FLORA OF THE APPLETON-WHITTELL 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 m to 1570 m. The known vascular flora comprises 81 families, 290 genera, 473 native species, and 38 exotic species. One species, Lygodesmia ramosissima, 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 Coronado 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 Appletons 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 northeastern 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 1430 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 northeastern 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 species of the genera Bouteloua, 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. 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 saocation (Spodomma wrightii) 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 “monsoonal” 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 Headquarters (432 mm), San Rafael Ranch (441 mm) and Canelo (453 mm).
The Appleton-Whittell Research Ranch

Figure 1. Map of the Appleton-Whittell Research Ranch, with index map showing its location in northeastern Santa Cruz County, Arizona.

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 Canyon, O'Donnell Canyon, and Turkey Creek have sandy loams in the Grabe-Comoro 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 middle 1980s. 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 (Mason 1998), Loasaceae (Cheney 1998), Rubiaceae (Dempster 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 occurrence in local floras (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.), Chamaesyce (7 spp.), and Baccharis, Asteraceae, Aristida, and Errogrossis, each with 6 species.

A new species for the flora of Arizona, Lygodesmia ramosissima, was found during this study. This species is sparsely distributed from west Texas to Durango (Correll and Johnston 1970). Several plants were seen only in grassland vegetation on a grassy slope near the 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>

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 highest to the west.
Table 4. Floristic elements in the flora of the Appleton-Whittell Research Ranch, with their mean percentage incidence in samples of 40 local floras from the western US, 32 local floras from Mexico, and 40 floras 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</td>
<td>166</td>
<td>35.1</td>
<td>9.1</td>
<td>13.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Chihuahuan</td>
<td>41</td>
<td>8.7</td>
<td>11.0</td>
<td>9.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Sonoran</td>
<td>42</td>
<td>8.9</td>
<td>30.4</td>
<td>10.7</td>
<td>7.2</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-Whittell Research Ranch with other local floras, 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 floristic 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 least 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. 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 regions; (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

Argyrochosma limitanea (Maxon) Windham [Pellaea limitanea (Maxon) Morton] 7862. Rare, limestone outcrop adjacent to upper Turkey Creek.

Astrolepis cochisensis (Goodding) Benham & Windham [Notholaena sinuata (Lag.) Kaulf. var. cochisensis (Goodding) Weatherby] 7864B. Rare, limestone outcrops.

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

Astrolepis sinuata (Lag. ex Sw.) Benham & Windham ssp. sinuata [Notholaena 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 lindheimeri Hooker. 7793. Uncommon, oak woodlands.

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

GYMNOSPERMS

Cupressaceae


Ephedraceae

Ephedra trifurca Torrey ex S. Watson. Elias 8463. 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.


Amaranthus torreyi (A. Gray) Benth. 8031. Uncommon, grasslands.


Gomphrena nitida Rothrock. 7791. Uncommon, grasslands and woodlands.

Gomphrena sonorae Torrey. 7765. Common in grasslands, uncommon in woodlands.


Anacardiaceae

Rhiz microphylla Engelm. ex A. Gray. Elias 8943. Rare, grasslands.

Rhus triloba Lindb. ex A. Gray var. anisophylla (Greene) Jepson. Elias 8352. Uncommon, woodlands.

Rhus vigilis Lindb. ex A. Gray var. choriophylla (Wooton & Standley) L. D. Benson [R. choriophylla Wooton & Standley]. Elias 9313. Uncommon, grasslands and woodlands.

Toxicocdendron rydbergii (Small ex Rydb.) Greene [Rhus radicans L. var. rydbergii (Small ex Rydb.) Rehder]. 8801. Uncommon, canyons.

Apioaceae

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


Apocynaceae

Apocynum cannabinum L. 7889. Rare, along stream in upper O'Donnell Canyon.

Microsiphonia brachysiphon (Torrey) A. Gray. Uncommon on steeper, calcareous slopes adjacent to O'Donnell Canyon.

Asclepiadaceae


Asclepias involucrata Engelm. ex Torrey. 7453. Rare, grasslands and woodlands.


Asclepias nyctaginifolia A. Gray. 7607. Uncommon, grasslands, woodlands, and washes.

Asclepias quinquenervia A. Gray. 7991. Rare, oak woodlands in Post Canyon.

Asclepias subverticillata (A. Gray) Vail. 7579. Uncommon, grasslands, woodlands, and washes.

Asclepias uncinus Greene ssp. uncinus. Peterson et al. s.n. (ARIZ). Rare, grasslands.

Sarcostemma crispum Bentham [Funastrum crispum (Bentham) Schlechter]. 7557. Rare, grasslands.

Asteraceae

Acourtia nana (A. Gray) Reveal & King [Perezia nana A. Gray]. Anonymous, August 27, 1987. Rare, below mesquites in grasslands.

Acourtia 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 confertiflora DC. [Franeria confertiflora (DC.) Rydb.] 7846. Common, grasslands, washes, and disturbed sites.

Ambrosia psilostachya DC. 7867. Common, grasslands and woodlands.

Artemisia campesiira L. ssp. pacifica (Nutt.) Hall & Clements. [A. pacifica Nutt.] 7788. Rare, along creek in Post Canyon.


Artemisia ludoviciana Nutt. ssp. sulcata (Rydb.) Keck. 7695. Common, canyons.

Aster falcatius Lindl. var. crassulus (Rydb.) Cronq. [Aster commutatus (Torrey & A. Gray) A. Gray var. crassulus (Rydb.) Blake] 7363. Rare, Finley Tank.

Aster subulatus Michx. var. ligulatus Shinners [Aster exilis Ell.] 7365. Rare, along stream in Lyle Canyon.


Baccharis neglecta Britton. 8798. Rare, in wash below Finley Tank.


Baccharis thesioides Kunth. 7789. Rare, below oaks.

Bahia absinthifolia Bentham var. dealbata (A. Gray) A. Gray. 7323. Uncommon, calcareous grasslands.

Bahia dissecta (A. Gray) Britton. 7711. Uncommon, oak woodlands.


Bidens aurea (Aiton) Sherff. 7875. Rare, along stream in Lyle Canyon.

Bidens bigelovii A. Gray. 7802. Uncommon, oak woodlands in Lyle Canyon.

Bidens ferulifolia (Jacq.) DC. 7874. Rare, along stream in Lyle Canyon.

Bidens leptocepha1a Sherff. 7320. Abundant below oaks.


Brickellia californica (Torrey & A. Gray) A. Gray var. californica. 8884. Uncommon, canyons.

Brickellia europorum (L.) Shinners var. chlorolepis (Wooton & Standley) B. L. Turner [Kuhnia rosmarinifolia Vent var. chlorolepis (Wooton and Standley) Blake]. 7536. Common, oak woodlands and grasslands.

Brickellia floribunda A. Gray. 8127. Common late-fall bloomer in washes.

Carminatia tenuiflora DC. 7776. Uncommon below oaks in woodlands and riparian areas.

Carphoa eae bigelovii A. Gray. 7463. Rare, found on rocks in Post Canyon.


Cirsium neomexicanum A. Gray. Uncommon, grasslands.

Cypressia chilense (DC.) Cav. Rare, mostly in washes.

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


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

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

Gaillardia pinnatifida Torrey. 7486. Uncommon, grasslands, riparian areas.


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

Gnaphalium striatum Kunth [Gnaphalium chilense Spreng]. 7574B. 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.

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

Helianthus petiolaris Nutt. ssp. petiolaris. 8067. Uncommon, adjacent to stream in Lyle Canyon.

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

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

Heliospermum 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 tenuissima Greene [Alopappus tenuissima (Green) Blake]. 7324. Common to abundant in grasslands.


Lygodesmia ramosissima Greene. 7340. Rare, calcareous grasslands east of lower O’Donnell Canyon.


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

Machaeranthera tagetinus [Aster tagetinus (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.

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

Sanvitalia aberti A. Gray. 7276. Uncommon, woodlands and canyons.


Solidago velutina DC. [S. sparsiflora A. Gray]. 7787. Rare, in Post Canyon south of Headquarters.
Descurainia pinnata


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

Thelesperma 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. Uncommon, oak woodlands.

Verbascum encelioides [Cav.] Bentham & Hooker f. ex A. Gray ssp. exauriculata (Robins. & Greene.) J. R. Coleman. 7604. Common, washes, seasonally wet depressions.

Verbascum rotbrotcii Robins. & Greene. Elias 72550. Rare, oak woodlands.

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

Viguiera dentata (Cav.) Spreng. var. dentata. 7792. Common, oak woodlands, 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. arcuata (Fosb.) Heinrichson. 7571. Common in lower O'Donnell Canyon.

Boraginaceae


Lithospermum incisum Lehman. 7328. Common, grasslands.


Brassicaceae

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

Descurainia pinnata (Walt.) Britton ssp. halictorum (Cockerell) Dettling. 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.


Rotippa nasturtium-aquaticum (L.) Hayek. Elias 8446. Rare, upper portions of O'Donnell Canyon.


*Sisymbrium altissimum L. Anonymous, April 19, 1987. Rare, disturbed sites.

*Sisymbrium trios L. 7986. Uncommon, disturbed sites.

Cactaceae

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

Echinocereus fendleri (Engelm.) F. Seitz var. rectispinus (Peebles) L. D. Benson. Uncommon, grasslands.

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

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

Mammillaria heyderi Muehlenfelt var. macdougallii (Rose) D. Benson [M. macdougallii Rose]. Rare, grasslands, rock outcrops.


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

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


Campanulaceae

Lobelia cardinalis L. ssp. cardinalis [L. cardinalis L. ssp. graminea (Lam.) McVaugh]. Geiger 30. Rare, spring at Finley Tank.

Capparaceae

Caprifoliaceae

Sambeus mexicana K. Presl ex DC. 7570. Rare, Post Canyon.

Caryophyllaceae

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

Drymaria molluginea (Lag.) D. Dietr. [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 rarely flowering.

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


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

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

Ipomoea cristata Hallier f. Elias 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 lindheimeri Muell. Arg. 7612. Uncommon, washes and canyons.


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


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


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


Chamaesyce stictospora (Engelm.) Small [Euphorbia stictospora Engelm.]. 8036. Uncommon, grasslands and washes.


Euphorbia bilobata Engelm. 7355. Rare, washes.

Euphorbia excipulata Engelm. Rare, calcareous grasslands.


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

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


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

Fabaceae


_Amorpha fruticosa_ L. 7567. Rare, Post Canyon.

_Astragalus allachrous_ A. Gray. _Elias_ 8317. Uncommon winter annual, mostly in grasslands.

_Astragalus arizonicus_ A. Gray. 7447. Uncommon, grasslands.


_Astragalus nothoxys_ A. Gray. 7441. Abundant in grasslands and woodlands following wet winters.

_Astragalus nuttallianus_ DC. var. _nuttallianus_ Liston 739-5. Uncommon, grasslands.

_Astragalus thurberi_ A. Gray. _Elias_ 8393. Uncommon, grasslands.

_Calliandra eriophylla_ Bentham var. _eriophylla_. Common, grasslands.


_Chamaecrista nictitans_ (L.) Moench ssp. _nictitans_ var. _leptadenia_ (Greenm.) Gandhi & Hatch [Cassia _leptadenia_ Greenm.]. 7282. Common, grasslands and woodlands.

_Colagonia angustifolia_ Kunth [C. _longifolia_ A. Gray]. 8110. Rare, Post Canyon.

_Coquesia carthae_ (Jacq.) Lavin var. _sericea_ (A. Gray) Lavin [Cracca _edwardsii_ 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 _exiguus_ A. Gray]. _Elias_ 8945. Rare, along stream in Lyle Canyon.

_Dalea formosa_ Torrey. 7497. Locally common in calcareous grasslands.


_Dalea jamesii_ (Torrey) Torrey & A. Gray. 7564. Rare, grasslands.

_Dalea lachnostachys_ A. Gray. 8038. Uncommon, grasslands.

_Dalea mara_ var. _ex A. Gray var. canescens_ Kearney & Peebles. 7632. Common, grasslands.

_Dalea neomexicana_ (A. Gray) Cory var. _neomexicana_. 7500. Rare, calcareous grasslands.

_Dalea pogonathera_ A. Gray. 7535. Uncommon, grasslands.

_Dalea versicolor_ Zucc. ssp. _versicolor_ var. _sessilis_ (A. Gray) Barneby [D. _wislizenii_ A. Gray]. 7350. Rare, oak woodlands.

_Desmanthus coleyi_ (Eaton) Trel. 7293. Common, grasslands.


_Desmodium cinerascens_ 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. Uncommon, oak woodlands.

_Desmodium rosei_ Schubert. 7797. Uncommon, oak woodlands.

_Indigofera sphaerocarpa_ A. Gray. 8046. Rare, oak woodlands.

_Lotus greenei_ Ottley ex Kearney & Peebles. _Elias_ 8303. Abundant in grasslands and woodlands after wet winters.


_Lupinus brevicaulis_ S. Watson. 7450. Uncommon spring annual, grasslands and washes.


_Marina calycosa_ (A. Gray) Barneby [Dalea _calycosa_ A. Gray]. 7545. Rare, washes.


_Phaseolus ritenis_ M. E. Jones. 7839. Rare, grasslands.

_Prospis glandulosa_ Torrey var. _torreyana_ (L. D. Benson) M. C. Johnston [P. _juliflora_ (Swartz) DC. var. _torreyana_ L. D. Benson]. Rare, grasslands.

_Prospis velutina_ Wooton [P. _juliflora_ (Swartz) DC. var. _velutina_ (Wooton) Sarg.] _Elias_ 8341. Abundant in grasslands in northern part of the Research Ranch, common elsewhere in grasslands and woodlands.


_Rhynchosia senna_ Gillies ex Hooker var. _texana_ (Torrey & A. Gray) M. C. Johnston [R. _texana_

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. ~885. Rare, one plant noted along drainage east of lower O'Donnell Canyon.

Fouquieriaceae
Fouquieria splendens Engelm. ssp. splendens. Elias 8489. Locally common, calcareous 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

Krameriaeae

Lamiaceae
Hedeoma dentatum Torrey. 7638. Uncommon, canyons.
Hedeoma drummondii Bentham. 7609. Rare, Post Canyon.

Mentzelia albicaulis Hooker. 7573. Common, washes and disturbed areas.
Mentzelia multiflora (Nutt.) A. Gray. 7550. Uncommon, disturbed sites.

Lythraceae
Cuphea wrightii A. Gray. 7804. Rare, oak woodlands in Lyle Canyon.
Lythrum califor micum 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.) Schidl. 7708. Uncommon canyons.
Rhynchosida physocalyx (A. Gray) Fryxell. 7555 Uncommon, grasslands.
Sida abutifolia F. 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. 7572. Uncommon, mostly in washes.

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

Nyctaginaceae
 Allisonia incarnata L. Geiger 29. Common, washes, grasslands, disturbed sites.
BOerhavia coulteri (Hooker f.) S. Watson. 7831. Uncommon, washes.
BOerhavia purpurascens A. Gray. 7693. Uncommon, canyons.

Oleaceae
Fraxinus velutina Torrey. 7610. Common, canyons.

Onagraceae
Calystegia herbertii (Bentham) Raven ssp. pubescens (A. Gray) Towner & Raven [Oenothera gregii 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 Hausskn.]. 7947. Rare, upper O'Donnell Canyon.
Gaura coccinea Nutt. ex Pursh. 7506. Uncommon, grasslands.
Oenothera caespitosa Nutt. ssp. marginata (Nutt. ex Hooker & Arn.) Munz. 7488. Uncommon, grasslands and woodlands.
Oenothera rosea L'Her. ex Ait. 7513. Uncommon, along streams and at Finley Tank.

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

Papaveraceae
Argemone pleiacantha Greene ssp. pleiacantha. 7551. Common, grasslands and disturbed areas.

Pedaliaceae

Plantaginaceae
Plantago patagonica Jacq. 7575. Uncommon, grasslands, woodlands, and washes.

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 thurberi (Torrey ex A. Gray) V. Grant [Gilia thurberi Torrey]. 7637. Rare, Lyle Canyon.

Polygalaceae
Monnina wrightii A. Gray. 8064. Uncommon, woodlands and canyons.
Polygala alba Nutt. 7541. Uncommon, grasslands.
Polygala hemipterocarpa A. Gray. 7539. Rare, grasslands.

Polygonaceae
Eriogonum abertianum Torrey var. abertianum. Geiger 27. Locally common, grasslands.
Eriogonum polycodon Benth. 7870. Common, roadsides, other disturbed sites.
Eriogonum wrightii Torrey ex Benth. var. wrightii. 7333. Common, mostly in grasslands.
Polygonum amphibium 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. 7777. Rare, Post Canyon.
*Rumex crispus* L. 7574. Uncommon, wet ground around tanks.
*Rumex salicifolius* Weinm. var. *mexicanus* (Meisn.) C. L. Hitch. [R. *trianagulalvus* (Danser) Rech. f.]. 8132. Rare, depression below dormitory.

**Portulacaceae**
*Portulaca umbrosa* Kunth var. *xalapensis* (Kunth) A. Gray var. *xalapensis* (Kunth) S. Watson. 7947. Rare, oak woodlands.
*Portulaca oleracea* var. *macranthos* (Jacq.) Gaertn. var. *paniculatum* Geiger 35. Rare, oak woodlands.

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

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

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

**Rosaceae**
*Salix exigua* Nutt. Elias 8452. A single dense stand in upper Turkey Creek canyon.
*Salix lasiolepis* Benth. 7568. Uncommon, along creek in Lyle Canyon.
*Salix taxifolia* Kunth. Elias 9336. Rare, washes and canyons.

**Sapindaceae**

**Scrophulariaceae**
*Brachystegia wrightii* (A. Gray) Pennell. Elias 8930. Rare, oak woodlands.
*Mimulus guttatus* DC. Elias 8406. Common along streams in canyons.
*Penstemon dasypyllus* A. Gray. 7491. Uncommon, grasslands and woodlands. Blooming in both the spring and fall at the Research Ranch.
*Schizanthus intermedia* (A. Gray) Pennell. 7773. Uncommon, woodlands and canyons.

**Solanaceae**
*Chamaesmarica coronopus* (Dunal) A. Gray. 8121. Uncommon, washed, disturbed areas.
*Datura ferox* L. [D. *quercifolia* Kunth]. 8026. Rare, washes.
*Datura wrightii* Regel [D. *meltoleoides* DC]. Elias 8428. Uncommon, washes, disturbed areas.
*Physalis longifolia* Nutt. Fugate 37, ARIZ. Rare, washes.
*Saloinum deflexum* Greenm. 8109. Rare, oak woodlands in Post Canyon.

**Saxifragaceae**
*Salix exigua* Nutt. Elias 8452. A single dense stand in upper Turkey Creek canyon.
*Salix lasiolepis* Benth. 7568. Uncommon, along creek in Lyle Canyon.
*Salix taxifolia* Kunth. Elias 9336. Rare, washes and canyons.

**Sapindaceae**
Solanum douglasii Dunal. 7633. Rare, Lyle Canyon.
Solanum elaeagnifolium Cav. Geiger 5.
Uncommon, grasslands and disturbed areas.
Solanum fendleri A. Gray var. fendleri. 8039.
Rare, canyons.
Solanum rostratum Dunal. 8133. Rare, depressions, disturbed areas.

**Ulmaceae**
Celis 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. bilinatifida. 7587. Uncommon, washes, grasslands, woodlands.
Phyla incisa Small. Reported by E. Geiger from disturbed areas around Headquarters.
Tetraclea 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.
Tradezania pinetorum Greene. Geiger 46.
Uncommon, oak 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 Rothb.] 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. 7360. Rare, springs at Finley Tank.
Juncus saximontanus A. Nelson. 7561. Rare, Finley Tank.

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

**Liliaceae**
Calochortus ambigus (M. E. Jones) Ownbey. 7484. Rare, grasslands.
Calochortus kennedyi Porter. Liston 739-17.
Uncommon, grasslands.
Dichemocteris pulchellum (Salish.) Heller var. pauciflorum (Torrey) Hoover. 7449.
Uncommon, grasslands.
Milla biflora Cav. 7270. Rare, oak woodlands.

**Nolinaceae**
Dasylirion wheeleri S. Watson. Locally abundant, grasslands.
Poaceae

*Bromus anomalus* Nutt. var. longiseta (Steud.) Vasey [A. longiseta Steud.]. 7340. Locally abundant, grasslands.

*Brachiaria arizonica* (Nutt.) Hitchc. 1571. Abundant, grasslands.

*Chloris virgata* (Lam.) Hitchc. 7777. Rare, grasslands.


*Elymus trachycaulus* (Link) Gould ex Shimer var. *trachycaulus* [Agropyron trachycaulus (Link) Mâle]. 7557B. Rare, spring at Finley Tanf.


*Enneapogon dawsonii* Desv. ex Beav. 7858. Common, calcareous grasslands.

*Eriachne aristidoides* (Kunth) Griseb. var. aristidoides. 8066. Uncommon, washes, disturbed areas.


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

*Eriochloa curvula* (Schrad.) Nees (Alf.) ex J. Presl [E. curvula (Schrad.) Nees var. curvula]. 7782. Rare, spring at Finley Tanf.

*Enneapogon dawsonii* Desv. ex Beav. 7858. Common, calcareous grasslands.

*Eriachne aristidoides* (Kunth) Griseb. var. aristidoides. 8066. Uncommon, washes, disturbed areas.

*Eriocaulon scalaris* (Vasey) Hitchc. 7729. Abundant in grasslands, common in woodlands.

*Eriocaulon scalaris* (Vasey) Hitchc. 7729. Abundant in grasslands, common in woodlands.

*Eriocaulon scalaris* (Vasey) Hitchc. 7729. Abundant in grasslands, common in woodlands.


*Erioderia scalaris* (Vasey) Hitchc. 7729. Abundant in grasslands, common in woodlands.


*Enneapogon dawsonii* Desv. ex Beav. 7858. Common, calcareous grasslands.

*Eriachne aristidoides* (Kunth) Griseb. var. aristidoides. 8066. Uncommon, washes, disturbed areas.


Leptochloa dubia (Kunth) Nees. 7334. Common, grasslands and woodlands.
Sporobolus asperifolius (Nees & Meyen ex Trin.) Parodi. 8112. Rare, one patch in grassland near north entrance to the Research Ranch.

Sporobolus contractus. Common, woodlands.
Sorghum halepense var. hirtiflorum (Nees) Hatch. 7840. Common, grasslands.

Setaria viridis (L.) Beauv. 7335. Uncommon, oak woodlands.
Setaria grisebachii Fourn. 7879. Common, woodlands and canyons.
Setaria grisebachii. Common, grasslands and woodlands.
Setaria grisebachii var. hirtiflorum (Nees) K. Schum. 7764. Uncommon, grasslands.

Sorghum halepense var. hirtiflorum. Common, grasslands.

Phalaris canariensis. Common, grasslands.

*Munroa rigens (Benth.) A. S. Hitchc. 7876. Abundant, canyon bottoms.
Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

*Muhlenbergia emersleyi Tomlinson 8342. Rare, wet ground in Post Canyon.
Panicum obtusum Kunth. 7339. Locally abundant, grasslands, woodlands, and canyons.

*Paspalum dilatatum Poir. 7773. Rare, wet ground in Post Canyon.
Paspalum distichum L. 7362. Common at Finley Tank.
Paspalum setaceum Michx. Tomlinson 753. Rare, canyons.
Paspalum setaceum. Rare, disturbed sites.

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


*Polygonoa monspeliensis (L.) Desf. Elias 8356. Uncommon, wet areas.
Polygonoa viridis (Gouan) Breistr. [Agrostis semiverticillata (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 canyons.


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, grasslands.
Stipa nesomexicana (Thunb.) Scribn. 7496. Locally common, calcareous grasslands.

*Tridens muticus. Rare, wet grasslands.

Panicum hirticaule. Common, woodlands and grasslands.

*Muhlenbergia arenicola Buckl. 810. Rare, oak woodlands.
Muhlenbergia arenicola. Rare, oak woodlands.

Lycurus amiaotale (Nees) Hatch. 807.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

Abundant, canyon bottoms.

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

*Paspalum dilatatum Poir. 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.


*Polygonoa monspeliensis (L.) Desf. Elias 8356. Uncommon, wet areas.
Polygonoa viridis (Gouan) Breistr. [Agrostis semiverticillata (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 canyons.


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, grasslands.
Stipa nesomexicana (Thunb.) Scribn. 7496. Locally common, calcareous grasslands.

*Tridens muticus. Rare, wet grasslands.

Panicum hirticaule. Common, woodlands and grasslands.

*Muhlenbergia arenicola Buckl. 810. Rare, oak woodlands.
Muhlenbergia arenicola. Rare, oak woodlands.

Lycurus amiaotale (Nees) Hatch. 807.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

Abundant, canyon bottoms.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

Abundant, canyon bottoms.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

Abundant, canyon bottoms.

Muhlenbergia rigida (Kunth) Trin. 7360. Rare, calcareous grasslands.
Muhlenbergia tenuifolia (Kunth) Trin. [Muhlenbergia monicola Buckl.]. 7636. Rare, rock outcrops in Lyle Canyon.

Abundant, canyon bottoms.


