canyons.
Mirabilis cocinea (Torrey) Benth. & Hooker f. [Oxybopus cocineus Torrey]. 7537.
Uncommon, oak woodlands.

Oleaceae
Fraxinus velutina Torrey. 7610. Common, canyons.

Onagraceae
Calylophus hartwegii (Bentham) Raven ssp. pubescens (A. Gray) Towner & Raven [Oenothera greggii A. Gray]. 7498. Locally common, calcareous ridgetops.
Epilobium canum (Greene) Raven ssp. latifolium (Hooker) Raven [Zauschneria latifolia (Hooker) Greene var. arizonica (Davidson) Hilend]. 7707. Uncommon, canyons.
Epilobium ciliatum Raf. ssp. ciliatum [E. californicum Haussk]. 7547. Rare, upper O'Donnell Canyon.
Gaura cocconia Nutt. ex Pursh. 7506.
Uncommon, woodlands.
Oenothera caespitosa Nutt. ssp. marginata (Nutt. ex Hooker & Am.) Munz. 7488. Uncommon, grasslands and woodlands.
Oenothera rosea L'Hérit. ex Ait. 7513. Uncommon, along streams at Finley Tank.

Oxalidaceae
Oxalis drummondii A. Gray [O. ampeloplia (Trel.) Knuth]. 8040. Rare, Post Canyon.

Papaveraceae
Argemone pietanica Greene ssp. pietanica. 7551. Common, washes and disturbed areas.

Pedaliaceae

Plantaginaceae
Plantago patagonica Jacq. 7575. Uncommon, grasslands, woodlands, and washes.
*Plantago virginica L. Noel 17. Uncommon, springs.

Platanaceae

Polemoniaceae
Gilia mexicana A. D. Grant & V. Grant. 7456.
Common, grasslands and washes.
Ipomopsis macombii (Torrey ex A. Gray) V. Grant [Gilia macombii Torrey]. 7623. Uncommon, canyons and oak woodlands.
Ipomopsis thurberti (Torrey ex A. Gray) V. Grant [Gilia thurberti Torrey]. 7637. Rare, Lyle Canyon.

Polygalaceae
Mornina wrightii A. Gray. 8064. Uncommon, woodlands and canyons.
Polygala albo Nutt. 7347. Uncommon, grasslands.
Polygala barbeyana Chad. [P. longa Blake]. 7308. Uncommon, grasslands.
Polygala hemipterocarpa A. Gray. 7539. Rare, grasslands.

Polygonaceae
Eriogonum aberti Torrey var. aberti. Geiger 27. Locally common, grasslands.
Eriogonum polycadum Bentham. 7870. Common, roadsides, other disturbed sites.
Eriogonum wrightii Torr. ex Bentham var. wrightii. 7533. Common, mostly in grasslands.
Polygonum amphitrichum L. var. emersum Michx. [P. coccineum Muhl.]. 7846. Rare, in standing water, Post Canyon.
Polygonum pensylvanicum L. 7844. Rare, seasonally wet depression near Post Canyon.
Polygonum punctatum Ell. var. punctatum. 7771. Rare, Post Canyon.
*Rumex crispus* L. 7574. Uncommon, wet ground around tanks.
*Rumex salicifolius* Weim. var. mexicanus (Mein.) C. L. Hitchc. [*R. triangulivalvis* (Danser) Rech. f.]. 8132. Rare, depression below dormitory.

**Portulacaceae**

*Portulaca oleracea* L. [*P. retusa* Engelm.]. 7853. Uncommon, washes.
*Portulaca oleracea var. spathulata* Engel. 7292. Common, grasslands.
*Talinum punctatum* (Jacq.) Gaertn. var. *punctatum* Geiger 35. Rare, oak woodlands.

**Primulaceae**

*Androsace occidentalis* Pursh. 7444. Rare, oak woodlands.

**Ranunculaceae**

*Clematis drummondii* Torrey & A. Gray. *Elias* 8962. Rare, oak woodlands.
*Mycosaret cupulatus* S. Watson. 7445. Rare, oak woodlands.
*Ranunculus macranthus* Scheele. 7947. Rare, wet ground, upper O’Donnell Canyon.

**Rhamnaceae**

*Ceanothus greggi* A. Gray ssp. *greggi* *Elias* 9329. Rare, oak woodlands, Post Canyon.

**Rosaceae**

*Rhus discolor* Wege & Nees [*Rhus procerus* P. J. Mull]. 8797. Abundant at Finley Tank, where displacing native vegetation.

**Rubiaceae**

*Diodia teres* Walter var. *angustata* A. Gray, Geiger 47. Uncommon, grasslands and woodlands.
*Galium wrightii* A. Gray. Rare, canyons.

*Houstonia rubra* Cav. Martin & Stromberg, s.n., April 24, 1987. Rare, oak woodlands.
*Mitracarpus breviflorus* A. Gray. Geiger 48. Rare, shallow soils on rock outcrops, Post Canyon.

**Salicaceae**

*Salix lasiolepis* Benth. 7568. Uncommon, along creek in Lyle Canyon.
*Salix taxifolia* Kunth. *Elias* 9336. Rare, washes and canyons.

**Sapindaceae**


**Scrophulariaceae**

*Brachyaglottis wrightii* (A. Gray) Pennell. *Elias* 8930. Rare, oak woodlands.
*Castilleja integra* A. Gray var. *integra*. 7457. Uncommon, canyons.
*Mimulus guttatus* DC. *Elias* 8406. Common along streams in canyons.
*Penstemon dasyphyllus* A. Gray. 7491. Uncommon, grasslands and woodlands. Blooming in both the spring and fall at the Research Ranch.
*Schizanthus intermedia* (A. Gray) Pennell. 7273. Uncommon, woodlands and canyons.

**Solanaceae**

*Chamaesara chaconiana* (Dunal) A. Gray. 8121. Uncommon, washes, disturbed areas.
*Datura jerox* L. [*D. quercifolia* Kunth]. 8026. Rare, washes.
*Datura wrightii* Regel [*D. meteloide DC*.] *Elias* 8428. Uncommon, washes, disturbed areas.
*Margaranthus solanaceus* Schultl. 7343. Common, oak woodlands.
*Physalis longifolia* Nutt. Fugate 37, ARIZ. Rare, washes.
*Solanaeum deflexum* Greenm. 8109. Rare, oak woodlands in Post Canyon.
Solanum douglasii Dunal. 7633. Rare, Lyle Canyon.
Solanum elaegnifolium Cav. Geiger 5. Uncommon, grasslands and disturbed areas.
Solanum fendleri A. Gray var. fendleri. 8039. Rare, canyons.
Solanum rostratum Dunal. 8133. Rare, depressed areas, disturbed areas.

Ulmaceae

Celtis laevigata Willd. var. reticulata (Torrey) L. D. Benson [C. reticulata Torrey]. 8803. Rare, Post Canyon.

Verbenaceae

Bouchea prismatica (L.) Kuntze. 7768. Rare, Post Canyon.

Glandularia bipinnatifida (Nutt.) Nutt. var. binnatifida. 7387. Uncommon, washes, grasslands, woodlands.

Phyla incisa Small. Reported by E. Geiger from disturbed areas around Headquarters.

Tetraceae coulteri A. Gray. 7280. Uncommon, grasslands.

Verbena gracilis Desf. 7603. Locally common in grasslands.


Violaceae

Hybanthus verticillatus (Ortega) Baill. 7512. Common, grasslands.

Viscaceae

Phoradendron villosum (Nutt.) Nutt. ssp. coryae (Trel.) Wiens [P. coryae Trel.]. 7866. Rare, on Quercus arizonica.

Vitaceae

Parthenocissus quinquefolia (L.) Planch. [P. inserta (Kerner) K. Fritsch]. Rare, upper O’Donnell Canyon.


Zygophyllaceae


ANGIOSPERMS – MONOCOTYLEDONS

Agavaceae

Agave palmeri Engelm. Locally abundant on ridgetops.

Agave parryi Engelm. var. huachucensis (Baker) Little. Rare, a few colonies in grasslands in southeastern part of the Research Ranch.

Yucca elata (Engelm.) Engelm. var. elata. Uncommon, grasslands.

Yucca schottii Engelm. Uncommon, canyons and woodlands.

Commelinaceae

Commelina dianthifolia Delile var. dianthifolia. 7296. Common, grasslands and woodlands.


Cyperaceae

Carex lanuginosa Michx. 7502. Rare, springs at Finley Tank.

Cyperus esculentus L. 7987. Uncommon, mostly disturbed areas.

Cyperus odoratus L. 8131. Uncommon, edges of tanks.


Cyperus squarrosus L. [C. aristatus Roth.] 7774. Rare, Post Canyon.


Scirpus maritimus L. 7363. Uncommon, Finley Tank.

Iridaceae

Sisyrinchium demissum Greene. 7501. Rare, springs at Finley Tank.

Juncaceae

Juncus interior Wieg. var. arizonicus (Wieg.) F. J. Herm. 7560. Rare, springs at Finley Tank.


Juncus saximontanus A. Nelson. 7561. Rare, Finley Tank.

Lemnaceae

Lemna minor L. Elias 9116. Rare, Post Canyon.

Liliaceae

Calochortus ambiguus (M. E. Jones) Ownbey. 7484. Rare, grasslands.


Dichostemma pulchellum (Salisb.) Heller var. pauciflorum (Torrey) Hoover. 7449. Uncommon, grasslands.


Milla biflora Cav. 7270. Rare, oak woodlands.

Nolinaceae

Dasylirion wheeleri S. Watson. Locally abundant, grasslands.

Poaceae

*Agrostis stolonifera* L. 7946. Locally common, canyons.

*Agrostis stolonifera* L. var. longiseta (Steud.) Vasey. *A. longiseta Steud.* 7540. Locally abundant, grassland.


*Agrostis ternipes* Cav. var. hamulosa (Hent.) Trent [A. hamulosa Hent.] 8035. Common, grasslands, woodlands, and canyons.


*Bothriochloa barbinodis* (Lag.) Herter [Andropogon barbinodis (Lag.) 7339. Abundant, grasslands and woodlands.

*Bothriochloa ischaemum* (L.) Keng. Rare, a single patch found near north entrance to the Research Ranch by Robert Whitcomb.

*Bouteloua aristidoides* (Kunth) Grassland. var. aristidoides. 8066. Uncommon, washes, grasslands.

*Bouteloua chondroplana* (Kunth) Bentham. ex S. Watson. 7320. Abundant, grasslands, woodlands, and canyons.

*Bouteloua curtipendula* (Michx.) Torrey var. curtipendula. 7269. Abundant, grasslands, woodlands, and canyons.


*Bouteloua eriopoda* (Torrey) 7285. Locally common, calcareous grasslands.


*Bouteloua hirsuta* Lag. var. hirsuta. 7311. Common, grasslands and woodlands.

*Bouteloua himalayica* (Fourn.) Griffiths. Geiger 42. Uncommon, oak woodlands.

*Bouteloua repens* (Kunth) Scribn. & Merr. [B. filiformis (Fourn.) Griffiths.] 7339. Uncommon, grasslands.


*Bromus ramosus* Rupr. ex Fourn. 7805. Uncommon, washes and canyons.

*Bromus catharticus* Vahl. 7517. Uncommon, wet ground in canyons.

*Centratherus californicus* Walter [C. pauciflorus (Benth.)] *Elias 8357. Uncommon, washes, disturbed areas.

*Chloris virginia* Swartz. *Tomlinson 792. Common, washes, disturbed areas.


*Digitaria cognata* (J. A. Schultes) Pilger [Leptoloma cognata (J. A. Schultes) Chase]. 8033. Rare, grassland, limestone outcrops.

*Echinachloa crus-galli* (L.) Beauv. 7775. Uncommon, wet areas.


*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

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*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

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*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.

*Elymus trachycaulus* (Link) Gould ex Shinners ssp. trachycaulus [Agropyron trachycaulus (Link) Male]. 7590. Rare, spring at Finley Tank.
Leptochloa dubia (Kunth) Nees. 7334. Common, grasslands and woodlands.

Lycurus setosus (Nutt.) C. G. Reeder. 7287. Common, grasslands.

Muhlenbergia arenicola Buckl. Tomlinson 832. Locally common, Bald Hill.

Muhlenbergia arizonica Scribn. 7771. Uncommon, canyons.

Muhlenbergia asperifolia (Nees & Meyen ex Trin.) Parad. 8112. Rare, one patch in grassland near north entrance to the Research Ranch.

Muhlenbergia emersleyi Vasey. 7342. Uncommon, oak woodlands.

Muhlenbergia fragilis Swallen. Geiger 49. Uncommon, grasslands.1

Muhlenbergia rigens (Benth.) A. S. Hitchc. 7876. Abundant, canyon bottoms.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.

Muhlenbergia tenella (Kunth) Trin. [Muhlenbergia monticola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

*Panicum antisoideae Retz. Williams & Ogden s.n., October 2, 1971. Rare, grassland.

Panicum bulbosum Kunth. 7629. Common, grasslands and canyons.

Panicum hallii Vasey. 7598. Uncommon, grasslands and woodlands.


Panicum obtusum Kunth. 7339. Locally abundant, grasslands, woodlands, and canyons.

*Paspalum dilatatum Poiret. 7773. Rare, wet ground in Post Canyon.

Paspalum distichum L. 7362. Common at Finley Tank.

Paspalum setaceum Michx. Tomlinson 753. Rare, canyons.

*Phalaris canariensis L. 7505. Rare, disturbed sites.


*Polypogon monspeliensis (L.) Desf. Elias 8356. Uncommon, wet areas.

*Polypogon viridis (Gouan) Breistr. [Agrostis semivercillata (Forsk.) C. Chr.]. 7364. Uncommon, Finley Tank.


Schizachyrium sanguineum (Retz.) Alston var. hirtiflorum (Nees) Hatch [Andropogon hirtiflorus (Nees) Kunth]. 7877. Uncommon, woodlands and canyons.

Setaria grisebachii Fourn. 7879. Common, woodlands and woodlands.


Sphenopholis obtusa (Michx.) Scribn. 7503. Rare, springs at Finley Tank.

Sporobolus cryptandrus (Torrey) A. Gray. 7869. Common, woodlands and grasslands.

Sporobolus wrightii Munro ex Scribn. Abundant, washes.

Stipa neomexicana (Thuem.) Scribn. 7496. Locally common, calcareous grasslands.


*Triticum aestivum L. 7504. Rare, disturbed sites.

Vulpia octoflora (Walt.) Rydb. [Festuca octoflora Walt.]. 7448. Uncommon, grasslands.

**Potamogetonaceae**

*Potamogeton foliosus Raf. var. foliosus. 7565. Rare, standing water in Post Canyon.

**Typhaceae**


Typha latifolia L. Geiger 9. Rare, Post Canyon.

**ACKNOWLEDGMENTS**

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**LITERATURE CITED**


