Checklist of the vascular flora of the Kaibab Plateau, Coconino County, Arizona

Glenn R. Rink
*Northern Arizona University, Department of Biological Sciences, Box 5640, Flagstaff, AZ 86001,*
faroutbotany@gmail.com

Wendy Hodgson
*Desert Botanical Garden, 1201 N. Galvin Parkway, Phoenix, AZ 85008*

Barbara Goodrich Phillips
*Museum of Northern Arizona, 3101 North Fort Valley Road, Flagstaff, AZ 86001*

Follow this and additional works at: [https://scholarsarchive.byu.edu/mwnan](https://scholarsarchive.byu.edu/mwnan)

**Recommended Citation**
Rink, Glenn R.; Hodgson, Wendy; and Phillips, Barbara Goodrich (2020) "Checklist of the vascular flora of the Kaibab Plateau, Coconino County, Arizona," *Monographs of the Western North American Naturalist*:
Vol. 12 , Article 1.
Available at: [https://scholarsarchive.byu.edu/mwnan/vol12/iss1/1](https://scholarsarchive.byu.edu/mwnan/vol12/iss1/1)

This Monograph is brought to you for free and open access by the Western North American Naturalist Publications at BYU ScholarsArchive. It has been accepted for inclusion in Monographs of the Western North American Naturalist by an authorized editor of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
The Kaibab Plateau (KP), located in Coconino County in northern Arizona and Kane County in southern Utah (Figs. 1, 2), is the southernmost plateau of the high plateaus that extend south through Utah. It is dominated by spruce-fir forests at upper elevations and ponderosa pine forests at lower elevations, with meadows between forested ridges. The dense, shaded spruce-fir forests are a southward extension of a vegetation type that is widespread just below the tundra in the Rocky Mountains and the Intermountain Region (Phillips et al. 1987). This high plateau is separated from similar habitats by deserts in every direction, limiting plant dispersal and reproductive interaction with plants from similar but distant habitats (MacArthur and Wilson 1967).

Our goal was to document the vascular flora of the upper-elevation sky island portion of the KP, as well as provide additional information related to the distribution and relative abundance of species of special concern, such as threatened and endangered species and exotics. Twenty-two Grand Canyon National Park (GRCA) special status plant species listed by Brian (2000), 26 species tracked by the Arizona State Natural Heritage Program (2007–2020a, 2007–2020b), and 20 species considered in Kaibab National Forest planning (Hannemann and Foster 2014) are listed in Table 1. Seven taxa in Table 1 are endemic to the KP and its immediate environs. The KP harbors 2 plant species, Castilleja kaibabensis (Kaibab paintbrush) and Physaria kingii subsp. kaibabensis (Kaibab bladderpod) that are endemic to its high meadows (Reichenbacher 1986, Spence 2006, 2007, Rink 2016). Locating new populations of these special status and endemic plant species was a focus of our 2007–2015 field effort.

**SITE DESCRIPTION**

The study site, which includes upper elevations of the KP, has an elevational range of approximately 2130–2800 m (6900–9200 ft).
The lower elevational limit for this checklist is somewhat arbitrary, with the intention of capturing the unique flora of the upper elevations of the KP and lower portion of the ponderosa pine–Douglas-fir communities. By so doing, we included steep xeric and mesic terrain below the rim as well as hanging gardens. With the exception of the higher regions of the Powell Plateau, high buttes or mesas within GRCA were not included. The boundary of our study area (Fig. 1) is well defined by the upper portions of the rim of the Grand Canyon; where that rim falls below the ponderosa pine zone on the west, our boundary follows the Winter Road (FRs 425, 427, and 423 to FR 22). The boundary continues, making a northern arc with a radius of 8–10 km around Jacob Lake at the lower level of the ponderosa pine zone to the East Side Game Road (FR 220), through Saddle Mountain Wilderness and to the east rim of the KP. Although Rasmussen (1941) places the lower elevational limit of the KP at 1830 m (6000 ft) with an area of 95 km² (60 mi²) by 55 km (35 mi) and 2980 km² (1152 mi²), our study area is ca. 1880 km² (725 mi²).

The northern two-thirds (ca. 1450 km² [560 mi²]) of our study area is Kaibab National Forest (KNF) administered by the North Kaibab Ranger District (NKRD), while the southern third (ca. 430 km² [166 mi²]) is managed by GRCA. The KNF portion of the KP includes the *Pediocactus paradinei* Conservation Area, which is managed to preserve the unique plants there (USDA 1997, Hannemann and Foster 2014), and the Franks Lake Geologic Botanic Area, which is managed to preserve natural features (Hannemann and Foster 2014).

The study area falls north of 36°07’ N latitude and between −111°54’ and −112°23’W longitude at Cape Final and Swamp Point, respectively. United States Geological Survey 7.5-minute topographic quadrangles that cover the study area are the following: Big Springs, Bright Angel Point, Kane Ranch, Cape Royal, Cooper Ridge, De Motte Park, Dog Point, Havasupai Point, House Rock, Jacob Lake, Kanabovnits Spring, King Arthur Castle, Little Park Lake, Point Imperial, Powell Plateau, Shiva Temple, Sovats Spring, Tapeats Amphitheater, Telephone Hill, Timp Point, Walhalla
Geology

The substrate of the Kaibab Plateau is made of up of 5 mostly flat-lying Paleozoic sedimentary formations. Porous Kaibab Limestone caps the majority of the study area. Toroweap Limestone occurs at the floor of several of the deeply incised canyons (i.e., Big Spring Canyon, Kanab Canyon, Kanabownts Canyon, Walla Valley, Crystal Creek, Milk Creek, Outlet Canyon, Thompson Canyon, Fuller Canyon, and Bright Angel Creek). A large meadow in GRCA called the “Basin” has eroded enough to reveal both the Toroweap Limestone and the underlying Coconino Sandstone (Billingsley 2000, Billingsley et al. 2008, 2012, Huntoon et al. 1996). The Toroweap Limestone and the Coconino Sandstone also occur in the study area on steep slopes below the rim (Moore et al. 1960, Huntoon et al. 1996). The deepest canyons erode into the Hermit Shale and Supai Sandstone, formations easily recognized by their red color. Information about the soils of the KP can be found on a U.S. Forest Service–produced map (Brewer et al. 1991).

Flowing, perennial streams on the KP are limited to areas immediately downstream of springs. Dutton (1882, p. 132) observed, “the very absence of these traces of running water constitutes one of the greatest charms of the Kaibab, for every ravine is smooth as a lawn and carpeted with a turf of mountain grass, richly decked with flowers of rare beauty and luxuriance.” Most rainfall and snowmelt seeps into the uppermost 3 stratigraphic layers: the Kaibab, Toroweap, and Coconino formations. Accumulation of fine soils has sealed some sinkholes causing water to be retained, forming small lakes and ponds (Rasmussen 1941, Huntoon 1974), which were included as targets of the work reported on here.

Climate

The KP is mesic compared to the surrounding region. The average annual precipitation at the southern end of the KP at Bright Angel Ranger Station at 2560 m (8400 ft) was 63.88 cm (25.15 in) for the period 1925–2016, while that at the northern end of the KP at Jacob Lake at 2400 m (7900 ft) was 53 cm (20.89 in) from 1916 to 1987 (WRCC 2020). The precipitation is bimodal, primarily falling as snow during the winter, typically with over 254 cm (100 in) of snow annually, reaching depths of 70–100 cm (2–3 ft). The early summer is often dry, but by late summer, monsoonal precipitation arrives nearly every afternoon. These rain showers can be intense but are often spotty in their distribution. The KP portion of GRCA has an average frost-free period of 93 d (Merkle 1954).

Vegetation

Rasmussen (1941), Warren et al. (1982), Galeano (1984), White and Vankat (1993), Moore and Huffman (2004), Binkley et al. (2006), Mast and Wolf (2006), Kearsley et al. (2015), and Sesnie et al. (2012) have contributed to the description of the vegetation of the KP, and their work is summarized here along with the authors’ personal observations.

The higher-elevation forests of the KP are dominated by Picea pungens (blue spruce), Picea engelmannii (Engelmann spruce), Pinus
Table 1. Taxa known to occur on the Kaibab Plateau that have agency rare plant status: 22 GRCA special status species (Brian 2000), 26 species tracked by the Arizona State Heritage Program (https://drive.google.com/drive/folders/0BwLs0i-QWFssMTFXXpISW1Z0Xc), and 20 species considered in Kaibab National Forest Planning (Hannemann and Foster 2014). USDA rankings are as follows:

- **F0** = occurs off the KNF
- **F1** = extremely rare on the KNF
- **F2** = very rare on the KNF
- **F3** = rare and uncommon on the KNF
- **F4** = widespread abundant on the KNF
- **FP** = potential habitat on the KNF but species not known to occur

Frye (2009), Holsten and Phillips (1998), and Phillips (2005a) reported on a variety of KP rare plants.

| Family          | Species name                                      | GRCA special status | AZ status | USDA ranking | Citations                                                                 |
|-----------------|---------------------------------------------------|---------------------|-----------|--------------|---------------------------------------------------------------------------|
| Agavaceae       | *Agave utahensis* subsp. *kaibabensis*             | GRCA                | AZ        | F1           |                                                                                         |
| Apiaceae        | *Aletes macdougallii* subsp. *breviradiatus*       | GRCA                | AZ        |              |                                                                             |
| Apiaceae        | *Pteryxia petrea*                                 | GRCA                | AZ        |              |                                                                             |
| Asclepiadaceae  | *Asclepias hallii*                                | GRCA                | AZ        |              |                                                                             |
| Asteraceae      | *Hymenoxys subintegra*                            | GRCA                | AZ        |              |                                                                             |
| Asteraceae      | *Dieteria bigelovii* var. *macronata*              | GRCA                | AZ        |              |                                                                             |
| Boraginaceae    | *Phacelia filiformis*                             | GRCA                | AZ        |              |                                                                             |
| Brassicaceae    | *Boechera gracilipes*                             | GRCA                | AZ        |              |                                                                             |
| Brassicaceae    | *Draba asprella* var. *kaibabensis*                | GRCA                | AZ        |              |                                                                             |
| Brassicaceae    | *Draba asprella* var. *stelligera*                 | GRCA                | AZ        | F1           | F1                                                                                   |
| Brassicaceae    | *Draba rectiflora*                                | GRCA                | AZ        | F1           | F1                                                                                   |
| Brassicaceae    | *Physaria arizonica*                              | GRCA                | AZ        | F2           | F2                                                                                   |
| Brassicaceae    | *Physaria kingii* subsp. *kaibabensis*             | GRCA                | AZ        | F1           | F1                                                                                   |
| Cactaceae       | *Coryphantha missouriensis*                       | GRCA                | AZ        |              |                                                                                         |
| Cactusae        | *Pediocactus paradox*                             | GRCA                | AZ        | F1           | F1                                                                                   |
| Caryophyllaceae | *Paronychia sessiliflora*                          | GRCA                | AZ        |              |                                                                                         |
| Caryophyllaceae | *Silene rectiramis*                               | GRCA                | AZ        |              |                                                                                         |
| Cyperaceae      | *Carex oreocharis*                                | GRCA                | AZ        | F1           |                                                                                         |
| Ericaceae       | *Phyllocladus empetriformis*                      | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus amphioxys* var. *modestus*             | GRCA                | AZ        | F0           |                                                                                         |
| Fabaceae        | *Astragalus creonophylax*                          | GRCA                | AZ        | F3           |                                                                                         |
| Fabaceae        | *Astragalus humistratus* var. *tenuirimus*         | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus lentiginosus* var. *oropedii*          | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Boechera gracilipes*                             | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus creonophylax*                          | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus humistratus* var. *tenuirimus*         | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus lentiginosus* var. *oropedii*          | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus amphioxys* var. *modestus*             | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus creonophylax*                          | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus humistratus* var. *tenuirimus*         | GRCA                | AZ        |              |                                                                                         |
| Fabaceae        | *Astragalus lentiginosus* var. *oropedii*          | GRCA                | AZ        |              |                                                                                         |
Table 1. Continued

| Family          | Species name                  | GRCA special status | AZ status | USDA ranking | Citations                                                                 |
|-----------------|-------------------------------|---------------------|-----------|--------------|---------------------------------------------------------------------------|
| Orchidaceae     | *Coralorrhiza striata*        | AZ                  | AZ        |              |                                                            |
| Orchidaceae     | *Coralorrhiza wisteriana*     | AZ                  | AZ        |              |                                                            |
| Orchidaceae     | Goodyera oblongifolia         | AZ                  | AZ        |              |                                                            |
| Orchidaceae     | Platanthera sparsiflora       | AZ                  | AZ        |              |                                                            |
| Orchidaceae     | *Spiranthes romanzoffiana*    | AZ                  | AZ        |              |                                                            |
| Orobanchaceae   | *Castilleja kaibabensis*      | GRCA                | AZ        | F1           | Phillips 1993a; Phillips III 1992c–k, 1993a–f; Reichenbacher 1986; Spence 2006, 2007; Fletcher 1978c; Mazzoni et al. 1982; Phillips III 1992c–k, 1993a–f; Rominger 1977 |
| Plantaginaceae  | *Penstemon pseudopus*         | GRCA                | AZ        | F2           |                                                            |
| Poaceae         | *Beckmannia syzigache*        | GRCA                | AZ        | F4           |                                                            |
| Primulaceae     | *Primula specuicola*          | GRCA                | AZ        |              |                                                            |
| Ranunculaceae   | *Aquilegia chrysanthia*        | GRCA                | AZ        |              |                                                            |
| Ranunculaceae   | *Aquilegia coerulea var. pinetorum* |               | F1       |              |                                                            |
| Ranunculaceae   | *Aquilegia desertorum*        | AZ                  | AZ        | F1           | Fletcher 1978a                                                            |
| Ranunculaceae   | *Clematis hirsutissima* var. hirsutissima* |               | AZ       | F1           |                                                            |
| Rosaceae        | *Ivesia arizonica*            | GRCA                | F0        |              | Brian and Koopman 2002                                                   |
| Rosaceae        | *Rosa stellata subsp. abyssa*| GRCA                | AZ        | F1           | Phillips III 1992a–b, Phillips III and Phillips 1982                     |
| Rubiaceae       | Galium bifolium               | GRCA                | AZ        | F1           |                                                            |
| Salicaceae      | Salix bebbiana                | GRCA                | AZ        | F1           |                                                            |
| Selaginellaceae | *Selaginella watsonii*        | GRCA                | AZ        | F1           |                                                            |

*Seven taxa marked with an asterisk are endemic to the KP and its immediate environs.*
ponderosa (ponderosa pine), *Abies lasiocarpa* (subalpine fir), and *A. concolor* (white fir), with large stands of *Populus tremuloides* (quaking aspen) and *Pseudotsuga menziesii* (Douglas-fir). *Juniperus communis* (dwarf juniper) and *Carex siccata* (dryspike sedge) dominate the understory. Lower and drier forests on the KP, particularly on the Walhalla Plateau, are dominated by *Pinus ponderosa*, with an understory of *Carex siccata*, *C. rossii* (Ross’ sedge), *C. occidentalis* (western sedge), and *Berberis repens* (creeping mahonia).

Meadows lying between forested areas support a high level of plant diversity, including at least 60 dicots and more than 20 monocots (Spence 2007) including *Carex spp.* (sedges), *Poa spp.* (bluegrasses), *Deschampsia spp.* (hairgrasses), *Eremogone spp.* (sandworts), *Cryptantha setosissima* (bristly cryptantha), *Achillea millefolium* (western yarrow), *Potentilla spp.* (cinquefoils), *Penstemon pseudoputus* (beard-tongue), *Solidago spp.* (goldenrods), *Ipomopsis spp.* (ipomopsis), *Agoseris spp.* (agoseris), *Hymenoxys subintegra* (Arizona rubberweed), *Castilleja spp.* (paintbrushes), and *Eriogonum racemosum* (buckwheat). These meadows harbor 2 endemics: *Castilleja kaibabensis* (Kaibab paintbrush) and *Physaria kingii* subsp. *kaibabensis* (Kaibab bladderpod).

Ponds and lakes, which were the targets of much of our field effort, occur in both forest and meadow habitats dominated by *Carex spp.* and *Eleocharis spp.* (spike rush) and *Juncus spp.* (rushes). Margaret Moore and D. Huffman (2004) noted that trees have been encroaching on KP meadows since the early 1900s and that the forest vegetation could completely replace the meadow vegetation within the next several decades.

Steep north-facing slopes harbor mesic species not found elsewhere on the KP including *Pyrola* (wintergreen), *Prosartes trachycarpa* (roughfruit fairybell), *Acer glabrum* (Rocky Mountain maple), *A. grandidentatum* (bigtooth maple), and *Physocarpus malvaceus* (nine-bark). Slopes of other aspects harbor xeric species more typical of lower elevations. Such slopes support many woodland and shrubby plants including *Pinus edulis* (pinyon), *Juniperus spp.* (juniper), *Quercus gambelii* (Gambel oak), *Chrysothamnus* and *Eriogonum* spp. (rabbitbrush), *Atriplex canescens* (four-wing saltbush), *Amelanchier* spp. (serviceberry), *Ribes* spp. (currant), and *Artemisia* spp. (sagebrush).

Warm winds from within the canyon create microclimates that allow plants that typically grow at lower elevations to grow at higher locations along rim margins (Halvorson 1972, Phillips et al. 1987). Common plants of cliffs and hanging gardens below the rim include *Ivesia arizonica* (rock whitefeather), *Cirsium spp.* (thistles), *Calamagrostis scopulorum* (ditch reedgrass), *Aletes mcdougalii* (MacDougal’s Indian parsley) and *Muhlenbergia andina* (foxtail muhly).

Weng and Jackson (1999) studied sediment cores at Fracas Lake, about 10 miles southwest of Jacob Lake, and at Bear Lake, just north of the GRCA boundary, where they reported that prior to 13,000 years before present (BP), the upper elevations of the KP were covered by alpine tundra and that the species making up present-day forests arrived by 8000 years ago.

### Land Use History

The history of land use has a direct and significant impact on the plants found in an area. Human history can often explain the occurrence of specific plants at specific locations.

**Prehistory**

Stone points dating to ca. 6000 years BP were uncovered during a 1983 archaeological survey (Fairley et al. 1984) of the Highway 67 right-of-way that bisects the KP. This archaeological find may be the earliest evidence of human occupation on the KP (Azar 2005). Later-period agricultural sites and Puebloan structures occur at many places on the KP (Altschul and Fairley 1989), with high concentrations on the Walhalla and Powell Plateaus. Elsewhere, sites usually occur close to the southern edge of the rim of the Grand Canyon and near travel routes leading into the canyon (Hall 1942, Abbott 1979, Fairley et al. 1984, Hughes 1991, Schroedl et al. no date). The KP was the summer home for the Kaibabits, a division of the Paiute, who, with the Navajo people, used the area as a deer hunting ground (Rasmussen 1941), calling the area “Kaibab” which translates as “mountain lying down.” In the early 1900s, settlers of the Kanab area found Native American camps with as many as 1000 deer carcasses in one camp (Mann and Locke 1931). People harvested so many deer hides on the KP during that time that the plateau
acquired the name Buckskin Mountain (Jones and DeMille 1986).

Grazing

Clarence Dutton (1882), of the Powell survey, commented that wild cattle were present on the KP at the time of his visit in 1879–1881. Two thousand cattle were placed on the KP during 1885 and 1886, and “in 1887 and 1889, at least 200,000 sheep and 20,000 cattle and many horses were using the range and surrounding desert country and the Kaibab Mountain” (Mann and Locke 1931). During 1908 and 1909, approximately 60,000 head of cattle (Rider 1985) and ca. 80,000 sheep (Hodgin 1962) were on the Kaibab Forest. Several dairy ranches also operated on the KP (Jones and DeMille 1986, Hodgin 1962). By 1962, there were only 2200 cattle and of these, only 800 were on summer range. As of 2020, Grand Canyon Trust manages 600 cattle on 850,000 acres of the KP, alternating between the “north” and the “south” pastures every year (E. Grumbine, GC Trust Ranch Manager, personal communication 2015; https://www.grandcanyontrust.org/north-rim-ranches).

Bison

The absence of bison (Bison bison) on the KP prior to 1905. In that year and in 1906, “Buffalo” Jones and Jimmy Owens introduced bison to the KP. Since that time, the bison have alternated between the KP and House Rock Valley. They were present into the 1920s (Anderson 2000) when GRCA leased a portion of the southern end of the Walhalla Plateau for bison grazing (Horn 2008). But by the 1930s, the bison were spending most of their time in the House Rock Valley. Later, by the mid-1990s, they roamed freely, spending more time on the KP, especially in GRCA, rarely returning to the House Rock Valley (R. Jacoby, KP bison hunting guide and recognized KP bison expert, personal communication 2018). The boundary of GRCA is not effectively fenced, so cattle and bison freely range onto GRCA. Bison negatively affect the vegetation at springs and ponds on the KP, both by trampling and wallowing. Wallowing both disturbs aquatic vegetation in ponds and creates depressions in meadows, devoid of vegetation. Pushed by winter snows, bison move to the west rim of the KP, then make their way down to springs along the Hermit Shale within GRCA and impact sensitive wetlands and hanging gardens (Rink personal observation; Reimondo 2012, Reimondo et al. 2015). The lakes and wetland areas within GRCA that do not exclude bison and cattle have more bare soil as well as reduced vegetative cover, height, and biomass, as well as differences in species composition (Reimondo 2012).

Historically, GRCA has encouraged bison within the park with the goal of enhancing the visitor experience (Anderson 2000). However, as the herd continues to grow, the damage bison do to ecosystems within GRCA is increasing and this situation is starting to elicit a response from GRCA management.

Logging

Logging started on the KP by the 1870s. Many sawmills operated at various times and sites, including at Big Springs, De Motte Park, Le Fevre Ridge, Castle, Franks, Jacob, Mile and a Half, and Three Lakes; as well as Orderville, Lookout, Mangum, Riggs, and Le Fevre Canyons (Jones and DeMille 1986, Azar no date). Logging peaked in the late 1940s (Anderson 2000) and 1950s, when loggers cut one million board feet of timber per week (Jones and DeMille 1986). Timber harvesting was intensive into the 1990s, and the salvage of burned timber continues to this day (Azar personal communication 2015; Wahfeld 1993). Changes in forest structure related to logging over the last 100 years include the presence of higher densities of small trees, commonly called dog-hair thickets (Garrett et al. 1997).

Mining

Beginning in the mid-1880s, miners filed copper claims on the KP, working west and southwest of Jacob Lake. Around the year 1900, miners established Coconino City (now known as Ryan) near the mouth of Warm Springs Canyon as a smelter site serviced by a narrow-gauge railway, a flume, and a 4-inch wooden pipe to bring water from Big Springs (Billingsley et al. 1997). A steam-powered pumping plant and leaching plant were built in Warm Springs Canyon. Workers built a 100-ton blast furnace in the late 1920s, but fire soon destroyed the structure, ending the KP’s mining history. Ryan remains a significant location for exotics and unusual KP plant records.
Tourism

The first automobile arrived at the North Rim of Grand Canyon in 1909, but it was not until the late 1910s that a completed road to Bright Angel Point allowed automobiles to make it to the North Rim viewpoints on a regular basis. Several tourist concessionaires operated into the late 1920s, including Jimmy Owens at Harvey Meadow; “Blondie” Jensen, who operated from a cabin near the head of the Bright Angel Trail, perhaps located near Fuller Spring; Woolley, who had a cabin at Greenland Lake (Anderson 1998); and Elizabeth Wylie McKee, who operated an early concession at Bright Angel Point. Later, GRCA awarded a single concession contract, this to the Utah Parks Company (Verkamp 1993).

Visitation to the North Rim increased many-fold during the 1920s, with the area hosting as many as 7000 tourists by 1925 (Anderson 2000), justifying the construction of Jacob Lake Lodge in 1923 and the North Rim Lodge in 1927. During the late 1920s, GRCA started to build facilities to accommodate tourism, including the cabin above Kanabowints Spring in 1927, partly to exert a National Park Service (NPS) presence on newly acquired lands on the KP. By the 1930s, GRCA managed campgrounds at both Point Sublime and Cape Royal. Air service between V.T. Park just south of Kaibab Lodge and the South Rim was initiated in the late 1920s (Anderson 2000).

No towns exist on the KP, but a resident summer population of approximately 250 (E. Davis, email communication, 21 March 2016) and a winter population of 4 GRCA employees live on the North Rim. Visitation to GRCA has increased over the years, from 14,500 visitors in 1926 to nearly 300,000 people per year during 2006–2015 (NPS 2016).

Grand Canyon National Park and U.S. Forest Service Administration

Holcomb (2009, 2010) synthesized the management history of the KP, contrasting that of the KNF with that of GRCA. In 1893, 23rd U.S. President Benjamin Harrison created the Grand Canyon Forest Reserve, including the KP and GRCA. Later, in 1906, 26th U.S. President Theodore Roosevelt created the Grand Canyon National Game Preserve, including much of what is now the KNF and GRCA north of the Colorado River. Still later, in 1908, he created Grand Canyon National Monumen-
The herd was reduced to 10,000 animals by 1939, which is close to present numbers. While scholars may argue about the lack of accurate data from this period, or that there may be other factors involved (Mann and Locke 1931, Russo 1964, Burk 1973, Dunlap 1988, Young 2002, Binkley et al. 2006), no one contests the effective predator removal program and subsequent eradication of deer populations. The Arizona Game and Fish Department estimates the Kaibab deer herd at 13,000 (June 2018) and plans to stabilize the population (McCall, Arizona Fish and Game Regional Game Manager, personal communication 2018).

Fire History

Forests of the KP have complex disturbance histories related to fire, fire suppression, logging, drought, insect outbreaks, microbursts, and windstorms (Holcomb 2009). Fire was an important management tool used by Paiute and other groups (Anderson 2006) on the KP. According to N. Adams, who lived in Kanab, Utah, in the late 1800s, “The smoke would be almost continuous from early spring until late autumn” (Ranger Ed Laws, Kanab, Utah, verbal communication 1934, as cited in McHenry 1935, p. 1). During this time, the Southern Paiute still occupied the Arizona Strip in their traditional manner.

Various researchers have studied aspects of fire ecology on the KP, as follows:

| Author            | Year | Subject                                      |
|-------------------|------|----------------------------------------------|
| White and Vankat  | 1993 | Fire and white fir                           |
| Wolf and Mast     | 1998 | Fire interval and elevation                  |
| Fulé et al.       | 2002 | Pine density as related to fire history      |
| Meigs             | 2004 | Fire frequency over time                     |
| Fulé et al.       | 2004 | Model of fire behavior                       |
| Binkley et al.    | 2006 | Fire and aspen                               |
| Mast and Wolf     | 2006 | Changes in dominants as related to fire regimes |
| Fulé and Laughlin | 2007 | Forest structure                             |
| Laughlin and Fulé | 2008 | Forest structure                             |
| McMaster et al.   | 2010 | Warm Fire                                   |
| Sesnie            | 2012 | Tree basal area changes                      |

The Warm and the Mangum fires have been the largest wildfires on the KP in recent history, burning 24,000 hectares (ha) and 28,915 ha in 2006 and 2020, respectively. Burned areas as a result of the Warm Fire are botanically diverse, with _Populus tremuloides_, _Quercus gambelii_, and _Robinia neomexicana_ (New Mexican locust) dominating, and with many common understory plants including _Rosa woodsii_ (Arizona rose), _Ceanothus fendleri_ (buckbrush), _Phacelia heterophylla_ (varieal phacelia), _Geranium ssp._ (Geranium), _Gnaphalium ssp._ (cudweed), _Conyza_ (horseweed), _Carex occidentalis_ (western sedge), and _C. rossii_ (Ross’ sedge). At Fire Point, along the east rim of the KP within GRCA, a fire resulted in an understory of increased annual and biennial forbs, with _Gayophytum diffusum_ (spreading groundsmoke), _Polygonum douglasii_ (Douglas knotweed), _Chenopodium ssp._ (goosefoot), _Solidago ssp._ (goldenrod), _Elymus elymoides_ (squirreltail), _Calochortus nuttallii_ (sego-lily), _Hesperostipa comata_ (needle and thread), and _Lotus ssp._ (trefoil); these species are all indicative of areas influenced by recent fires (Laughlin et al. 2004).

In their 2010 Fire Management Plan, GRCA states that “restoration of fire to its natural role in park ecosystems is a priority for Grand Canyon National Park” (GRCA 2010). GRCA continues significant thinning and burning projects to reduce fuel loads (Rink personal observation). The updated KNF plan (USDA 2014a) and supporting material may be accessed at https://bit.ly/KaibabForestPlan.

Transportation

An average of ca. 100,000 vehicles enter GRCA at the North Rim every summer season (https://irma.nps.gov/Stats/Reports/Park/GRCA). Vehicles are a common vector for exotic plant introduction (Ansong 2016), so the amount of traffic is an indicator of the amount of potential exotic plant transfer. Arizona State Highways 89a and 67 traverse the study area from northwest of Jacob Lake to the south at Cape Royal. The road to Cape Royal was completed in 1931, while the modern alignment of Highway 67 was more or less complete by 1940. Within GRCA, the unpaved Point Sublime Road traverses from the main visitor services area west to Point Sublime, north to Big Springs Canyon, and west to Swamp Point, all within the study area. Other unpaved roads within GRCA are closed to motorized (wheeled) traffic, except for administrative use. In contrast to the few roads on GRCA, KNF has so many roads that it is virtually impossible to be farther than 1.6 km (1 mi) from a road.

Weed Management

The USFS evaluated the presence of noxious and invasive weeds on the KP (B.G. Phillips and Crisp 2004, USDA 2005), then
repeatedly applied herbicides to leafy spurge and other species on the NKRD. In 2014, GRCA vegetation management crews attempted (unsuccessfully) to eradicate native *Cirsium* ssp. (thistles) at Cliff Spring in the belief that they were exotic. This incident reinforces the need for land managers and staff to work closely with botanists familiar with the region’s flora.

**Previous Floristic Work**

Ellen Powell Thompson, sister of the well-known Colorado River explorer John Wesley Powell, may have collected plants on the KP (Smith 1994) but is known to have prepared and sent collections made by J.W. Powell’s associates in the 1870s (Cronquist et al. 1972), which are now in the Gray Herbarium (GH). Marcus E. Jones, early western botanist, traveled over the KP in 1890 and made a few plant collections. He returned for a dedicated plantcollecting trip during 15–23 September 1894, and perhaps in July of 1923 (Lenz 1986). Jones’s KP vouchers are deposited at several herbaria, including GH, Rancho Santa Ana Botanic Garden (RSA), and the Missouri Botanical Garden Herbarium (MO). Pauline Mead (Patraw), the first GRCA ranger-naturalist, described the ecology of the KP (Mead 1930) and was the first person to make large numbers of KP plant collections. Prior to the work reported herein, Rose Collom, the first paid GRCA botanist, collected 528 plant specimens on the KP portion of GRCA from the 1930s to the 1950s (Quartaroli 2011, SEINet 2010–2020). Inez Haring, mostly known for her work in the field of bryology, collected 123 specimens from the KP from 1940 to 1945. Early GRCA park naturalist John Merkle analyzed the spruce-fir community on the KP within GRCA (Merkle 1954, 1962) and collected 458 plant specimens from 1938 to 1962, the majority during 1951 and 1952. Forest Service botanist Leslie Goodding collected many specimens from the KP during 1948 and 1949, mostly from the KNF. Barbara Phillips, Zone Botanist on the KNF from 1990 to 2013, has been collecting plants on the KP since 1970. Melinda Hurst collected 284 specimens from the KP during 1976 and 1977. Crews from the Ecological Restoration Institute at Northern Arizona University collected 219 specimens from the KP during the period 1990–2007. Nancy Brian, GRCA botanist, collected 178 specimens from the KP during the period 1994–1999. Lawrence Stevens of the Museum of Northern Arizona collected 25 specimens at 11 springs on the KP portion of GRCA (Stevens personal communication 2012). Northern Arizona University professor Tina Ayers (Ayers et al. 1994), Brian et al. (1999), and Brian (2001) added 35, 72, and 35 new records of vascular plants at GRCA, respectively. Barbara Phillips and Art Phillips collected plants on the KP in June 1970, and also in August 1981 with Nancy Brian, while documenting rare plant locations for USFWS candidate species (Brian et al. 1982, Mazzoni et al. 1982). Kaibab National Forest botanist Renee Galeano conducted a comprehensive species and habitat inventory on the NKRD between 1980 and 1984 (Galeano 1984). Wendy Hodgson of the Desert Botanical Garden documented 61 taxa within the Bridger Knolls area (Hodgson 1999) and 420 taxa on the East Kaibab Monocline (Hodgson and Salywon 2014), 2 areas on and adjacent to the Kaibab Plateau, portions of which are included in our present effort. Ernie Nelson of the Rocky Mountain Herbarium collected 423 specimens from the KP during the period 2004–2006.

Various efforts have been made to compile lists of plants found in the region that includes the KP. Patraw (1932) prepared the first checklist of the plants occurring within GRCA, listing 450 species of plants, adding ca. 200 species a few years later (Patraw 1936). McDougall (1947) listed ca. 900 species of plants and presented a key to the plants of Grand Canyon (McDougall 1964), including those from the KP. The Phillips et al. (1987) annotated list of ca. 1400 species of plants for GRCA primarily reflects work done along the Colorado River in the 1970s and 1980s but also includes the KP. Brian (2000) designated species with special status at GRCA including the GRCA portion of the KP. Lori Makarick’s (14 March 2007) unpublished vascular plant checklist for GRCA includes 1784 botanical entities. There is no existing list of plants for the North Kaibab Ranger District.

**Methods**

We compiled records of thousands of KP specimens from SEINet that are curated in
Table 2. Fieldwork dates and person hours, including the period 1983–2004, which was prior to the inception of our more directed efforts.

| Year | Dates               | Person hours | Location |
|------|---------------------|--------------|----------|
| 1983 | 23–25 June, 2–4 September | 48           | KNF      |
| 1990 | 6, 9 August         | 16           | GRCA     |
| 1991 | 29 May              | 8            | KNE GRCA |
| 1992 | 1 August            | 8            | GRCA     |
| 1998 | 17 June             | 2            | KNF      |
| 1999 | 2–3 September       | 16           | GRCA     |
| 2001 | 31 August, 1 September | 16        | GRCA     |
| 2002 | 30–31 August        | 16           | GRCA     |
| 2004 | 27–29 July          | 24           | KNF      |
| 2007 | 4–8 July, 6–10 August | 14, 320     | GRCA     |
| 2008 | 13–17 July, 4–8 August | 60, 200   | GRCA     |
| 2009 | 13–17 July, 2–8 September | 150, 70   | GRCA     |
| 2010 | 27 July–13 August   | 300          | GRCA     |
| 2011 | 19–29 June, 2–5 September | 200, 40    | Walhalla, GRCA; KNF |
| 2012 | 13–18 June, 10–15 August | 50, 150  | KNF      |
| 2013 | 17 August–1 September | 100         | KNF      |
| 2014 | 19 July             | 10           | KNF      |
| 2015 | 13–16 June          | 40           | KNF      |

In our collecting efforts, we visited 69 natural lakes (Appendix 2), 70 springs, including 4 not mapped on USGS quadrangles or otherwise known (Appendix 3), 16 cattle tanks (Appendix 4), and 36 natural sinks (Appendix 5). We focused on rim margins and areas below the rim that contain both mesic and xeric plants. We concentrated on undercollected families and plant groups not well represented in herbaria such as Cyperaceae, Juncaceae, Poaceae, and aquatics. We deposited our specimens primarily at ASC, DES, GRCA, MNA, and RM. Table 2 documents the intensity of our efforts.

Our primary sources for identification included Intermountain Flora (Cronquist et al. 1977, 1984, 1989, 1994, 1997, Holmgren et al. 2005, 2012); Flora of North America (FNA 1993–2016) Volumes 2, 3, 4, 5, 7, 8, 19, 20, 21, 22, 23, 24, and 25 (1993–2007); Seed Plants of Northern Arizona (McDougall 1973); and A Utah Flora (Welsh et al. 2003). Several treatments aided in the determination of specific plant groups including Manual of the Grasses of the United States (Hitchcock 1935), Grasses of the Southwestern United States (Gould 1951), Atlas of North American Astragalus (Barney 1964), and The Cruciferae of Continental North America (Rollins 1993). The Manual of Cultivated Plants (Baily 1949) and Manual of Cultivated Trees and Shrubs (Rehder 1987) aided our identification of cultivated plants. Because plant keys are often inadequate for accurate identification, comparison of new collections to specimens in ASC and GRCA was crucial. H.D. Hammond (ASC), A. Salywon (Brassicaceae, DES), S. Goodrich (Cyperaceae, USFS), and I. Al-Schehbaz (Brassicaceae, MO) also assisted in the identification of particularly difficult species.

We followed the standards for floras as identified by Palmer et al. (1995), where appropriate. We used the abundance scale developed by Palmer et al. (1995) and followed the nomenclature of the Integrated Taxonomic Information System (ITIS 2007–2020; https://www.itis.gov), the U.S. Department of Agriculture Plants Database (USDA 2007–2020), the Flora of North America (FNA 1993–2016),
or the Angiosperm Phylogeny Website, Version 13 (http://www.mobot.org/MOBOT/research/APweb).

**RESULTS**

At the inception of this study in 2007, we located 3357 vouchers of plants from just the GRCA portion of the KP at regional herbaria, including GRCA, MNA, ASC, DES, ARIZ, and ASU. At present, more than 10,000 herbarium specimens have been collected from both national forest and GRCA portions of the KP. We were unable to find Marcus E. Jones’s specimens. Searches at ILL (University of Illinois at Urbana–Champaign), US (Smithsonian Institution), and F (Field Museum of Natural History) have not revealed Pauline Mead’s vouchers. Until those specimens are data-based, it will be impractical to locate and verify their determinations. Two hundred and forty taxa either published in Phillips et al. (1987) or on SEINet were eliminated by reviewing specimens that were either misdetermined or mismapped (Appendix 6).

We collected over 900 specimens from 2007 through 2015. Appendix 1 is an annotated list of the vouchered taxonomic entities of the KP. Known vouchered specimens in our checklist include 86 families, 374 genera, 761 species, 7 subspecies, 20 varieties, and 4 hybrids—a total of 792 taxonomic entities. The 5 genera with the highest taxonomic diversity are Carex (23), Eriogonum (13), Bromus (13), Penstemon (13), and Astragalus (12). Despite our collecting efforts, the KP is still undercollected. For instance, 188 taxa documented for the KNF portion of the KP are undocumented for the KP in GRCA; and 140 taxa are documented for GRCA but not for the KNF on the KP. It seems likely that many taxa that are present in one jurisdiction, but absent in the other, are likely to be found with further searching.

Nonnative plants not previously published or recorded in SEINet in our list include 3 for Arizona, 1 for Coconino County, 1 for the KNF, 1 for GRCA, and 9 for the KP. Seventy-six of the vouchered taxa are introduced, including 4 horticultural introductions; 9.2% of the taxa in the checklist are introduced. Table 3 shows the number of new native taxa and new nonnative entities for the various jurisdictions.

Because the majority of our time was spent collecting plants in GRCA and at the upper elevations of the KP, this plant list is most complete for those higher areas and GRCA, and less so for the lower ponderosa pine zone and the KNF. Twenty-six species in the checklist are included in the Arizona Natural Heritage Program Special Status Species Database (Table 1).

Twenty of 70 targeted springs and 31 of 69 targeted ponds were dry. Fuller, Neal, Tipover, Greenland, and Bright Angel springs, upon which early North Rim development depended, are presently dry or nearly dry. Forty-eight of the targeted wetland sites within GRCA were dry. We found evidence of historic development at many springs we visited. Within GRCA, we found pipes or other water delivery systems showing historical use at Outlet, Robber’s Roost, Tipover, Greenland, Barrel, Upper and Lower Thompson, and 2 unnamed springs. Old corral remains at Kanabownits and Castle springs indicate historic livestock use of those areas. The remains of a cabin are evident at Kanabownits Spring.

**DISCUSSION**

Eleven percent of KP taxa are exotic. For the KNF portion, 11.5% are exotic, while just 7.4% of the GRCA portion of this flora is exotic, a low percentage relative to other NPS areas on the southern Colorado Plateau (Rink 2003). Although other National Park Service inventory work in the region found many exotic species in disturbed and administrative sites (Rink 2005, Rink and Cully 2007, 2008, Rink et al. 2009), such was not the case on the KP portion of GRCA. Heavily used tourist areas on the North Rim of GRCA have few exotic and no purposefully planted exotic species, due to the vegetation management policies at GRCA.
We were able to document the invasion and vector for 2 species known from the region but not previously known for GRCA. A few individuals of *Phacelia alba* and *Mentzelia laevicaulis* were found at CC Hill and along the pathway from the North Rim Lodge to the campground, areas where GRCA construction crews had brought substrate in from Utah. Another mistake occurred when GRCA personnel attempted to eliminate a native thistle (*Cirsium* sp.) at Cliff Spring, having thought it to be an invasive species (see Land Use History section). In contrast, the KNF side of the KP is much weedier, probably due to its more intensive disturbance history. Gardens at Jacob Lake Lodge may be the source for *Chrysanthemum leucanthemum* invading along roadways.

We observed that many of the lakes of the KP are in the transitional stages of reverting to meadows (Rink personal observation). The first stage of this process is characterized by the presence of floating mats of vegetation in the center of the lakes, the mats surrounded by a ring (or moat) of clear water. In a few cases such as at Three Lakes, the mat has filled with soil and become an island. Most of the lakes have well-defined rings of vegetation. The most common vascular plants in the center mats are *Potamogeton*, *Sparganium*, *Glyceria*, and *Carex utriculata*. Close to shore in shallow water, one finds *Carex vesicaria*, *Callitriche*, *Eleocharis acicularis*, and *Glyceria*.

*Callitriche*, *Galium trifidum*, *Alopecurus* spp., *Eleocharis acicularis*, and *Carex athrostachya* are on shore immediately adjacent to the lake. A few natural lakes and ponds on the KP have well-maintained fences capable of excluding cattle and bison.

Many plant species occur only at the margins of the KP; several are restricted to certain elevations, unable to grow at higher, colder climates. Other species only grow on cliffs, including those in the Kaibab Limestone, which on the KP occur primarily at rim edges that are at the margins of the plateau rim. Other taxa are present on the rims of the Grand Canyon, responding to weather conditions that include strong winds, heat rising from below, cold-air drainage, drier, hotter conditions on south-facing rims, and cooler, moister conditions on north-facing rims (Phillips et al. 1987, Stevens 2012).

The highest forested areas of the KP suffered a major die-off of subalpine fir during the 1990s. So many trees have fallen that it can be difficult to walk through these forests. In 2010, young subalpine fir trees 1–5 m tall dominated the understory of these areas (Rink personal observation).

**Recommendations**

The nonnative bison introduced to the KP severely impact the ecosystem of the KP (Reimondo et al. 2015), which harbors endemic plant and insect species (Stevens personal communication 2012). Unless controlled, bison will continue to increase in numbers, invade new areas, and spread their impacts throughout the KP as well as below the rim into the Grand Canyon.

Collaboration between the National Park Service, U.S. Forest Service, and knowledgeable botanists should continue to be encouraged, allowing for appropriate management options based on sound scientific information as it pertains to rare and introduced species. Such collaboration will decrease the risks of inadvertently and negatively affecting rare species and habitats. Soil substrates for construction should be limited to sources within GRCA, or at the least, within the KP, to avoid the possibility of inadvertently introducing seed sources of species not native to the KP.

**Acknowledgments**

We are indebted to Grand Canyon Conservancy Field Institute (known at the time as the GC Field Institute) participants Susan E. Ahearn, William C. Ahearn, Gary Bachman, Joanne Basta, Tom Bean, P. Douglas Folk, Michael Frank, Jerilee Grandy, Karen Greg, Darroy M. Hanson, Joseph Hanson, Susan Lamb, Ann Litke, Kimberly Hansen, Celia A. Southwick, and Don Witter. They freely shared their energy and enthusiasm for learning the flora of the area and collecting plant specimens during our 5 field courses. Andrew Salywon, Ann Connolly, and Emily Palmquist also helped with plant collecting. Brad Wallace, Mike Buheite, and Jack Pennington of the Grand Canyon Field Institute provided continuous and steady support by offering and arranging the North Rim Botany classes. Funding came from participants of Grand Canyon Field Institute courses (https://www.grandcanyon.org/classes-tours). We have drawn on the work of other modern collectors including
Walter Fertig, Max Licher, Kate Watters, Melissa McMaster, and others. The primary author conducted a portion of this work while employed by the Museum of Northern Arizona to evaluate springs, work that was funded by the KNF. Stephen Rice, GRCA hydrologist, shared ideas about springs and buffalo impacts, while Evan Reimondo and Michael Kearsley shared their discoveries of springs and sinks on the KP. Ariel Leonard and Michael Hannemann, both of the KNF, freely shared information about the KNF. Mike Anderson and John Azar provided invaluable information about the history of GRCA and KP, respectively. Katherine Callingham and Gael Gilliland assisted with the map illustration. Many thanks to Ed Gilbert for maintaining the online database SEINet, which facilitates this type of work. Colleen Hyde provided access to GRCA collections. Jenet Gillette and Kirstin Phillips provided access to MNA collections. Michelle McMahan, Philip Jenkins, George Ferguson, and Sarah Hunks provided access to collections at ARIZ while Les Landrum, Walter Fertig, and Elizabeth Makings provided access to the collections at ASU. Andrew Salywon and Sarah Hunks assisted in accessing specimens at DES. Burrell Nelson at RM was always responsive to our specimen requests. Tina Ayers, curator at Northern Arizona University (ASC), was a constant source of help and inspiration and a wonderful host for the mayhem involved with specimen processing. Robert Mathiasen reviewed our Viscaceae. This research was conducted under several GRCA and USFS research permits. Thanks to Marc Baker, Walter Fertig, Les Landrum, Max Licher, Elizabeth Makings, and 2 anonymous reviewers for their detailed reviews of the manuscript.

LITERATURE CITED

Abbott, D.R. 1979. Introduction to the cultural resources of the Kaibab Plateau. Western Anasazi Reports 2: 126–140.

Altschul, J.H., and H.C. Fairley. 1989. Map, models, and management: an overview of the archaeology of the Arizona Strip and the management of its cultural resources. Statistical Research Technical Series 11. SRI Press, Tucson, AZ.

Anderson, K.M. 2006. Tending the wild: Native American knowledge and the management of California’s natural resources. University of California Press, Berkeley, CA. 558 pp.

Anderson, M.F. 1998. Living at the edge. Grand Canyon Association, Grand Canyon, AZ.

Anderson, M.F. 2000. Polishing the jewel: an administrative history of Grand Canyon National Park. Grand Canyon Association, Grand Canyon, AZ.

Anson, M. 2016. Unintentional human dispersal of weed seed. Doctoral dissertation, Griffith University, Queensland, Australia.

Arizona State Natural Heritage Program. 2007–2020a. Plant species folders. [Accessed via Google Drive]. https://drive.google.com/drive/folders/0BwLs0i-QWFssMTFlX0xI/SWIzOx

Arizona State Natural Heritage Program. 2007–2020b. Special status species database [online]. Arizona Game and Fish Department, Phoenix, AZ. https://azgfd.com/wildlife/heritagefund

Audretsch, B.W. 2011. Shaping the park and saving the boys, the Civilian Conservation Corps at Grand Canyon, 1933–1942. Dog Ear Publishing, Indianapolis, IN.

Ayers, T.J., R.W. Scott, L.E. Stevens, K. Warren, A. Phillips III, and M.D. Yard. 1994. Additions to the flora of Grand Canyon National Park—1. Journal of the Arizona–Nevada Academy of Science 1/2:70–75.

Azar, J.S. No date. Logging camps and sawmills of the Arizona Strip and southern Utah 1870 to 1950. Unpublished manuscript available from the author, Fredonia, AZ.

Azar, J.S. 2005. Buckskin Mountain. Pages 53–56 in M.F. Anderson, editor, A gathering of Grand Canyon historians: ideas, arguments, and first-person accounts: proceedings of the inaugural Grand Canyon History Symposium, January 2002. Grand Canyon Association, Grand Canyon, AZ. 199 pp.

Bailey, L.H. 1949. Manual of cultivated plants. MacMillan Company, New York, NY.

Barney, R.C. 1964. Atlas of North American Astragalus. Memoirs of the New York Botanical Garden 13, Bronx, NY.

Billingsley, G.H. 2000. Geologic map of the Grand Canyon 30’×60’ quadrangle, Coconino and Mohave counties, northwestern Arizona. U.S. Geological Survey Geologic Investigations Series I-2688. https://pubs.usgs.gov/i/2688/i-2688/pdfl

Billingsley, G.H., S.S. Priest, and T.J. Felger. 2008. Geologic map of the Fredonia 30’×60’ quadrangle, Coconino and Mohave counties, northern Arizona. U.S. Geological Survey Scientific Investigations Map 3035. http://pubs.er.usgs.gov/publication/sim3035

Billingsley, G.H., E.E. Spamer, and D. Menkes. 1997. Quest for the pillar of gold: the mines and miners of the Grand Canyon. Grand Canyon Association, Grand Canyon, AZ.

Billingsley, G.H., P.H. Stoffer, and S.S. Priest. 2012. Geologic map of the Tuba City 30’×60’ quadrangle, Coconino County, northern Arizona. U.S. Geological Survey Scientific Investigations Map 3227. http://pubs.er.usgs.gov/publication/sim3227

Binkley, D., M.M. Moore, W.H. Romme, and P.M. Brown. 2006. Was Aldo Leopold right about the Kaibab deer herd? Ecosystems 9:227–241.

Brewer, D.G., R.K. Jorgensen, L.P. Munk, W.A. Robbie, and J.L. Travis. 1991. Terrestrial ecosystem survey of the Kaibab National Forest: Coconino County and part of Yavapai County, Arizona. USDA Forest Service, Southwestern Region.

Brian, N.J. 2000. A field guide to the special status plants of Grand Canyon National Park. Science Center, Grand Canyon National Park, Grand Canyon, AZ.
BRIAN, N.J., AND M.N. KOOPMAN. 2002. Status report

FAIRLEY, H.C., P.R. GEIB, AND J.R. AMBLER. 1984. An

BRIAN, N.J., W.C. HODGSON, AND A.M. PHILLIPS III. 1999. 

CRONQUIST, A., A.H. HOLMGREN, N.H. HOLMGREN, J.L. 

BURK, J.C. 1973. The Kaibab deer incident: a long-persist-

CRONQUIST, A., A.H. HOLMGREN, N.H. HOLMGREN, J.L. 

crosswhite, F.S. 1965. Hybridization of 

DUNLAE, T.R. 1988. That Kaibab myth. Journal of Forest History 32:60–68.

DUTTON, C.E. 1882. Tertiary history of the Grand Cañon district, with atlas. U.S. Geological Survey, Department of the Interior, Washington, DC.

fairley, h.c., P. reeves, and J.R. AMBLER. 1984. An 

archaeological survey along State Highway 67, Jacob Lake to Grand Canyon National Park, Kaibab National Forest, Arizona. Report, Highway Administration, Denver. Northern Arizona University Archaeological Report No. 891, Flagstaff, AZ.

FLETCHER, R. 1978a. Status report Aquilegia desertorum. U.S. Forest Service, Albuquerque, NM. 4 pp.

FLETCHER, R. 1978b. Species report for Draba asprella var. asprella, and Draba asprella var. stelligera and Draba asprella var. kaibabensis. U.S. Forest Service.

FLETCHER, R. 1978c. T&E species habitat study area notes Penstemon virgatus subsp. pseudoputus, Glen Lake, September 22, 1978. USDA Forest Service.

FLETCHER, R. 1987. Lesquerella kaibabensis and Highway 67 reconstruction. Report to the USDA, U.S. Forest Service, Kaibab National Forest, Southwestern Region, Albuquerque, NM.

[FNA] Flora of North America Editorial Committee, editors. 1993–2016. Flora of North America. Volumes 2, 3, 4, 5, 7, 8, 19, 20, 21, 22, 23, 24, 25. Oxford University Press, New York, NY.

FREEMAN, D.R. 1983. The North Kaibab revisited: a look at policies and management. Master’s thesis, Colorado State University, Fort Collins, CO.

Frye, R.J. 1996a. Current status of Pediocactus paradinei and possible future trends. Unpublished report, Kaibab National Forest.

Frye, R.J. 1996b. Population viability analysis of Pediocactus paradinei. Pages 39–46 in H. Maschinski, D. Hammond, and L. Holter, editors, Southwestern rare and endangered plants: proceedings of the second conference. September 11–14, 1996, Flagstaff, Arizona. General Technical Report RM-GTR 283, USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Frye, R.J. 2009. Surveys and population assessments by conservation area. Unpublished Section Six report, U.S. Fish and Wildlife Service.

Frye, R.J. 2011. Current status of Pediocactus paradinei and data analysis, 2011. Unpublished report, USDA Forest Service, Kaibab National Forest, Williams, AZ.

Fulé, PZ., W.W. COVINGTON, M.M. MOORE, T.A. HEIN- 

LEIN, AND A.E.M. WALTZ. 2002. Natural variability in forests of the Grand Canyon, USA. Journal of Biogeography 29:31–47.

Fulé, PZ., J.E. CROUSE, A.E. COCKE, M.M. MOORE, AND 

W.W. COVINGTON. 2004. Changes in canopy fuels and potential fire behavior 1890–2040: Grand Canyon, Arizona. Ecological Modeling 175:231–248.

Fulé, P.Z., AND D.C. LAUGHLIN. 2007. Wildland fire effects on forest structure over an altitudinal gradient, Grand Canyon National Park, USA. Journal of Applied Ecology 44:136–146.

Galeano, R. 1984. Ordination and classification of the plant communities on the North Kaibab Ranger District, Arizona. Master’s thesis, Northern Arizona University, Flagstaff, AZ.

Galeano, R. 1985. Pediocactus paradinei Benson: results of surveys 1983–1984. North Kaibab Ranger District, Kaibab National Forest, Williams, AZ.

Garrett, L.D., M.H. SOULEN, AND J.R. ELLENWOOD. 1997. After 100 years of forest management: "The North Kaibab." Proceedings of the Third Biennial Conference of Research on the Colorado Plateau: Transactions and Proceedings, NPS; NRNAU/NRTP-97-12.

Gould, EW. 1951. Grasses of the Southwestern United States. University of Arizona Press, Tucson, AZ.

[GRCA] Grand Canyon National Park. 2010. United States Department of the Interior, National Park Service, Record of Decision, Fire Management Plan, Grand Canyon National Park, Arizona. https://parkplanning.nps.gov/document.cfm?parkID=65&projectID=10959&documentID=32371

Hall, E.T. 1942. Archaeological survey of the Walhalla Glades, Museum of Northern Arizona Bulletin No. 20, Flagstaff, AZ.
HALVORSON, W.L. 1972. Environmental influence on the pattern of plant communities along the North Rim of Grand Canyon. American Midland Naturalist 87: 222–235.

HANEMANN, M., AND VS. FOSTER. 2014. Botany specialist report—Kaibab Forest plan revision FEIS. USDA Forest Service, Southwestern Region. 37 pp. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5446812.pdf.

HITCHCOCK, A.S. 1935. Manual of the grasses of the United States. U.S. Government Printing Office, Washington, DC.

HODGSON, W.C. 1999. Bridger Knolls (May 1996) Fire Area, a preliminary flora. Unpublished report, Desert Botanical Garden, Phoenix, AZ.

HODGSON, W.C., AND A.M. SALWYN. 2014. A preliminary checklist of the vascular plants of the Pediocactus paradinei /East Kaibab Monoline Study Area and Cocks Comb (Saddle Mountain Wilderness Area), Kaibab National Forest, Arizona. Kaibab National Forest, U.S. Forest Service agreement number 10-CS-11030700-022.

HOLCOMB, C.M. 2009. Literature review: fire ecology of north rim ponderosa pine and mixed conifer forests. Unpublished report, Fire ecology, Northern Arizona University, Flagstaff, AZ.

HOLCOMB, C.M. 2010. Ecological divergence across a jurisdictional boundary and the need for cooperative management, Kaibab Plateau, AZ. Master’s thesis, Northern Arizona University, Flagstaff, AZ.

HOLMIGREN, N.H., P.K. HOLMIGREN, AND A. CROQUIST. 2005. Intermountain flora: vascular plants of the Intermountain West, USA. Volume 2B. New York Botanical Garden, Bronx, NY.

HOLMIGREN, N.H., P.K. HOLMIGREN, AND J. REVEAL. 2012. Intermountain flora: vascular plants of the Intermountain West, USA. Volume 2A. New York Botanical Garden, Bronx, NY.

HOLSTEN, G., AND B.G. PHILLIPS. 1998. Biological assessment and evaluations for East Rim Overlook. North Kaibab Ranger District, Kaibab National Forest.

HORN, A. 2008. Stories among the aspen: running cattle on the North Rim and north Kaibab. Pages 147–151 in T. Berger, editor, Reflections of Grand Canyon historians: ideas, arguments, and first-person accounts. Monograph 14, Grand Canyon Association, Grand Canyon, AZ.

HUGHES, J.D. 1991. In the house of stone and light: a human history of the Grand Canyon. Grand Canyon Natural History Association, University of Denver Press, Denver, CO.

HUNTOON, PW. 1974. The karstic groundwater basins of the Kaibab Plateau, Arizona. Water Resources Research 10:579–590.

HUNTOON, PW., G.H. BILLINGSLEY, J.W. SWEARS, B.R. ILC, K.E. KARLSTROM, L. HAWKINS, D. HAWKINS, W.J. BREED, T.D. FORD, M.D. CLARK, ET AL. 1996. Geologic map of the eastern part of the Grand Canyon National Park, Arizona. Scale 1:62,500. Grand Canyon Association, Grand Canyon, AZ.

[ITIS] INTEGRATED TAXONOMIC INFORMATION SYSTEM. 2007–2020. Data retrieved from ITIS [online]. https://www.itis.gov

JONES, G., AND J.F. DE MILE. 1986. History of Fredonia, Arizona, 1885–1985. Homestead Publishers, Hurricane, UT.

KEARSEY, J.M.C., K. GREEN, M. TUKMAN, M. REID, M. HALL, T.J. AVARS, AND K. CHRISTIE. 2015. Grand Canyon National Park–Grand Canyon/Parashant National Monument vegetation classification and mapping project. National Resource Report NPS/GRCA/NRR–2015/913. National Park Service, Fort Collins, CO.

KRAL, R. 1993. Pinus. Pages 373–398 in Flora of North America Editorial Committee, editors, Flora of North America: north of Mexico. Volume 2. Oxford University Press, Oxford, England.

LAUGHLIN, D.C., J.D. BAKKER, M.T. STODDARD, M.L. DANIELS, J.D. SPRINGER, G.N. GILDAR, A.M. GREEN, AND W.W. COVINGTON. 2004. Toward reference conditions: wildfire effects on flora in an old growth ponderosa pine forest. Forest Ecology and Management 199:137–152.

LAUGHLIN, D.C., AND PZ. FULÉ. 2008. Wildland fire effects on understory plant communities in two fire-prone forests. Canadian Journal of Forest Research 38:133–142.

LAURENZI, A.W., AND P.L. WARREN. 1988. The Arizona Nature Conservancy: Pediocactus paradinei Benson on the North Kaibab Ranger District of the Kaibab National Forest—current status and management recommendations. U.S. Forest Service, Kaibab National Forest, Williams, AZ.

LENZ, L.W. 1986. Marcus E. Jones, western geologist, mining engineer and botanist. Rancho Santa Ana Botanic Garden, Claremont, CA.

LEOPOLD, A. 1943. Deer irruptions. Wisconsin Conserva- tion Bulletin 8:3–11.

LICHER, M., AND G. RINK. 2019. Vascular plants of Arizona, Juncaceae. Canotia 15:14–65.

MACARTHUR, R.H., AND E.O. WILSON. 1967. The theory of island biogeography. Princeton University Press, Princeton, NJ.

MANN, W.G., AND S.G. LOCKE. 1931. The Kaibab deer: a brief history and recent developments. Mimeo- graphed report, U.S. Department of Agriculture Forest Service, Kaibab National Forest, Williams, AZ.

MAST, J.N., AND J.J. WOOLT. 2006. Spatial patch patterns and altered forest structure in middle elevation versus upper ecotonal mixed conifer forests, Grand Canyon National Park, Arizona, USA. Forest Ecol- ogy and Management 236:241–250.

MAZZONI, J., L.T. GREEN, B.G. PHILLIPS III, AND N. BRIAN. 1982. Status report Penstemon pseudoputus (Crosswhite) N. Holmgren. U.S. Fish and Wildlife Service, Albuquerque, NM.

MCDOUGALL, W.B. 1947. Plants of Grand Canyon National Park. Grand Canyon National [sic] History Association, Grand Canyon, AZ.

MCDOUGALL, W.B. 1964. Grand Canyon wildflowers. Museum of Northern Arizona, Bulletin 43.

MCDOUGALL, W.B. 1973. Seed plants of northern Arizona. Museum of Northern Arizona, Flagstaff, AZ.

MCCONNELL, D.E. 1935. Quaking aspen—its future in the Park. Gand Canyon nature notes. As cited in S. Lamb, 1994, The best of Grand Canyon nature notes. Grand Canyon Association, Grand Canyon, AZ.

MCMASTER, M.A., A. THODE, B. BROST, M. WILLIAMSON, E. AUMACK, AND D. MERTZ. 2010. Changes in vegetation
and fuels due to the Warm Fire on the Kaibab National Forest. Project Number 07-1-2-18, School of Forestry, Northern Arizona University, Flagstaff, AZ.

Mead, P. 1930. An ecological description of the Kaibab Plateau, Arizona. Master's thesis, University of Illinois, Chicago, IL.

Meigs, G.W. 2004. Recent patterns of large fire events on Kaibab Plateau, Arizona, USA. Undergraduate honors thesis, Department of Natural Resources, Cornell University, Ithaca, NY.

Merkle, J. 1954. An analysis of the spruce-fir community on the Kaibab Plateau, Arizona. Ecology 35:316–322.

Merkle, J. 1962. Plant communities of the Grand Canyon area, Arizona. Ecology 34:698–711.

Moore, M.M., and D.W. Huffman. 2004. Tree encroachment on meadows of the North Rim, Grand Canyon National Park, Arizona, USA. Arctic, Antarctic, and Alpine Research 36:474–483.

Moore, R.T., E.D. Wilson, and R.T. O'Haire. 1960. Geologic map of Coconino County and vicinity, Arizona Bureau of Mines, University of Arizona, Tucson, AZ.

[NPS] National Park Service. 2016. NPS stats: park reports: Grand Canyon NP (GRCA) reports. [Accessed 17 March 2016]. https://irma.nps.gov/Stats/Reports/Park/GRCA.

Nesom, G. 2006. Taxonomic overview of the Heterotheca cillosa complex (Asteraceae: Astereae). SIDA, Contributions to Botany 22:367–380.

Palmer, M.W., G.L. Wade, and P. Neal. 1995. Standards for the writing of floras. BioScience 45:339–345.

Patraw, P.M. 1932. Preliminary checklist of plants of Grand Canyon National Park. National Park Service. Grand Canyon National Park Technical Bulletin 6. 47 pp.

Patraw, P.M. 1936. Checklist of plants of Grand Canyon National Park. Revised edition. Grand Canyon National History Association, Bulletin 6. Grand Canyon, AZ. 75 pp.

Phillips, A.M., III. 1992a. A new subspecies of Rosa stellata (Rosaceae) from northwestern Arizona. Madrono 39:31–35.

Phillips, A.M., III. 1992b. Distribution and ecology of cliff milkvetch, Astragalus cremnophylax var. myriorrhaphis, on the Kaibab National Forest; Final Report P.O. #43-8156-0-04720, item 4. Unpublished report, Kaibab National Forest, Williams, AZ.

Phillips, A.M., III. 1992c. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. East Rim Recreation Site Development, North Kaibab RD, Kaibab National Forest. Evaluations for Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992d. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Lookout Lake Riparian Fence, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992e. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Cougar Lake Riparian Fence, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992f. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Lost Canyon Ecological Unit, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992g. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Moquitch Gravel Pit, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992h. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Taters Ecological Unit, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992i. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Bare Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Aquilegia desertorum, Castilleja kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.

Phillips, A.M., III. 1992j. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Cab ELU Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992k. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Taters Ecological Unit, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis and Penstemon pseudoputus.

Phillips, A.M., III. 1992l. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. North Kaibab Ranger District, Kaibab National Forest, Fredonia, AZ.

Phillips, A.M., III. 1993a. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Bare Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.

Phillips, A.M., III. 1993b. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Cab ELU Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Lesquerella kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.

Phillips, A.M., III. 1993c. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Dry Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.

Phillips, A.M., III. 1993d. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Dry Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.

Phillips, A.M., III. 1993e. Threatened, endangered and sensitive species: activity area documentation of need for biological evaluation. Phone ELU Assessment Area, North Kaibab RD, Kaibab National Forest. Evaluations for Castilleja kaibabensis, Penstemon pseudoputus, Lesquerella kaibabensis.
Plateau: integrating science and management on the Colorado Plateau. 5–7 October 2009. Flagstaff, AZ.

SHAW, H.G. 1999. Kaibab plains cactus monitoring historical habitat investigation. Juniper Institute, Inc., Final report, Kaibab National Forest, AZ.

SMITH, B.S. 1984. The 1872 diary and plant collections of Ellen Powell Thompson. Utah Historical Quarterly 62:6–33.

SPENCE, J.R. 2006. Status of two rare endemic plants on the north Kaibab Plateau, north-central Arizona. Plant Press, Arizona Native Plant Society 30:14–15.

SPENCE, J.R. 2007. Final report: status of three plant species on the Kaibab Plateau, Arizona. Unpublished report, USFWS Section 6.

STEVENS, L.E. 2012. The biogeographic significance of a large, deep canyon: Grand Canyon of the Colorado River, southwestern USA. Pages 169–208 in L.E. Stevens, editor, Global advances in biogeography. InTech, Rijeka, Croatia.

STEVENS, P. 2001–present. Angiosperm phylogeny website. Version 12, July 2012 [and more or less continuously updated since]. [Accessed January 2014]. http://www.mobot.org/MOBOT/research/APweb

THEIRS, B.M., EDITOR. 2020. Index Herbariorum [online database]. New York Botanical Garden Steere Herbarium, New York, NY. http://sweetgum.nybg.org/science/ih

TURNER, B.L. 2001. Taxonomic revision of the genus *Fendlera* (Hydrangeaceae). Section of Integrative Biology and Plant Resources Center, University of Texas, Austin, TX. 11 pp.

[USDA] UNITED STATES DEPARTMENT OF AGRICULTURE. 2014a. Botany specialist report, Kaibab Forest plan revision FEIS. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5446812.pdf

[USDA] UNITED STATES DEPARTMENT OF AGRICULTURE. 2014b. Land and resource management plan for the Kaibab National Forest; Coconino, Yavapai, and Mojave counties, Arizona. Forest Service Southwest Region, MB-R3-07-17.

VERKAMP, M.M. 1993. History of Grand Canyon National Park. Master’s thesis, University of Arizona, Flagstaff, AZ. Published by Grand Canyon Pioneers Society, Flagstaff, Arizona, in Collectors Series Volume 1. 57 pp.

WAHFELD, D. 1993. North Kaibab logging history. Unpublished report, Kaibab National Forest Supervisor’s Office, Williams, AZ.

WARREN, P.L. 1991a. Frank’s Lake Natural Area, establishment proposal. Unpublished report, Nature Conservancy, Tucson, AZ.

WARREN, P.L. 1991b. Monitoring natural community condition in the Frank’s Lake Natural Area, Kaibab National Forest. Nature Conservancy report, Tucson, AZ. Submitted to the Kaibab National Forest, Williams, AZ.

WARREN, P.L., R.J. FRYE, D.F. GORI, AND A. LAURENZI. 1992a. *Pediocactus paradinei* monitoring and management recommendations of the North Kaibab Ranger District, Kaibab National Forest 1987–1990. Report submitted to Kaibab National Forest under Challenge Cost-Share Agreement, Williams, AZ.

WARREN, P.L., R.J. FRYE, D.F. GORI, AND A. LAURENZI. 1992b. Population biology of *Pediocactus paradinei*, a rare cactus from northern Arizona. Pages 132–143 in R. Sivinski and K. Lightfoot, editors, Southwestern rare and endangered plants. Proceedings of the Southwestern Rare Plant Conference. 30 March–2 April 1992, Santa Fe, NM. New Mexico Forestry and Resources Conservation Division, Miscellaneous Publication 2.

WARREN, P.L., K.L. REICHARDT, D.A. MOULT, B.T. BROWN, AND R.R. JOHNSON. 1982. Vegetation of Grand Canyon National Park. Technical Report 9, Cooperative National Park Resources Study Unit, University of Arizona, Tucson, AZ.

WELSH, S.L., N.D. ATWOOD, S. GOODRICH, AND L.C. HIGGINS, EDITORS. 2003. A Utah Flora. 3rd edition, revised. Print Services, Brigham Young University, Provo, UT.

WENG, C., AND S.T. JACKSON. 1999. Late glacial and Holocene vegetation history and paleoclimate of the Kaibab Plateau, Arizona. Palaeogeography, Palaeoclimatology, and Palaeoecology 153:179–201.

[WRCC] WESTERN REGIONAL CLIMATE CENTER. 2020. Recent climate in the West. [Accessed 13 July 2020]. https://www.wrcc.dri.edu

WHITE, M.A., AND J.L. VANKAT. 1993. Middle and high elevation coniferous forest communities of the North Rim region of Grand Canyon National Park, Arizona, USA. Vegetatio 109:161–174.

WILKEN, D.H. In review. Ipomopsis. In: Flora of North America Editorial Committee, editors, Flora of North America: north of Mexico, 21+ volumes. Volume 15. New York and Oxford.

WILKEN, D.H., AND J.M. PORTER. 2005. *Polemonium* family. Vascular Plants of Arizona, Canotia 1:1–37.

WOLF, J.J., AND J.N. MAST. 1998. Fire history of mixed-conifer forest on the North Rim, Grand Canyon National Park, Arizona. Physical Geography 19:1–14.

YOUNG, C.C. 2002. In the absence of predators: conservatism and controversy on the Kaibab Plateau. University of Nebraska Press, Lincoln, NE.

Received 2 April 2020

Revised 2 July 2020

Accepted 23 July 2020

Published online 1 December 2020
APPENDIX 1. Annotated checklist of vascular plants of the Kaibab Plateau, Coconino County, Arizona.

Taxa are arranged by phylum, with the phylum Magnoliophyta divided into classes Magnoliopsida and Liliopsida. Subsequent ranks are listed alphabetically. Family names are taken from the Angiosperm Phylogeny Group III (APGIII) classification system (Stevens 2001–present). Scientific names primarily follow the *Flora of North America* (FNA 1993–2016). In cases where species are not yet treated in the *Flora of North America*, other sources are used including the USDA Plants Database (USDA 2007–2020), the Integrated Taxonomic Information System (ITIS 2007–2020), or more current sources. We give synonyms published for the Kaibab Plateau under prior names, and in other cases for which including the synonymy would be helpful.

Annotation abbreviations: nKP = new record for the Kaibab Plateau (KP) with this work, from either herbarium review of existing specimens (with the result of an annotation to a previously unrecorded taxon for the KP) or our own collections; nC = new county record; nAZ = new state record; nGRCA = new GRCA record; native (N) vs. exotic (E) or both (B) (follows USDA). E* = species native to the region but introduced to the Kaibab Plateau, H = horticultural introduction (personal observation). Taxa considered to be new records are those not previously recorded (published or currently uploaded on SEINet) for the KP.

Abundance follows Palmer et al. (1995): 5, Abundant, dominant or codominant in one or more common habitats; 4, Frequent, easily seen or found in one or more common habitats but not dominant in any common habitat; 3, Occasional, widely scattered but not difficult to find; 2, Infrequent, difficult to find, with few individuals or colonies but found in several locations; 1, Rare, very difficult to find and limited to one or very few locations or uncommon habitats; 0, Absent, not found by the authors but found in a previous survey.

Distribution: G = Grand Canyon National Park, K = Kaibab National Forest, GK = both jurisdictions; habitat information and/or range; elevation. Elevations given reflect the elevations for which we have specimens and should not be considered the full range over which each species occurs on the KP.

Specimen citations include the collector, collector number (sn = without number, in cases with no collector number), herbarium acronym of the herbarium where the voucher is curated (Index Herbariorum [Theirs 2020]). We cited just one specimen voucher, though often species are vouchedered by several or more specimens. We conclude some taxon citations with notes.

**LYCOPODIOPHYTA**

**Selaginellaceae**

Selaginella watsonii Underwood, N, 2, GK, 2400–2660 m, subalpine, Rink 6627, ASC.

**PTERIDOPHYTA**

**Aspleniaceae**

Asplenium septentrionale (Linnaeus) Hoffmann, nKP, N, 1, G, rock crannies, Bobber’s Roost and Basin Springs, 2500–2520 m, Rink 7694, ASC. *Asplenium trichomanes* Linnaeus, N, 1, G, rock crannies, R. Collom sn, ASU.

**Dennstaedtiaceae**

Pteridium aquilinum (Linnaeus) Kuhn, N, 3, GK, disturbed areas, 2430–2730 m, Halverson 185, ASU.

**Dryopteridaceae**

Cystopteris fragilis (Linnaeus) Bernh., N, 2, GK, cracks in rocks, 2100–2670 m, Rink 4865, ASC. FNA shows the range of *C. fragilis* further north, but our many vouchers refute this.

Cystopteris reevesiana Lellinger, N, 2, K, mesic sites, 2280–2550 m, Rink 7835, ASC.

Cystopteris tenuis (Michx.) Desv., N, 1, G, small meadow NE of Coffee Lake, 2510–2640 m, Rink 7535, ASC.

Cystopteris utahensis Windham & Hauffler, nKP, N, 1, G, Neal Spring, 2390 m, Rink 6566, ASC. Determination by Windham.

Dryopteris filix-mas L. Scholz., N, 1, G, Kaibab Basin, 2500 m, Merkle 567, GRCA.

Polystichum louchitidis (Michx.) Desv., nKP, N, 1, G, below east rim, 2360 m, Rink 6185, ASC.

Woodia oregana D.C. Eaton subsp. cathcartiana (B.L. Robins.) Windham, N, 1, GK, 2100–2710 m, Rink 6439, ASC.

**Ophioglossaceae**

Botrychium pinnatum St. John, nKP, N, 1, GK, forests, 2670 m, Rink 7585, ASC.

**Pteridaceae**

Myriopteris gracilis Fee (Cheilanthes feei T. Moore), N, 2, GK, 2100–2410 m, cracks in dry cliffs, Rink 6539, ASC.

Pellaea glabella Mett. ex Kuhn, nKP, N, 1, G, rock crannies, R. Collom sn, ASU.

Rink 7694

**Selaginella cathcartiana** (Linnaeus) Bernh., N, 1, GK, 2400–2550 m, meadows, Windham 264B, ASC.

**CONIFEROPHYTA**

**Cupressaceae**

Juniperus communis Linnaeus, N, 4, GK, understory in subalpine forests, 2370–2750 m, Rink 6475b, ASC.

Juniperus osteosperma (Torr.) Little, N, 4, GK, rim edges and low areas, 2100–2320 m, Hodgson 15820, ASC.

Juniperus scopulorum Sarg., N, 4, GK, throughout, 2130–2690 m, Hodgson 7331, DES.
**Pinaceae**

*Abies concolor* (Gord. & Glend.) Lindl. ex Hildebr., N, 4, GK, subalpine forests, 2200–2690 m, *Hodgson 7354*, ASU.

*Abies lasiocarpa* (Hook.) Nuttall. N, 5, GK, subalpine forests, 2660–2720 m, *Hodgson 18463*, DES.

*Picea engelmannii* Parry ex Engelm., H, 5, GK, subalpine forests, 2660–2710 m, *Hodgson 15981*, DES.

*Picea pungens* Engelm., N, 4, GK, subalpine forests, 2440–2710 m, *Hodgson 18432*, DES.

*Pinus edulis* Engelm., N, 3, GK, rims and lower areas, 2100–2440 m, *Rink 7979b*, ASC. We followed Kral (1993) in differentiating *P. edulis* from *P. monophylla* by the expedient of number of needles per fascicle, two in *P. edulis*, one in *P. monophylla*. Species relationships are likely to be more complicated.

*Pinus monophylla* Torr. & Frém., N, 2, K, rims and lower areas, 2310 m, *Christy 1433*, ASC. According to Cole et al. (2008), this would be *P. m. Torr. & Frm. var. californiarum* (Bailey) Silha. Kral (1993) does not accept varieties of *P. m. Torr. & Frm.*

*Pinus ponderosa* P. & C. Lawson, N, 5, GK, throughout except the highest subalpine forests, 2100–2650 m, *Hodgson 15925*, DES.

*Pseudotsuga menziesii* (Mirbel) Franco, N, 5, GK, steep slopes and subalpine forests, 2110–2710 m, *Hodgson 14794*, DES.

**GNETOPHYTA**

*Equisetum arvense* Linnaeus, N, 1, G, 2420 m, meadow at Kanabowits Spring, *Collom sn., DES*.

*Equisetum × ferrissii* Clute (pro sp.), N, 1, G, 2330 m, Castle Lake, *Rink 8792*, ASC.

*Equisetum hyemale* Linnaeus var. *affine* (Engelm.) A.A. Eaton, N, 2, GK, 2130–2500 m, wet places, *Collom 1425*, ASC.

*Equisetum laeacatum* A. Braun, N, 2, G, 2440–2530 m, high southern parts, *Rink 7638*, ASC.

*Ephedra viridis* Coville, N, 2, GK, rim edges and low areas, 2250–2310 m, *Rink 6549*, ASC.

**MAGNOLIOPHYTA**

*Adoxaceae* (includes some Caprifoliaceae)

*Sambucus nigra* Linnaeus subsp. *cerulea* (Raf.) R. Bolli, N, 3, GK, throughout, 2100–2680 m, *Go256-49*, ARIZ.

*Sambucus racemosa* Linnaeus, N, 3, GK, throughout, 2260–2750 m, *Go256-49*, ASC.

*Amaranthaceae* (includes Chenopodiaceae)

*Amaranthus powellii* S. Watson, N, 2, K, lower, disturbed areas, 2100–2410 m, *Goodding 9-48*, ASC.

*Atriplex patula* Linnaeus, E, 1, K, Allen’s Riding Corral just south of Jacob Lake Lodge, 2410 m, *Rink 12192*, ASC.

*Atriplex rosea* Linnaeus, E, 1, K, Orderville Canyon, 2150 m, *Goodding 45-248*, ASC.

*Chenopodium album* Linnaeus, N, 2, GK, disturbed areas, 2130–2650 m, *Rink 12194*, ASC.

*Chenopodium atrovirens* Rydberg, N, 3, GK, throughout, 2310–2690 m, *Rink 8069*, ASC.

*Chenopodium berlandieri* Moq. var. *zeckackii* (J. Murr) J. Murr ex Aschers., N, 2, GK, uncommon, 2400–2660 m, *Rink 12257*, DES.

*Chenopodium capitatum* (Linnaeus) Ambrosi var. *parvicapitatum* Welsh, N, 3, GK, throughout, 2130–2670 m, *Goodding 76-48*, ASC. Some specimens approach var. capitatum, particularly *Rink 10901* from Moquitch Tank; most have a few vertical seeds mixed in the inflorescences.

*Chenopodium fremontii* S. Watson, N, 2, GK, throughout, 2130–2710 m, *Rink 4503*, ASC. Some specimens with acute leaves approach *Chenopodium incanum*.

*Chenopodium incanum* (S. Watson) A. Heller var. *incanum*, N, 2, K, Crazy Jug Point, 2270 m, *Nelson 69973*, RM.

*Chenopodium incognitum* Nuri Benet-Pierce, N, 1, K, *Sanders 7343a*, UCB.

*Chenopodium leptophyllum* (Moq.) Nuttall ex S. Watson, N, 1, GK, 2180–2710 m, *Hodgson 15816*, DES.

*Chenopodium neomexicanum* Standl., N, 2, GK, disturbed areas, 2100–2690 m, *Rink 8974*, ASC.

*Chenopodium pratericola* Rydberg, N, 1, G, 2380–2470 m, *Rink 7973*, ASC.

*Chenopodium strictum* Roth, nC, N?, 1, G, mixed conifer woodland, 2470 m, *Hodgson 14734*, DES.

*Dysphania graveolens* (Willd.) Mosyakin & Cle-...
**Apiaceae**

*Aletes macdougallii* Coult. & Rose subsp. *breviradiatus* Theobald & Tseng, N, 1, GK, rock faces, 2290–2710 m, Rink 6192, ASC.

*Angelica pinnata* S. Watson, N, 1, K, North Canyon & Big Springs Canyon, 2150 m, Goodding 384-48, ARIZ.

*Cicuta maculata* Linnaeus, N, 1, K, North & Big Springs Canyons, 2310–2470 m, Goodding 384-48, ASC. We follow the *Cicuta* nomenclature as *P. petraea* (M.E. Jones) Coult. & Rose (Torr.) Raf., nKP, N, 1, G, below rim, 2290–2710 m, Rink 6192, ASC.

*Asclepias latifolia* Asclepias hallii

*Asclepias asperula* Lomatium nevadense

*Lomatium leptocarpum* (Torr. & A. Gray) Coult. & Rose subsp. *macdougalii* (J.M. Coult. & Rose) Dorn), N, 2, GK, throughout, 2440–2590 m, Rink 10626, ASC.

*Lomatium foeniculaceum* (S. Watson) Coult. & Rose, N, 2, G, Greenland Lake, 2440 m, Collom sn, ASC.

*Osmorhiza depauperata* Phil., N, 3, GK, throughout, 2100–2730 m, Hodgson 7322, DES.

*Perideridia parishii* (Coult. & Rose) A. Nelson & J.F. Macbr., N, 3, G, throughout, 2440–2590 m, Collom sn, ASC. We follow McDougall in calling all of our material *P. parishii*, rather than *P. gardneri*, based on ternate rather than pinnate leaves.

*Pseudocymopterus montanus* (A. Gray) Coult. & Rose (*Cynopterus lemoinei* (J.M. Coult. & Rose) Dorn), N, 2, GK, subalpine forests, 2330–2750 m, Goodding 73-49, ASC.

*Pteryxia petraea* (M.E. Jones) Coult. & Rose (*Cynopterus petraeus* M.E. Jones), nKP N, 1, G, below rim, 2290 m, Rink 6193, ASC.

**Apocynaceae**

(*includes Asclepiadaceae*)

*Apocynum androsaemifolium* Linnaeus, N, 2, GK, forested areas, 2100–2570 m, Rink 7885, ASC.

*Apocynum cannabinum* Linnaeus, N, 2, GK, forested areas, 2100–2570 m, Rink 7885, ASC.

*Apocynum androsaemifolium* var. *occidentalis* DC., N, 4, GK, throughout, 2100–2710 m, Collom sn, ASC.

*Acrotilton repens* (Linnaeus) DC. (*Centaurea repens* Linnaeus), E, 1, K, disturbed areas, 2440 m, Higgins 23407, UTC.

*Ageratina herbacea* (A. Gray) King & H.E. Robbins. N, 2, GK, throughout, 2130–2590 m, Goodding 522-48, ARIZ.

*Agoseris aurantica* (Hook.) Greene, N, 3, GK, subalpine meadows, 2370–2750 m, Hodgson *H*-2559, DES. According to the FNA, *A. aurantica* should have no glands at the base of the involucre, but some specimens are both orange flowered and glandular, suggesting possible introgression between *A. aurantica* and *A. glauca* on the KP.

*Agoseris glauca* (Pursh) Rafinesque, N, 2, GK, mostly subalpine meadows, 2140–2750 m, Rink 5060, ASC. Distinctions between varieties *dasycephala* and *glauca* appear blurred on the KP.

*Agoseris parviflora* (Nuttall) D. Dietrich (*Agoseris glauca* (Pursh) Rafinesque var. *lacinata* (D.C. Eaton) Kuntze), N, 3, GK, meadows, 2100–2680 m, Hodgson 14763, DES.

*Amouriopsis dissecta* Rydberg (*Bahia dissecta* (A. Gray) Brit), N, 4, GK, mostly pine forests, 2130–2650 m, Hodgson *H*-2538, DES.

*Boronia acanthicarpa* Hook., N, 1, K, Tater Spring waterline, 2050 m, Hodgson 29140, DES.

*Boronia tomentosa* Nuttall, N, 1, K, Murray Lake, 2600 m, Nelson 70229, RM.

*Anaphalis margaritacea* (Linnaeus) Benth., N, 2, K, subalpine forests, 2420–2630 m, Hodgson 14768, DES.

*Antennaria marginata* Greene, N, 3, GK, forests throughout, 2130–2690 m, Rink 13267, ASC.

*Antennaria microphylla* Rydberg, N, 3, GK, forests throughout, 2330–2760 m, Rink 7517b, ASC. Includes specimens determined as *Antennaria rosea* Greene subsp. *ridgii* distinguished by the presence of glands beneath the stem tomentum, which seem indiscernable.

*Antennaria parviflora* Nuttall, N, 4, GK, forests throughout, 2250–2750 m, Rink 7993, ASC.

*Antennaria rosalata* Rydberg, N, 3, GK, subalpine meadows, 2400–2710 m, Rink 8033, ASC.

*Arcitan minus* Bernh., E*, 1, K, weedy places, 2130–2230 m, Hodgson 10978, DES.

*Arnica chamissonis* Lessing, N, 3, GK, subalpine lake margins, 2440–2760 m, Rink 8907, ASC.

*Arnica cordifolia* Hook., N, 3, GK, mostly subalpine meadows, 2500–2660 m, Rink 11328, ASC.

*Artemisia biennis* Willd., E*, 2, K, lake margins, 2350–2600 m, Rink 11468, ASC.

*Artemisia bigelovii* A. Gray, N, 4, GK, margins & rim edges, <2000 m, Goodding 424-48, ASC.

*Artemisia campestris* Linnaeus subsp. *pacific* (Nuttall) H.M. Hall & Clements (Artemisia *pacific*...
Artemisia carruthii Wood ex Carruth, N, 4, GK, throughout, 2100–2690 m, Rink 11549, ASC.
Artemisia dracunculus Linnaeus, N, 4, GK, throughout, 2130–2710 m, Rink 11547, ASC.
Artemisia frigida Willd., N, 3, K, throughout, 2140–2690 m, Hodgson 11686, DES.
Artemisia nova A. Nelson, N, 4, GK, margins, 2130–2690 m, Hodgson 25714, DES.
Artemisia tridentata Nuttall var. vaseyana (Rydberg) B. Boivin, N, 4, GK, mostly rim edges and lower areas, 2130–2260 m, Hodgson 5873, DES.

Balsamorhiza sagittata (Pursh) Nuttall, N, 1, GK, 2100–2470 m, Stevens 341, ASC.
Brickellia californica (Torr. & A. Gray) A. Gray, N, 4, GK, rocky areas in pine forest, 2130–2500 m, Hodgson 2589, DES.
Brickellia Europatorioides (Linnaeus) Shinners var. chlorolepis (Woot. & Standl.) B.L. Turner, N, 2, K, pine forest, 2250 m, Rink 12243, ASC.
Brickellia grandiflora (Hook.) Nuttall, N, 3, GK, throughout, 2130–2660 m, Rink 4866, ASC.
Brickellia oblongifolia Nuttall var. linifolia (D.C. Eat.) B.L. Robins., N, 1, K, Ryan, 1950 m, Goodding 294-49, DES.
Carduus nutans Linnaeus, E, 2, GK, stock pond along the AZ Trail south of Hwy. 89 and at Cliff Spring, 2370 m, Rink 12186, ASC.
Centaura stoebe Linnaeus subsp. micranthos (S.G. Gmelin ex Gugler) Hayek (Centaura maculosa nom. Lam.), E, 2, K, along Hwy. 67, 2570–2610 m, Nelson 66823, ASC.
Chaenactis douglasii (Hook.) Hook., & Arn., N, 2, GK, disturbed and rim areas, 2180–2500 m, Rink 10659b, ASC.
Chaetopappa ericoides (Torr.) Nesom, nKP, N, 1, G, rim margins, 2380 m, Rink 7970, ASC.
Chrysothamnus depressus Nuttall, N, 2, GK, margins, 2110–2410 m, Hodgson 5879, DES.
Chrysothamnus scopulorum (M.E. Jones) Urbatsch (Hesperodoria scopulorum (M.E. Jones) Greene), N, 2, G, within the canyon, 2100–2300 m, Rink 8943, ASC.
Chrysothamnus viscidiflorus (Hooker) Nuttall subsp. puberulus (D.C. Eaton) H.M. Hall and Clements, N, 1, K, LeFevre Ridge, 2130 m, Mann 123, RM. Likely more common than this one specimen would indicate.
Chrysothamnus viscidiflorus (Hooker) Nuttall subsp. viscidiflorus, N, 1, K, plateau margins, 2140–2590 m, Hodgson 15842, ASC.

Cirsium arizonicum (A. Gray) Petrak var. arizonicum (A. Gray) Keil (Cirsium niulatum (Jones) Petrak, N, 1, G, wet places, plateau margins, Cliff Spring and developed areas, 2130–2320 m, Hodgson 25702, DES.

Cirsium arizonicum (A. Gray) Petrak var. rothrockii (A. Gray) Keil, N, 2, K, 2030 m, Hodgson 15808, DES.
Cirsium cf. rydbergii Petrak, N, 1, G, Cliff Spring, 2316 m, Rink 6551, ASC. Possible sp. nov.
Cirsium vulgare (Savi Ten., E, 2, GK, more common in the K, throughout, 2130–2590 m, Rink 10884, ASC.

Cirsium wheeleri (A. Gray) Petrak., N, 4, GK, 2110–2750 m, Goodding 321–48, ASC. The most common and widespread dryland thistle on the KP; specimens previously determined as C. undulatum and other species are now determined as C. wheeleri.

Coneya canadensis (Linnaeus) Cronquist, N, 3, K, along roadways, 2140–2540 m, Hodgson 11788, DES.

Crepis intermedia A. Gray, N, 3, GK, mostly in pine forests along rims, 2180–2490 m, Hodgson 2297, DES.
Crepis occidentalis Nuttall, N, 2, GK, pine forests, 2270–2490 m, Hodgson 26240, DES.

Dieteria bigelowii (A. Gray) D.R. Morgan & R.L. Hartm. var. mucronata (Greene) D.R. Morgan & R.L. Hartman (Machaeranthera mucronata Greene, Pittonia 4:72, 1899; M. bigelowii (A. Gray) Greene var. mucronata (Greene) B.L. Turner), N, 3, GK, throughout, 2130–2750 m, Collom sn, ASC. A KP endemic, however, as described in the FNA, this entity approaches varieties of Dieteria canescens.

Dieteria canescens (Pursh) Nuttall var. ambiguus (B.L. Turner) D.R. Morgan & R.L. Hartman (Machaeranthera canescens (Pursh) A. Gray var. ambiguus B.L. Turner), N, 4, GK, mostly pine forests, 2070–2470 m, Rink 8031, ASC.

Dieteria canescens (Pursh) Nuttall var. aristata (Eastwood) D.R. Morgan & R.L. Hartman (Machaeranthera canescens (Pursh) A. Gray var. aristata (Eastwood) B.L. Turner), N, 2, GK, mostly pine forests, 2100–2600 m, Rink 7974, ASC.

Dieteria canescens (Pursh) Nuttall var. glabra (A. Gray) D.R. Morgan & R.L. Hartman (Machaeranthera canescens (Pursh) A. Gray var. glabra A. Gray, M. linearis Greene), N, 2, GK, 2190–2660 m, margins, Hodgson 6831, DES. The three varieties of Dieteria canescens intergrade on the KP.

Ericameria nauseosa (Pallas ex Pursh) G.L. Nesom & Baird var. graveolens (Nuttall) Reveil & Schuyler (Chrysothamnus nauseosus (Pallas ex Pursh) Britton) subsp. graveolens (Nuttall) H.M. Hall & Clements; C. nauseosus var. graveolens (Nuttall) H.M. Hall), N, 2, GK, Cliff Spring and plateau margins, 2120–2590 m, Hodgson 25709, DES.

Ericameria parryi (A. Gray) G.L. Nesom & Baird var. nevadensis (A. Gray) Nesom & Baird (Chrysothamnus parryi (A. Gray) Greene...
Gutierrezia microcephala
Gaillardia pulchella
Grindelia squarrosa (Pursh) Dunal var.
Gaillardia pinnatifida
Torr., N, 1, K, Big Springs, DeMotte Park, 2140–2680 m, Rink 6220, ASC.
Erigeron divergens Torr. & A. Gray., N, 4, K, throughout, 2110–2710 m, Rink 11575, ASC.
Erigeron eatoni A. Gray, N, 2, GK, throughout, 2190–2780 m, Rink 4190, ASC.
Erigeron eximius Greene, N, 2, GK, throughout, 2150–2690 m, Hodgson 7348, DES.
Erigeron flagellaris A. Gray, N, 4, GK, throughout, 2260–2740 m, Rink 8775, ASC.
Erigeron formosissimus Greene, N, 4, GK, throughout, 2130–2750 m, Goodding 80-48, ASC. We do not recognize varietal level on the KP.
Erigeron speciosus (Torr.) D.C. Eat., N, 2, K, 2530–2670 m, Hodgson 9533, DES. See note with E. vreelandii.
Erigeron tracyi D.C. Eat., N, 2, K, 2530–2670 m, Braun sn, ASC. Determination by Nesom.
Erigeron vreelandii A. Nelson, N, 4, GK, throughout, 2300–2750 m, Goodding 80-48, ASC. We do not recognize varietal level on the KP.
Erigeron cincreusus Greene, N, 4, GK, throughout, 2300–2000 m, Goodwin 14-48, ARIZ. Determination by Semple. See note with H. v. var. minor.
Erigeron villosus (Pursh) Shinners var. scabra (Eastwood) Semple, N, 1, K, lower elevations, 2133–2362 m, Goodding 14-48, ARIZ. Determination by Semple. See note with H. v. var. minor.
Hieracium fendleri Schultz-Bip., N, 3, GK, throughout, 2350–2750 m, Rink 9890, ASC.
Hymenoxys filifolius Hooker var. lugens Hooker, N, 2, GK, throughout, 2130–2440 m, Rink 4843, DES.
Hymenopappus filifolius Hooker var. nanaus (Rydberg) B.L. Turner, N, 2, GK, throughout, 2130–2500 m, Rink 4843, ASC. We are uncertain whether our KP varieties are taxonomically distinct. If so, we may also have H. filifolius var. cinereus (Rydby) Johnst.
Hymenoxys cooperi (A. Gray) Cockerell, N, 2, K, pine forest margin, 2100–2300 m, Bierner 52356, UCR.
Hymenoxys subintegra Cockerell, N, 4, GK, throughout, 2120–2760 m, Goodding 25-48, ASC. This is the prevalent Hymenoxys on the KP, despite many misdeterminations.
Helianthus annuus Linnaeus, N, 2, K, roadside, 2060–2130 m, Goodding 262-48, ASC. Many specimens previously determined as Helianthus annuus are Helianthus quinquenervis.
Helianthus petiolaris Nuttall, N, 1, K, roadside, 2060 m, Rink 11650, ASC.
Heliantheris multiflora Nuttall var. multiflora, N, 2, GK, throughout, 2100–2710 m, Goodding 47-48, ARIZ.
Heliantheris multiflora Nuttall var. nevadensis (A. Nelson) W.F. Yates, N, 4, GK, throughout, 2100–2590 m, Butterfield 301, ARIZ.
Herrickia glauca (Nuttall) Brouillet var. pulchra (S.F. Blake) Brouillet (Aster glaucodes S.F. Blake subsp. pulcher S.F. Blake), N, 2, G, wet plateau margins, 2220–2500 m, Rink 8591, ASC.
Heterotheca fulcrata (Greene) Shinners var. fulcrata, N, 2, GK, throughout, (2072) 2392–2652 m, Butterfield 269, ARIZ. Determination by Semple.
Heterotheca villosa (Pursh) Shinners var. minor (Hooker) Semple, N, 2, GK, throughout, 2200–2500 m, Goodding 203-48, ARIZ. Determination by Semple. We are not convinced that Semple’s varieties are worth considering. We have taken a conservative approach to Heterotheca villosa group taxonomy on the KP; not following Nesom (2006).
Heterotheca villosa (Pursh) Shinners var. nana (Gray) Semple, N, 2, GK, throughout, 2151–2470 m, Hodgson 15933, DES. See note with H. v. var. minor.
Hymenoxys cooperi (A. Gray) Cockerell, N, 2, K, Timp Point, 2130 m, Goodding 495-48, ARIZ.
Iva axillaris Nuttall, N, 2, K, weedy places, 2270–2450 m, Rink 9851, ASC.
Lactuca serriola Linnaeus, E, 4, GK, throughout, 2200–2690 m, Rink 6515, ASC.

Laennecia schiedeana (Less.) G.L. Nesom (Conyza schiedeana (Lessing) Cronquist), N, 4, GK, common in burned areas, 2460–2660 m, Rink 11556, ASC.

Layia glandulosa (Hook.) Hook. & Arn., N, 1, G, north of Greenland Point, 2450 m, Rink 10627, GRCA.

Leucanthemum vulgare Lam., E, 2, GK, roadsides, 2470–2800 m, Rink 10894, ASC.

Machaeranthera tanacetifolia (Kunth) Nees, N, 1, K, disturbed areas, Hodgson 29078, DES.

Madia glomerata Hook., N, 2, GK, mostly high meadows, 2160–2690 m, Rink 6422, ASC.

Matricaria discoides DC., E, 1, GK, DeMotte Park and the old dump along the Point Sublime Rd., 2490–2660 m, Rink 6453, ASC.

Mulgedium pulchellum (Pursh) G. Don (Haplopappus parryi Rink 6503), N, 1, G, mostly meadows, 2130–2680 m, Rink 6503, ASC.

Oreochrysum parryi (Nuttall) Greene var. (M.E. Jones) Shinners, N, 2, G, common in burned areas, 2460–2660 m, Rink 11556, ASC.

Perityle gracilis Nuttall, N, 1, G, pine forest, 2300 m, Boness sn, USFS–TEU.

Psilostrophe sparsiflora (A. Gray) A. Nelson, N, 1, K, plateau margin, 2130–2240 m, Hodgson 28812, DES.

Senecio eremophilus Richardson var. kingii Greenman, N, 4, GK, forests, 2360–2600 m, forests throughout, Goodding 375–48, ASC. Our specimens intergrade with S. eremophilus Richardson var. macdougalii (A. Heller) Cronquist.

Senecio flaccidus Lessing var. flaccidus, N, 1, G, Neal Spring, 2530 m, Collum sn, GRCA.

Senecio wootonii Greene, N, 2, G, 2430–2740 m, Theroux 126, MNA.

Solidago altissima Linnaeus, N, 2, GK, throughout, 2100–2660 m, Hodgson 15907, DES. See note under S. velutina.

Solidago multiradiata Ait., N, 3, GK, throughout, 2310–2750 m, Rink 11523, ASC.

Solidago nana Nuttall, N, 3, GK, meadows, 2100–2760 m, Goodding 223–48, ASC.

Solidago velutina DC., N, 3, GK, throughout, 2130–2680 m, Goodding 19–48, ARIZ. On the KP, we cannot easily differentiate Solidago canadensis, S. altissima, S. missouriensis and S. velutina, as some specimens have lower leaves that are readily deciduous (a trait of S. altissima and S. canadensis) and leaves strongly reduced upward (a trait of S. velutina). Additionally, some specimens have pubescent inflorescences (a trait of S. canadensis) and entire leaves (a trait of S. missouriensis).

Sonchus asper (Linnaeus) Hill., E, 3, GK, disturbed areas throughout, 2160–2670 m, Rink 7524, ASC.

Stephanomeria exigua Nuttall, N, 1, K, pine forest, 2300 m, Boness sn, USFS–TEU.

Stephanomeria minor (Hook.) Nuttall var. minor, N, 2, GK, rims, 2100–2550 m, Hodgson 2590, DES.

Stephanomeria thurberi A. Gray, N, 1, G, Cape Royal, 2350 m, Collum sn, GRCA.

Symphyotrichum ascendens (Lindl.) Nesom (Aster ascendens Lindley, A. chilensis Nees subsp. ascendens (Lindley) Cronquist), N, 2, GK, meadows, 2440–2690 m, Rink 8089, ASC.

Symphyotrichum falcatum (Lindl.) G.L. Nesom var. commutatum (Torr. & A. Gray) G.L. Nesom (A. commutatus (Torrey & A. Gray) A. Gray, A. falcatus Lindley subsp. commutatus (Torrey & A. Gray) A.G. Jones; A. falcatus var. commutatus (Torrey & A. Gray) A.G. Jones, Symphyotrichum falcatum subsp. commutatum (Torrey & A. Gray) Semple; S. falcatum var. commutatum (Torrey & A. Gray) G.L. Nesom, Virgulus falcatus (Lindl.) Reveel & Keener), N, 4, GK, throughout, 2100–2500 m, Hodgson 11783, DES.

Symphyotrichum foliaceum (DC.) G.L. Nesom (Aster foliaceus Lindley ex de Candolle), N, 2, GK, meadows, 2400–2750 m, Rink 8012, ASC.

Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. hesperium (A. Gray) G.L. Nesom (Aster hesperium A. Gray, A. lanceolatum Willdenow
subsp. hesperius (A. Gray) Semple & Chmielewski, Symphyotrichum hesperium (A. Gray) A. Löve & D. Löve), N, 2, GK, 2130–2640 m, Rink 12249, ASC.

Taraxacum erythrospermum Andrzejowski ex Besser (T. laevigatum), E, 2, GK, throughout, 2110–2580 m, Goodding 171-49, ARIZ.

Taraxacum officinale Weber, N, 4, GK, throughout, 2130–2710 m, Hodgson 14712, DES.

Tetradynia canescens DC., N, 2, K, margins, 2140–2440 m, Rink 12164, ASC.

Tetranereuris acaulis (Pursh) Greene var. arizonica (Greene) Parker, N, 3, GK, throughout, 2190–2680 m, Rink 4816, ASC.

Tetranereuris ivesiana Greene, N, 1, K, East Rim View, 2560–2680 m, Hodgson 7337, DES.

Thelesperma subdumum A. Gray, nKP, N, 1, K, east side, 21600 m, Hodgson 28819, DES.

Townsendia exscapa (Richards.) Porter, N, 2, GK, forests, 2120–2450 m, Goodding 183–49, ASC.

Townsendia incana Nuttall, N, 1, K, Ryan, 2010 m, Goodding 293–49, ASC.

Tragopogon dubius Scop., E, 4, GK, throughout, 2320–2750 m, Rink 11537, ASC.

Tripleurospermum inodorum (Greene) Sch. Bip., nAZ, E, 2, K, margins of lakes and tanks, 2460–2600 m, Zola sn, ASC.

Verbesina encelioides (Cav.) Benth. & Hook. f. ex Gr, N, 1, K, Big Springs Canyon, 1980 m, Goodding 124–48, ASC. Goodding’s reported elevation is incorrect for this specimen. All of Big Springs Canyon is in the checklist area.

Wyethia arizonica A. Gray, N, 1, K, along FR611 and North Canyon Trail, 2530–2760 m, Rink 11344, ASC.

Xanthisma gracile (Nuttall) D.R. Morgan & R.L. Hartman (Machaeranthera gracilis (Nuttall) Shinners), N, 1, K, probably more widespread, 2350–2500 m, Rink 10983, ASC.

Berberidaceae

Berberis fremontii Torrey (Mahonia fremontii (Torrey) Fedde), N, 1, K, plateau margins, 2030–2270 m, Nelson 66979, RM.

Berberis repens Lindl. (Mahonia repens (Lindley) G. Don), N, 4, GK, throughout, high slopes, 2110–2720 m, Rink 6467, ASC.

Betulaceae

Betula occidentalis Hook., N, 1, G, springs near the rim, 2310–2430 m, Rink 8952, ASC.

Ostrya knowltonii Coville, N, 2, G, steep shaded gullies below the rim, 2270–2320 m, Rink 6190, ASC.

Boraginaceae

(oncludes Hydrophyllaceae)

Cryptantha cinerea (Greene) Cronquist var. abortiva (Greene) Cronquist, N, 2, GK, rim edges, lower slopes and rocky slopes within the canyon, 2150–2500 m, Rink 10679, DES.

Cryptantha cinerea (Greene) Cronquist var. cinerea, N, 2, G, plateau margins, 2500 m, Hodgson H 2283, DES.

Cryptantha confertiflora (Greene) Payson, nKP, N, 1, G, xeric places, 2270–2290 m, Hodgson 6264, DES.

Cryptantha gracilis Osterhout, nKP, N, 1, G, Naji Point, 2500 m, Rink 10661, GRCA.

Cryptantha setosissima (A. Gray) Payson, N, 4, GK, mostly open areas, 2150–2710 m, Rink 8049, ASC.

Cryptantha torreyana (A. Gray) Greene, nC, N, 1, G, Harvey Meadow, 2460–2490 m, Rink 7624, ASC.

Cynoglossum officinale (A. Gray) Greene, N, 1, GK, Jacob Lake Lodge and North Rim Campground, 2440–2520 m, Dekoker 16, ASC.

Hackelia floribunda (Lehm.) I.M. Johnston, N, 3, GK, mostly in canyons, 2110–2690 m, Rink 6395, ASC.

Lappula occidentalis (S. Watson) Greene var. occidentalis, N, 4, GK, disturbed areas, 2100–2640 m, Rink 6585, ASC.

Lithospermum inescum Lehms., N, 2, K, lower areas, 2160–2300 m, Schaack 1229, ASC.

Lithospermum multiflorum Torr. ex A. Gray, N, 3, GK, throughout, 2100–2650 m, Rink 7941, ASC.

Mertensia franciscana Heller, N, 3, GK, moist areas, 2260–2640 m, Rink 6200, ASC.

Mertensia macdougalii Heller, N, 1, K, pine forest, 2300–2490 m, Rink 4199, ASC.

Nama dichotomum (Ruiz & Pavón) Choisy, nKP, N, 2, K, plateau margins, 2170–2340 m, Rink 11467, ASC.

Phacelia alba Rydberg, nKP, E*, 1, G, Bridle Path to NR Lodge, 2500 m, Rink 10029, DES. A recent accidental introduction that came in with fill dirt.

Phacelia filiformis Torr. ex S. Watson, N, 2, G, springs and alcoves near the rim, 2120–2500 m, Rink 7622, ASC.

Phacelia heterophylla Torr., N, 3, GK, throughout, 2120–2720 m, Rink 6180, ASC.

Plagiobothrys scouleri (Hook. & Arn.) I.M. Johnston var. hispidulus (Greene) Dorn, N, 1, K, Murray Lake margin, 2590 m, Rink 10885, DES.

Brassicaceae

Alyssum simplex (Linnaeus) Linnaeus, E, 1, GK, Pt. Sublime and along Hwy. 67, 2270–2650 m, Rink 8879, ASC.

Arabis hisruta (Linnaeus) Scop., N, 2, G, 2100–2440 m, Rink 4861, ASU.

Berteroa incana (Linnaeus) DC., N, 1, K, Big Springs RS, 2130 m, Rink 12247, ASC.

Boechera divaricarpa (A. Nelson) A. Löve & D. Löve (Arabis divaricarpa A. Nelson), N, 1, GK, 2500–2670 m, Rink 6472, ASC.
Boechera fendleri (S. Watson) W.A. Weber (A. fendleri (S. Watson) Greene), N, 2, GK, pine forests, 2130–2650m, Rink 9896, ASC.

Boechera gracilipes (Greene) Dorn (Arabis gracilipes Greene), N, 2, GK, pine forests, 2240–2470m, Rink 8613, ASC.

Boechera pendulina (Greene) W.A. Weber (Arabis pendulina Greene), N, 1, K, pine forests, 2220–2300m, Goodding 197-49 ASC.

Boechera perennans (S. Watson) W.A. Weber (Arabis perennans S. Watson), N, 1, GK, pine forests, 2130–2650m, Rink 7101, ASC.

Boechera stricta (Graham) Al-Shehbaz (Turritis stricta Graham, A. drummondii A. Gray, B. drummondii (A. Gray) Á. Löve & D. Löve, T drummondii (A. Gray) Lunell), N, 2, GK, high wet areas, forests, and meadows, 2330–2770m, Rink 6210, GRCA.

Capsella bursa-pastoris (Linnaeus) Medic., E, 2, K, wet places, 2250–2600m, Rink 6454, ASC.

Cardaria draba (Linnaeus) Desv., nKP, E, 1, K, Castle Springs, 2220m, Rink 11107, ASC.

Caulanthus crassicaulis (Linnaeus) Desv., nKP, E, 1, K, meadows, 2330–2770m, Rink 4502, GRCA.

Chorispora tenella (Pallas) DC., E, 2, GK, Kaibab Trail, Big Springs, disturbed sites, 2100–2250m, Rink 4658, GRCA.

Descurainia californica (A. Gray) O.E. Schulz, N, 3, GK, mostly subalpine forests, 2040–2690m, Rink 6198, ASC.

Descurainia incisa (Engelm.) Britt. subsp. incisa, N, 2, GK, pine forests, 2440–2470m, Rink 11616, ASC.

Descurainia obtusa (Greene) O.E. Schulz, N, 2, G, rim edges, 2440m, Rink 7967, ASC.

Descurainia pinnata (Walter) Britt. subsp. ocho- lenca (Wooton) Deling, N, 2, GK, pine forest, 2130–2590m, Hodgson 29095, DES.

Descurainia sophia (Linnaeus) Webb ex Prantl., E, 2, K, mostly pine forests, 2150–2470m, Rink 11296, ASC.

Draba asprella Greene var. asprella, N, 1, G, Warm Springs Lake, 2350–2530m, Crawford 2004-1, ASC.

Draba asprella Greene var. stelligera O.E. Schulz (D. asprella var. kaibabensis C.L. Hitchc.), N, 2, G, rocky pine forest, 2190–2650m, Hodgson 15345, DES.

Draba aurea Vahl ex Hornem., nKP, N, 1, K, De Motte Park, 2650m, Reeves 5661, ASU.

Draba rectiflora C.L. Hitchc., N, 2, K, mostly lakes and sinks, 2440–2610m, Rink 6393, ASC.

Erysimum capitatum (Douglas ex Hook.) Greene var. purshii (Durand) Rollins, N, 3, GK, throughout, 2130–2730m, Davenport 6216, ASC. Our specimens have four-angled fruits, and a few have three-forked trichomes on the lower leaves; varietal recognition may not be appropriate here.

Erysimum in conspicuum (S. Watson) MacMill., nKP, N, 1, K, pine forest, 2400m, Rink 12183, ASC.

Erysimum repandum Linnaeus, E, 1, G, open areas, 2490–2560m, Reif 10808, ASC.

Hesperidanthus linearifolius (A. Gray) Rydberg (Schoenocrambe linearifolia (A. Gray) Rollins, Thelypodiospis linearifolia (A. Gray) Al-Shehbaz), N, 2, GK, plateau margins, 2130–2450m, Hodgson 26238, DES.

Lepidium appelianum Al-Shehbaz (Cardaria pubescens (C.A. Mey.) Jarmolenko), nC, E, 1, K, Castle Spring, 2190m, Rink 10735, ASC.

Lepidium montanum Nuttall, N, 1, K, Jacob Lake, 2380m, McCormick sn, ASC.

Lepidium virginicum Linnaeus var. menziesii (DC.) C.L. Hitchc., N, 1, LaFevre Ridge, 2320m, Holmgren 4696, ASC.

Nasturtium officinale R. Br., E, 1, K, Big Spring, 2150m, Stevens 324, ASC.

Noccaea fendleri (A. Gray) Holub subsp. glauca (A. Nelson) Al-Shehbaz & M. Koch, N, 2, GK, throughout, 2130–2750m, Hodgson H2238, ASC.

Pennellia longifolia (Benth.) Rollins, N, 2, GK, throughout, 2130–2640m, Goodding 88-48, ASC.

Pennellia micrantha (A. Gray) Nieuwland, N, 1, GK, subalpine forest, 2510–2750m, Goodding 327-49, ASC.

Physaria arizonica (S. Watson) O’Kane & Al-Shehbaz (Lesquerella arizonica S. Watson), N, 2, K, pine forests, 2070–2470m, Hodgson 11072, DES.

Physaria intermedia (S. Watson) O’Kane & Al-Shehbaz (Lesquerella intermedia (S. Watson) Heller), N, 1, K, pine forests, 2130m, Rink 8883, DES.

Physaria kingii (S. Watson) O’Kane & Al-Shehbaz subsp. kaibabensis (Rollins) O’Kane (Lesquerella kaibabensis Rollins), N, 2, GK, the Basin, Pleasant Valley, 2480–2690m, Goodding 165-49, ASC.

Physaria kingii (S. Watson) O’Kane & Al-Shehbaz subsp. latifolia (A. Nelson) O’Kane & Al-Shehbaz (Lesquerella latifolia A. Nelson), N, 1, K, northern KP, 2270–2380m, Go200-49, ASC.

Physaria rectipes (Woot. & Standl.) O’Kane & Al-Shehbaz (Lesquerella rectipes Woot. & Standl.), nC, E, 1, K,castle margins, 2100–2270m, Hodgson 29094, DES.

Rorippa curvipes Greene, N, 3, K, cattle tanks and lakes, 2280–2660m, Goodding 304-48, ASC.

Rorippa palustris (Linnaeus) Besser, N, 1, K, Warm Springs Lake, 2350–2690m, Rink 11665, ASC.
Rorippa sylvestris (Linnaeus) Bess., E, 1, K, lake-shores, 2270–2350 m, Fertig 22031, ASC.

Sisymbrium altissimum Linnaeus, E, 2, GK, mostly plateau margins, 2100–2560 m, Rink 6524, GRCA.

Streptanthus cordatus Nuttall, N, 2, K, plateau margins, 2190–2380 m, Rhodes 9947, ASC.

Thelypodium wrightii A. Gray, nKP, N, 1, G, Point Sublime, 2270 m, Rink 5881, ASC.

Thlaspi arvense L., nKP, N, 1, G, Plateau, Pt. Sublime, 2290–2560 m, & J.M. Bigelow) B.D. Parfitt, N, 1, G, Walhalla Plateau, 2100–2340 m, Gravelly Park, 2320–2560 m, Rink 7966, ASC. Following the Intermountain Flora (Cronquist et al. 1984), ours would be variety parishii. Variation in vestiture of twigs and leaves does not coincide with variation in anther exertion, leaf color, or venation. Symphoricarpos taxonomy is a mess in this region. Phillips et al. (1987) reported S. longiflorus and S. rotundifolius from the KP. We have found no compelling reason to split them. Valeriana acutituba Rydberg, nKP, N, 1, G, Mangum and Greenland Springs, 2170–2440 m, Rink 6199, ASC.

Valeriana arizonica A. Gray, N, 2, GK, margins, 2360–2390 m, Rink 6183, ASC.

Valeriana edulis Nuttall ex Torr. & A. Gray, N, 2, GK, springs and meadows, 2390–2730 m, Rink 7576, ASC.

Caryophyllaceae

Arenaria lanuginosa (Michaux) Rohrbach subsp. saxosa (A. Gray) Zarucchi, R.L. Hartman & Rabeler (Arenaria confusa Rydbl.), N, 3, GK, throughout, 2130–2770 m, Rink 6211, ASC.

Cerastium arvense Linnaeus, E, 2, GK, meadows, 2590–2670 m, Rink 10690, ASC.

Eremogone eastwoodiae (Rydberg) Ikonnikov var. adenophora (Kearney & Peebles) R.L. Hartman & Rabeler, N, 2, GK, mostly high meadows, 2250–2710 m, Rink 6534, ASC.

Eremogone fendleri (A. Gray) Ikonnikov, N, 3, GK, throughout, 2100–2760 m, Higgins 24876, ASC. Most of our material would be variety porteri (Rydberg) N.H. Holmgren & P.K. Holmgren.

Minuartia macrantha (Rydberg) House (M. filiorum (Maguire) McNeill), N, 1, GK, open areas, 2330–2670 m, Turner 78–80, ARIZ.

Parochysia sessiliflora Nuttall, N, 2, GK, east rim, 2560–2720 m, Rink 10041, ASC.

Pseudostellaria jamesii (Torr.) W.A. Weber & R.L. Hartman, N, 2, GK, throughout, 2250–2690 m, Rink 4518, ASC.

Sagina saginoides (Linnaeus) Karst., N, 1, GK, Fawn and Lower Thompson Springs, 2520–2640 m, Rink 6357, ASC.

Silene latifolia Poir. subsp. alba (Miller) Greuter & Burdet, nKP, E, 1, GK, Joe’s Mud Hole, Union Pacific (North Rim) Lodge, 2500–2580 m, Rink 10904, ASC.

Silene menziesii Hook., nC, nGRCA, N, 1, G, Swamp Point, 2250 m, Rink 4813, GRCA.

Silene rectiramea B.L. Robins., nKP, N, 1, G, steep mesic slopes in canyon, 2270 m, Rink 4506, ASC. Specimen collected below the rim in Douglas-fir forest.

Silene scouleri Hook., N, 2, GK, throughout, 2130–2750 m, Goodding 97–48, ASC. According to FNA, only var. pringlei (S. Watson)
C.L. Hitchcock & Maguire occurs in Arizona. This variety is characterized by having nodding inflorescences; our KP specimens have erect inflorescences.

Silene cespitosa S. Watson, N, 1, GK, burned pine forest and hanging gardens, 2290–2610 m, Rink 6191, ASC.

Spergularia rubra (Linnaeus) Presl & C. Presl., E, 2, GK, house at GRCA entrance station, Snipe Lake and south of Spring Canyon, 2610–2700 m, Rink 7538, ASC.

Stellaria longifolia Muhl. Ex Willd., N, 2, GK, probably more common, meadows, 2450 m, Rink 10008, DES.

Stellaria media (L.) Cyr., E, 1, G, Greenland Lake, 2590 m, Collom sn, GRCA.

Stellaria umbellata Turcz. ex Kar. & Kir. (Stellaria gomoniucha Boivin.), N, 2, GK, open areas, 2470–2750 m, Rink 7541, ASC.

Celastraceae

Paxistima myrsinoides (Pursh) DC. (Celastrus myrsinoides Pursh), N, 1, K, Jacob Reservoir, 2130 m, Goodding 8748, ASC.

Crassulaceae

Convolulus arvensis Linnaeus, E, 1, G, disturbed areas, 2470 m, Hodgson 14753, DES.

Cornaceae

Cornus sericea Linnaeus, N, 2, GK, throughout, 2250–2500 m, Rink 6476b, ASC.

Crassulaceae

Sedum lanceolatum Torr., N, 2, GK, cliffs and meadows, 2490–2650 m, Hodgson 26263, DES.

Elaeagnaceae

Shepherdia canadensis (Linnaeus) Nuttall, N, 2, GK, subalpine forests, 2320–2680 m, Goodding 176–48, ASC.

Shepherdia rotundifolia (Linnaeus) House, N, 2, GK, moist subalpine forests, 2280–2740 m, Rink 7511, ASC.

Pterospora andromedea Nuttall, N, 2, GK, forests, 2330–2650 m, Rink 7675, ASC.

Pyrola chlorantha Sw., N, 2, GK, moist subalpine forests, 2500–2750 m, Rink 7879, ASC.

Pyrola elliptica Nuttall, N, 1, G, Milk Spring, Lindberg Hill, 2490–2730 m, Hodgson 14850, DES.

Pyrola minor Linnaeus, nKP, N, 1, G, Milk Spring, 2520 m, Rink 7649, ASC.

Pyrola picta Sm., N, 2, GK, moist subalpine forests, 2400–2590 m, Rink 7878, ASC.

Euphorbiaceae

Chamaesyce chaetocalyx (Boiss.) Woott. & Standl. var. chaetocalyx, N, 2, K, pine forests, 2180–2260 m, Hodgson 2290, DES.

Chamaesyce fendleri Torr. & A. Gray var. fendleri, N, 1, pine forests, 2130–2310 m, Rink 8886, ASC.

Chamaesyce serpyllifolia (Pers.) Small, nKP, N, 1, GK, disturbed areas, 2350–2370 m, Rink 8969, ASC.

Euphorbia brachycera Engelm. (E. lurida Engelm., E. pauberis Engelm., E. robusta (Engelm.) Small ex. Britt. & B), N, 2, GK, throughout, 2120–2640 m, Rink 6414, NY.

Euphorbia esula Linnaeus, E, 1, K, Big Springs Ranger Station, 2130 m, A. Phillips 53, ASC.

Euphorbia incisa Engelm., N, 2, GK, 2400–2600 m, Collom sn, GRCA.

Euphorbia lurida Engelm., N, 2, GK, throughout, 2420–2620 m, Hurst 182, GRCA.

Euphorbia schizoloba Engelm. (E. incisa Engelm.), N, 2, G, rim margins, Collom sn, GRCA.

Fabaceae

Astragalus amphioxys A. Gray var. modestus Barneby, N, 1, G, plateau margins, 2220–2300 m, Rink 4195, ASC.

Astragalus calycosus Torr. ex S. Watson, N, 2, GK, pine forests, 2130–2290 m, Hodgson 29484, DES. Many plants at rim localities have a diminutive form suggestive of A. cremnophyllax Barneby.

Astragalus castaneiformis S. Watson, N, 3, GK, throughout, 2090–2730 m, Rink 10617, ASC.

Astragalus crennophyllax Barneby var. crennophyllax, N, 2, G, Cape Final, 2400 m, Brian 95-168, GRCA.

Astragalus humistratus A. Gray var. humistratus (Bydberg) Barneby, N, 1, K, Jones sn, ARIZ. Marcus Jones’ 1890 collection from the Buckskin Mountains without definite locality is the only record we have of this taxon on the KP.

Astragalus humistratus var. tenerrimus (Bydberg) Barneby, N, 3, GK, throughout, 2240–2660 m, Rink 6406, ASC.

Astragalus kentrophyta A. Gray var. elatus S. Watson, N, 2, GK, throughout, 2100–2720 m, Goodding 38-48, ASC.

Astragalus lentiginosus Dougl. ex Hooker var. diphysus (A. Gray) M.E. Jones (A. l. Douglas var. modestus) Barneby, N, 2, GK, throughout, 2250–2500 m, Hodgson 4195, ASC.

Orthilia secunda (Linnaeus) House, N, 2, GK, moist subalpine forests, 2280–2740 m, Rink 7511, ASC.
Lupinus hillii S. Wats. (Lupinus barbiger Pursh var.)
Psoralidium tenuiflorum (Pursh) Rydberg, N, 2, K, throughout,
Lupinus argenteus
Lotus wrightii
Lotus utahensis
Lotus corniculatus
Lathyrus laetivirens
Medicago lupulina
Medicago sativa Linnaeus, E, 2, GK, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, GK, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, G, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, K, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, K, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, K, throughout,
Melilotus officinalis (Linnaeus) Lam., E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
Medicago sativa Linnaeus, E, 2, K, throughout,
end of the spectrum is occupied by plants short in stature, with bunched stems, short sepal awns, strongly glandular sepal, and purple flowers. These are plants that botanists have usually called G. richardsonii. The other end of the spectrum is occupied by taller, lankier plants with fewer, more sprawling stems, longer sepal awns and either lacking glands on the sepal, or with fewer glands on the sepals, and white flowers. These plants, botanists have usually called G. cespitosum.

**Grossulariaceae**

_**Ribes cereum**_ (R. c. var. _inebrians_ (Lindley) C.L. Hitchcock, _R. c. var. pedicillare_ A. Gray, _R. inebrians_ Lindley), N, 3, GK, throughout, 2120–2780 m, Deaver 6212, ASC.

_**Ribes inerme**_ Rydb var. _inerme_, N, 2, G, rim margins, 2560–2680 m, Bailey _en_., GRCA.

_**Ribes leptanthum**_ A. Gray, N, 3, GK, throughout, 2320–2590 m, _Rink_ 6396, ASC.

_**Ribes quercetorum**_ Greene, N, 2, GK, lower forests, 2130–2320 m, _Goodding_ 61–49, ARIZ.

_**Ribes velutinum**_ Greene, N, 2, K, throughout, 2130–2290 m, _Goodding_ 47–49, ASC.

_**Ribes viscossissimum**_ Pursh, N, 2, G, 2440–2640 m, _Rink_ 10093, ASC.

**Hydrangeaceae**

_Fendlera rupicola_ A. Gray, N, 1, K, Timp Point, 2130–2320 m, probably more common, _Rink_ sn., GRCA. Turner’s (2001) assessment would have _F. eurycodon_ (Engelm. & A. Gray) A. Heller on the KP, with hairs on the upper leaf surface and a double layer of hairs on the lower leaf surface. Turner’s treatment has _F. rupicola_ with glabrous upper leaf surfaces and restricted to just a few localities in central Texas.

_Fendlerella utahensis_ (S. Watson) Heller, N, 2, G, rim edges, 2130–2440 m, _Rink_ 7979a, ASC.

_Philadelphus microphyllus_ A. Gray, N, 2, GK, slopes, 2260–2690 m, _Hodgson_ 5587, ASC.

**Hypericaceae**

_Hypericum anagalloides_ Cham. & Schlecht., N, 2, GK, pond margins and other wet land, 2440–2650 m, _Rink_ 6606, ASC.

_Hypericum sconleri_ Hook. N, 2, G, wet places, 2420–2520 m, _Collom_ 6, ASC.

**Lamiaceae**

_Agastache pallidiflora_ (Heller) Rydberg, N, 3, GK, throughout, 2340–2710 m, _Rink_ 6179, ASC.

_Clinopodium vulgare_ Linnaeus, nKP, N, 1, G, South Big Springs, 2320 m, _Rink_ 7891, ASC.

_Dracocephalum parviflorum_ Nuttall, N, 2, GK, wet areas, 2140–2750 m, _Rink_ 6488, ASC.

_Hedeoma drummondii_ Benth., N, 2, GK, plateau margins, 2170–2270 m, _Rink_ 8878, ASC.

_Hedeoma oblongifolia_ A. Heller, N, 2, K, 2100–2570 m, _Rink_ 11623a, ASC.

_Marrubium vulgare_ Linnaeus, E, 2, K, Big Springs RS, 2130–2300 m, White sn., MNA.

_Mentha arvensis_ Linnaeus, N, 2, G, springs and lakes, 2330–2440 m, _Rink_ 5802, ASC.

_Monardella glauca_ Greene, N, 3, GK, wet places, 2110–2450 m, _Goodding_ 441–48, ASC.

_Nepeta cataria_ Linnaeus, E, 1, G, Castle Canyon, _Goodding_ 400–48, ASC.

_Prunella vulgaris_ Linnaeus, N, 2, GK, wet places, 2430–2690 m, _Goodding_ 221–48, ASC.

_Scutellaria potosina_ Brandegee var. _kaibabensis_ S.L. Rhodes & T.J. Ayers, N, 1, K, east side, 2130–2610 m, _Hodgson_ 7334, DES. Endemic to the lower east margin of the KP and nearby areas.

**Lentibulariaceae**

_Utricularia macrorhiza_ Le Conte, N, 2, K, aquatic in lakes, 2280–2670 m, _Goodding_ 310–48, ASC.

**Linaceae**

_Linum arizatum_ Engelm., N, 1, K, dry forest, 2070–2490 m, _Hodgson_ 11807, DES.

_Linum australe_ Heller, N, 2, K, 2190–2610 m, _Rink_ 12163, ASC.

_Linum levisii_ Pursh, N, 2, GK, throughout, 2100–2730 m, _Rink_ 7998, ASC.

_Linum parvulatum_ (Engelm.) Heller, N, 1, K, 2290–2490 m, _Rink_ 11626, ASC.

**Loasaceae**

_Mentzelia laevicaulis_ Torr. & A. Gray var. _laevicaulis_ E.*, 1, G, CC fill pile and Bridle Path near North Rim Lodge, 2500–2560 m, _Rink_ 10028, ASC. A recent introduction.

_Mentzelia longiloba_ var. _yavapaiensis_ J.J. Schenk & L. Hufford, N, 1, G, Kaibab Trail, 2500 m, _Aten_ Nelson 2507, RM. Verified by Schenk and Hufford in 2011; generally known from lower elevations.

_Mentzelia montana_ (Davidson) Davidson, N, 1, K, 2255 m, disturbed margins, _Hodgson_ 2302, DES.

_Mentzelia russbyi_ Woot. ( _M. nuda_ (Pursh) Greene var. _russbyi_ (Woot.) Harrington), N, 2, GK, Big Springs and Warm Springs canyons, Pt. Sublime, 2130–2350 m, _Goodding_ 122–48, ASC.

**Malvaceae**

_Alicea rosea_ Linnaeus, nKP, E, 1, K, Big Springs, 2110 m, _Rink_ 12522, MNA.

_Iliamna grandiflora_ (Rydberg) Wiggins, N, 2, G, forest, 2390 m, _Rink_ 8051, GRCA.

_Malva neglecta_ Wallr., E, 2, GK, disturbed areas, 2100–2490 m, _Rink_ 10730, ASC.

_Sphaeralcea parvifolia_ A. Nel., N, 2, K, disturbed areas, 2110–2180 m, _Rink_ 12157, ASC.

**Montiaceae**

(species taken from Portulacaceae)

_Claytonia rosea_ (Rydberg) R.J. Davis, N, 1, GK, west rim, 2300 m, _Rink_ 4196, ASC.

_Lewisia pygmaea_ (A. Gray) B.L. Robins., N, 2, GK, meadows, 2440–2700 m, _Goodding_ 308–49, ASC.
Montia chamissoni (Ledeb. ex Spreng.) Greene, nKP, N, 1, G, Robber’s Roost and Milk Springs, 2510–2530 m, Rink 7690, ASC.

Phermeranthus confertiflorus (Greene) Hershkovitz (Talinum confertiflorum Greene), N, 1, K, ridge north of Tater Springs, east side of the monocline, 2415 m, Hodgson 28673, DES.

Nyctaginaceae
Mirabilis decipiens (Standl.) Standl., N, 2, GK, throughout, 2130–2550 m, Rink 7884, ASC.

Mirabilis linearis (Pursh) Heimerl., N, 2, GK, throughout, 2100–2560 m, Hodgson 3284, DES.

Mirabilis oxypbaphoides (A. Gray) A. Gray, N, 1, K, east side, 2130–2490 m, Rink 11623b, ASC.

Oleaceae
Fraxinus cuspidata Torr. subsp. macropetetala (Eastw.) Rehd., N, 1, G, below the rim, 2290 m, Rink 6194, ASC.

Onagraceae
Chamerion angustifolium (Linnaeus) Holub subsp. circumvagum (Mosquin) Hoch, ined, N, 2, GK, throughout, esp. burned areas, 2300–2480 m, Collom sn, ASC. Determination by Hoch.

Circaea alpina Linnaeus subsp. pacifica (Aschers. & Magnus) Raven, nKP, N, 1, K, mesic, 2320–2370 m, Rink 9525-a, MNA.

Epilobium brachycarpum K. Presl., N, 3, GK, throughout, 2100–2690 m, Rink 10113, ASC.

Epilobium ciliatum Raf., N, 3, GK, riparian, 2130–2690 m, Rink 6533, ASC.

Epilobium helenium Hausskn., N, 2, GK, wet meadows, 2310–2680 m, Rink 7656, ASC.

Epilobium hornemannii Reichenb., N, 2, K, wet meadows, 2520–2590 m, Rink 11493, ASC.

Epilobium saximontanum Hausskn., N, 2, GK, 2330–2780 m, Goodding 18-48, ASC.

Gayophyton decipiens E.H. Lewis and Szweyk., N, 2, G, Powell Plateau, Kaibab Basin, 2300–2500 m, Merkle362, GRCA.

Gayophyton diffusum Torr. & A. Gray subsp. parviflorum E.H. Lewis & Szweykowski, N, 3, GK, throughout, 2130–2780 m, Goodding 109-48, ASC.

Oenothera caespitosa Nuttall subsp. marginata (Nuttall ex Hook. & Arn.) Munz, N, 1, G, pine forests, 2130–2410 m, Rink 11378, ASC.

Oenothera coronopifolia Torr. & A. Gray., N, 1, K, Jacob Lake area, 2280–2410 m, Boness sn, USFS–TEUI.

Oenothera elata Kunth subsp. hirsutissima (A. Gray ex S. Wats.) Dietrich, N, 1, K, Big Springs area, Goolding 32-48, ARIZ.

Oenothera flava (A. Nelson) Garrett, N, 2, GK, open areas, 2370–2700 m, Goodding 299-49, ASC.

Oenothera longissima Rydberg, N, 2, GK, roadsides, 2100–2480 m, Rink 6456, ASC.

Oenothera pallida Lindl., N, 2, K, disturbed areas, pine forests, 1900–2010 m, Hodgson 3285, DES.

Orobanchaceae
(includes many species formerly in Scrophulariaceae)
Castilleja applegatei Fern. subsp. martini (Abrams) Chuang & Heckard, N, 1, G, Point Sublime, Risk sn, GRCA.

Castilleja integra A. Gray, N, 2, GK, 2100–2700 m, Pennell 21628, ARIZ.

Castilleja kaibabensis N. Holmgren, N, 2, GK, rocky limestone, usually in meadows, 2440–2750 m, Goodding 222-48, ARIZ.

Castilleja linariifolia Benth., N, 3, GK, throughout, 2100–2750 m, Rominger 1657, ASC.

Castilleja miniata Doug. ex Hook., N, 3, GK, throughout, 2340–2750 m, Rink 6588, ASC.

Collinsia parviflora Lindl., N, 2, G, 2220–2660 m, Rink 4194, ASC.

Cordylanthus wrightii A. Gray subsp. kaibabensis T.I. Chuang & Heckard, N, 1, K, 2100–2200 m, low areas into P/J woodland, Fertig 21300, RM.

Orobanche fasciculata Nuttall, N, 2, GK, plateau margins, 2100–2620 m, Rink 10622, ASC.

Orthocarpsus lutes Nuttall, N, 3, GK, meadows, 2200–2760 m, Rink 6445, ASC.

Orthocapsus purpureo-albus S. Watson, N, 3, GK, meadows, 2100–2730 m, Hodgson 18414, DES.

Pedicularis centranthera A. Gray, N, 3, GK, forests, 2280–2690 m, Rink 7103, ASC.

Papaveraceae
(includes Fumariaceae)
Argemone munita Dur. & Hilg. var. rotundata (Rydberg) Shimmers, N, 2, K, east side, 2100–2170 m, Hodgson 2270, DES.

Corydalis aurea subsp. occidentalis (Engelm. ex A. Gray) G.B. Ownbey, N, 1, K, usually in naturally disturbed areas, 2160–2660 m, Clifton 13553, PUA.

Phrymaceae
(includes species formerly in Scrophulariaceae)
Erythranthe guttata (DC.) G.L. Nesom (Minulus guttatus DC.), N, 1, K, North Canyon, 2290 m, Conway sn, ASC.

Erythranthe primuloides (Benth.) G.L. Nesom & N.S. Fraga (Minulus primuloides Benth.), N, 2, GK, springs and pond margins, 2500–2780 m, Rink 7708, ASC.

Erythranthe rubella (A. Gray) N.S. Fraga (Minulus rubella A. Gray), N, 1, G, wet areas, 2560 m, Hodgson 2595, DES.

Erythranthe suksdorfii (A. Gray) N.S. Fraga (Minulus suksdorfii A. Gray), N, 1, G, conifer forest, Cape Royal Road, 2440 m, Hodgson 154, ASU.

Plantaginaceae
(includes species formerly in Scrophulariaceae and Callitrichaceae)
Callitriche heterophylla Pursh, N, 2, GK, lake margins, 2340–2690 m, Rink 8079, ASC.

Callitriche verna Linnaeus, N, 2, GK, lake margins, 2500–2760 m, Smith 653, ASU. Mixed specimen; in SEINet as Elatine triandra.
Linaria dalmatica (Linnaeus) P. Mill., E, 2, GK, throughout, 2310–2400 m, Rink 9911, ASC.

Penstemon barbatus (Cav.) Roth, N, 3, GK, throughout, 2130–2690 m, Coutey sn, ASC.

Penstemon barbatus × pseudoputus N, 1, GK, 2450–2720 m, Rink 7673, ASC. This hybrid is noted by both Crosswhite (1965) and Cronquist et al. (1984, p. 428).

Penstemon eatonii A. Gray subsp. undosus (M.E. Jones) Keck, N, 2, GK, plateau margins, 2100–2200 m, Rink 4817, ASC.

Penstemon linarioides A. Gray var. coloradoensis (A. Nelson) C.C. Freeman, N, 2, GK, 2230–2400 m, Rink 4818, ASC.

Penstemon pachyphyllus A. Gray ex Rydberg var. congestus (M.E. Jones) N.H. Holmgren, N, 2, K, northern margins, 2100–2620 m, Rink 11375, ASC.

Penstemon palmeri A. Gray, N, 1, GK, disturbed places, 2380–2440 m, Rink 11381, ASC.

Penstemon pseudoputus (Crosswhite) N. Holmgren, N, 3, GK, throughout, 2120–2760 m, Goodding 349–48, ARIZ. This is the most common and widespread Penstemon on the KP.

Penstemon rostriflorus A. Gray, N, 1, GK, throughout, 2120–2690 m, Rink 7910, ASC.

Penstemon rydbergii var. aggregatus (Pennell) N. Holmgren, N, 2, GK, subalpine meadows, 2440–2750 m, Zola sn, ASC. We have mostly P. rydbergii var. aggregatus on the KP although some specimens have calyx segments that are somewhat erose and broadened distally (vs. usually long-caudate-tipped), approaching var. rydbergii.

Penstemon rydbergii A. Nelson var. rydbergii, N, 1, G, Little Park, 2660 m, Huisinga 2528, ASC.

Penstemon strictus Bentham, E*, 2, K, meadows, 2500–2690 m, Rink 10897, ASC. Introduced along KP highways.

Penstemon subglaber Rydb., E*, 1, K, roadside, 2635 m, Rink 10119, ASC. Introduced along KP highways.

Plantago argyrea Morris, nKP, N, 1, G, Neal Spring, 2390 m, Rink 6561, ASC.

Plantago eriopoda Torr., N, 2, GK, mesic places, 2650–2710 m, Rink 9895, ASC.

Plantago lanceolata Linnaeus, E, 2, K, disturbed areas, 2410–2600 m, Rink 10899, ASC.

Plantago major Linnaeus, E, 2, K, wet areas, 2280–2680 m, Goodding 249–48, ASC.

Plantago tweedii A. Gray, N, 1, GK, 2420–2680 m, Rink 7549, ASC.

Veronica americana Schwein. ex Bentham, N, 2, GK, springs, 2190–2530 m, Rink 10734, ASC.

Veronica peregrina Linnaeus subsp. xalapensis (Kunth) Pennell, N, 2, GK, wet areas, 2280–2780 m, Rink 6332, ASC.

Veronica serpyllifolia Linnaeus var. humifusa (Dickson) Syme, N, 2, GK, wet areas, 2310–2690 m, Rink 6605, ASC.

Polemoniaceae

Collomia grandiflora Dougl. Ex Lindl., N, 2, G, throughout, 2280–2640 m, Hodgson 209, ASU.

Collomia linearis Nuttall, N, 2, GK, throughout, 2310–2690 m, Rink 6517, ASC.

Gilia ophthalmoides Brand., N, 2, GK, 2370–2500 m, mostly rim edges, Rink 7971, ASC.

Ipomopsis aggregata (Pursh) V. Grant subsp. formosissima (Greene) Wherry, N, 3, GK, throughout, 2100–2690 m, Rink 7923, ASC.

Ipomopsis arizonica (Greene) Wherry, N, 2, GK, margins, 2370–2500 m, Rink 10045, ASC.

Ipomopsis longiflora (Torr.) V. Grant, N, 1, G, Cape Royal Road, probably a waif, Searl sn, GRCA.

Ipomopsis multiflora (Nuttall) V. Grant, N, 2, K, pine forest, 2530 m, Buol sn, ARIZ.

Ipomopsis tenuituba (Rydberg) V. Grant subsp. latiloba V.E. Grant & Wilken, N, 3, GK, meadows, 2150–2690 m, Rink 7540, ASC. The experts, Wilken and Porter (2005) and Wilken (in review) differentiate I. tenuituba, with tube lengths of 25–34 mm and lobes not conspicuously flecked, from I. macrosiphon (Kearney and Peebles) V.E. Grant and Wilken, with tube lengths of 33–42 mm and lobes with conspicuous dark purple flecks. Flower tube lengths of our specimens range from 20 to 45 mm long, with little to abundant flecking on the corolla lobes, which is not corollated with tube length, leading us to believe that I. macrosiphon and I. tenuituba are the same taxon on the KP or that on the KP, we have introgression between the two, and perhaps I. aggregata. Wilken (in review) goes on to say that I. macrosiphon does not occur on the Kaibab Plateau. However he annotated specimens from the KP that fit his key and description as I. macrosiphon to I. tenuituba, leading to further confusion.

Phlox austromontana Coville (Phlox diffusa subsp. subcarinata Wherry), N, 3, GK, throughout, 2100–2750 m, Goodding 33–49, ASC.

Phlox gracilis (Dougl.) Greene (Microsteris gracilis (Hooker) Greene), N, 2, GK, plateau margins, 2330–2650 m, Hodgson 155, ASU.

Phlox longifolia Nuttall, N, 1, GK, 2270–2320 m, Fertig 21983, UTC.

Polygonaceae

Bistorta bistortoides (Pursh) Small (Polygonum bistortoides Pursh), N, 1, G, Milk Creek, 2490–2750 m, Rink 7654, ASC.

Eriogonum alatum Torr., N, 3, GK, throughout, 2100–2500 m, Rink 11464, ASC.

Eriogonum arcuatum Greene var. arcuatum (E. jamesii Bentham, misapplied), N, 3, GK, meadows and rims, 2150–2720 m, Rink 8080, ASC.
Eriogonum cernuum Nuttall, N, 2, K, plateau margins, 2100–2200 m, Hodgson II 2505, DES.

Eriogonum corymbosum Bentham var. corymbosum, N, 1, K, Warm Springs/Ryan, 2100 m, Thackery 569, ARIZ. Determination by Reveal.

Eriogonum corymbosum var. glutinosum (M.E. Jones) M.E. Jones, N, 2, GK, 2130–2410 m, Rink 8972, ASC.

Eriogonum heermannii Durand & Hilg. var. argenteum (M.E. Jones) Munz, nKP, N, 2, G, Naji Point/Dragon Overlook, 2410–2500 m, Rink 8894, ASC.

Eriogonum heracleoides Nuttall var. heracleoides, nAZ, E*, 1, K, along Hwy. 67, just south of Crane Lake, 2610 m, Rink 8088, ASC. Probably a human-caused introduction from Utah.

Eriogonum microthecum Nuttall var. laxiflorum Hook., N, 2, K, plateau margins, 2100–2260 m, Gooodding 447-48, ASC.

Eriogonum microthecum Nuttall var. simpsonii (Benth.) Reveal, N, 2, GK, 2100–2450 m, Rink 6540, ASC.

Eriogonum racemosum Nuttall, N, 3, GK, throughout, 2100–2750 m, Rink 6501, ASC.

Eriogonum umbellatum Torr. var. subaridum S. Stokes, N, 2, GK, 2110–2610 m, Rink 8038, ASC.

Eriogonum wrightii Torr. ex Benth., N, 1, G, Pt. Sublime, 2270 m, Reveal 694, ARIZ.

Eriogonum zionis J.T. Howell var. coccineum J.T. Howell (E. racemosum Nuttall var. coccineum (J.T. Howell) S.L. Welsh), N, 1, G, Pt. Sublime, 2275 m, Phillips et al. 81–337, MNA.

Fallopia convolvulus (Linnaeus) Á. Löve (Linnaeus) A. Gray, N, 2, GK, 2100–2410 m, Thackery 569, ARIZ. Determination by Reveal.

Polygonum aviculare Linnaeus, E, 3, GK, mostly meadows, and ponds, 2270–2530 m, Rink 11456, ASC.

Ramunculus cernuum Nuttall, N, 2, K, plateau margins, 2100–2200 m, Hodgson II 2505, DES.

Ramunculus triangulicaulis (Danser) Rech. f., N, 2, GK, meadows, springs, and ponds, 2120–2630 m, Rink 8908, ASC.

Ramunculus utahensis Rech. f., N, 2, GK, lakes and springs, 2330–2670 m, Gooodding 215-48, ASC. Prostrate to erect plants with narrow, entire leaves, tubercles lacking and with entire to undulate margined tepals that have been called *Ramunculus californicus* Meisn. are here determined as *Ramunculus utahensis*.

### Portulaceae

**Portulaca oleracea** Linnaeus, N, 1, K, plateau margins, 2140–2280 m, Hodgson 28503, DES.

### Primulaceae

**Androsace occidentalis** Pursh, N, 1, K, margins, various, 2200 m, Higgins 28486, UNM.

**Androsace septentrionalis** Linnaeus (A. s. var. glandulosa (Woot. & Standl.) St. John, A. s. var. puberulenta (Byd.) Knuth), N, 3, GK, throughout, 2180–2750 m, Rink 8043, ASC.

**Dodecatheon alpinum** (A. Gray) Greene, N, 2, GK, high meadows, 2670–2780 m, Rink 10614, ASC.

**Primula specuicola** Rydberg (P. humnewellii Fern.), N, 1, G, Cliff Springs, 2500 m, Stevens 1424, ASC.

### Ranunculaceae

**Aconitum columbianum** Nuttall, N, 2, GK, throughout, 2310–2570 m, Rink 7906, ASC.

**Actaea rubra** (Ait.) Willd., N, 2, GK, steep slopes, 2310–2550 m, Rink 7893, ASC.

**Aquilegia chrysantha** A. Gray, N, 1, K, 2470–2710 m, Hodgson 18429, DES. All the specimens we have seen appear to be influenced by *A. coerulea*.

**Aquilegia coerules** E. James, N, 2, GK, throughout, 2560–2640 m, Gooodding 305-49, ARIZ. Most KP specimens, based on stamen and spur length, agree with var. *pinetorum* (Tidestrom) Payson ex Kearney & Peebles; other KP specimens, based on these characters, suggest var. *ochroleuca* Hook., which is not known to occur within Arizona. Based on the variation we see, we suspect that these plants may be influenced by *Aquilegia chrysantha*.

**Aquilegia desertorum** (M.E. Jones) Cockerell ex Hell, N, 1, G, Uncle Jim Point, 2300 m, Haubecker sn, GRCA.

**Caltha leptosepala** DC., N, 1, K, V.T. Park, 2660–2890 m, Rink 10615, ASC.

**Ceratocephala testiculata** (Grantz) Roth (Ranunculus testiculatus Grantz), E, 1, K, northern margin, 2100 m, Chamberland 1906, ARIZ.

**Clematis columbiana** (Nuttall) Torr. & A. Gray (C. pseudoalpina (Kuntze) Nels.), N, 2, GK, throughout, 2200–2690 m, Rink 4874, ASC.

**Clematis hirsutissima** Pursh var. hirsutissima, N, 1, GK, Pleasant Valley and near Basin Spring, 2480–2630 m, Hodgson 18545, DES.
Clematis ligusticifolia Nuttall, N, 2, GK, mesic areas, 2130–2500 m, Rink 6544, ASC.

Delphinium nuttallianum Pritz. ex Walp., N, 2, GK, throughout, 2310–2630 m, Rink 7109, ASC.

Myosurus apetalus Gay var. montanus (G.R. Campbell) Whittomore, N, 2, GK, lakes and meadows, 2640–2660 m, Rink 7571, ASC.

Myosurus minimus Linnaeus, N, 2, G, Greenland Lake, 2530–2560 m, Merkle 522, GRCA.

Ranunculus cardiophyllus Hook., N, 3, GK, meadows, 2430–2750 m, Rink 6397, ASC.

Ranunculus cymbalaria Hook., N, 2, GK, wet places, 2300–2760 m, Rink 10732, ASC.

Ranunculus flammula Linnaeus, N, 2, GK, springs and lake margins, 2520–2690 m, Rink 7515, ASC.

Ranunculus glaberrimus Hook. var. ellipticus (Greene) Greene (R. oreogenes Greene), N, 1, K, pine forests and meadows, 2530–2590 m, Hodgson 2262, ASU.

Ranunculus inamoenus Greene var. inamoenus, N, 2, GK, meadows, 2310–2670 m, Rink 11590, ASC.

Ranunculus uncinatus D. Don ex G. Don, N, 2, GK, meadows, 2520–2690 m, Rink 7569, ASC.

Thalictrum fendleri Engl. ex A. Gray, N, 3, GK, forested slopes, 2130–2720 m, Hodgson 15973, DES.

Rhamnaceae

Ceanothus fendleri A. Gray, N, 3, GK, throughout, 2100–2680 m, Hodgson 25727, DES.

Ceanothus martinii M.E. Jones, N, 2, G, rim edges, 2410–2450 m, Hodgson 14795, DES.

Ceanothus pauciflorus Sessé and Mocíño ex A.P. DC. (C. greggii A. Gray), N, 2, GK, plateau margins, 2130–2440 m, Hodgson 6260, DES.

Rosaceae

Amelanchier alnifolia (Nuttall) Nuttall ex M. Roemer, nKP, N, 2, G, mesic areas, 2100–2690 m, Rink 7913, ASC.

Amelanchier utahensis Koehne var. utahensis, N, 2, GK, plateau margins, 2100–2440 m, Peebles 13043, ARIZ.

Amelanchier utahensis var. covillei (Standl.) Clokey, N, 1, G, Crescent Ridge/Cliff Springs, 2320–2440 m, Hodgson 25710, DES. All but the young twigs and leaves are glabrous in this variety.

Cercocarpus ledifolius Nuttall var. intricatus (S. Watson) M.E. Jones, N, 2, GK, rim edges, Hodgson 6265, DES.

Cercocarpus ledifolius Nuttall var. ledifolius, N, 2, G, rim edges, 2130–2490 m, Hodgson 26257, DES.

Cercocarpus montanus Raf., N, 2, K, plateau margins, 2130 m, Hodgson 6293, DES. Introggresses with C. ledifolius on the KP.

Chamaebatia millefolium (Torr.) Maxim., N, 2, GK, rim edges, 2100–2380 m, Hodgson H-2591, DES.

Drymocallis arizonica Rydberg (Drymocallis glandulosa (Lindley) Rydberg subsp. arizonica (Rydberg) Sojak, Potentilla glandulosa Lindley subsp. arizonica (Rydberg) D.D. Keck, P. macdougali Tidestrom), N, 2, G, springs and mesic meadows, 2380–2640 m, Rink 7640, ASC.

Fallugia paradoxa (D. Don) Endl. ex Torr., N, 2, G, plateau margins, 2130–2500 m, Rink 10657, DES.

Fragaria virginiana Duchesne subsp. glauca (S. Wats.) Studt L., N, 2, GK, throughout, 2470–2660 m, Rink 7534, ASC.

Geranium macrophyllum Willd. var. pericinclus (Ryderberg) Raup, N, 1, GK, mesic areas, 2250–2320 m, Rink 7905, ASC.

Holodiscus densusus (Nuttall ex Hook.) Heller, N, 2, GK, throughout, 2310–2710 m, Goodding 135-48, ARIZ.

Ivesia arizonica (Eastw. ex J.T. Howell) Ertter (Potentilla osterhoutii (A. Nels.) J.T. Howell), N, 2, G, steep cliffs below the rim, 2120–2530 m, Rink 4500, ASC.

Petrophytum caespitosum (Nuttall) Rydberg, N, 2, GK, cliffs, 2100–2320 m, Hodgson 5585, DES.

Physocarpus malvaceus (Greene) Kuntz, nC, N, 1, G, east edges, 2360–2680 m, Rink 6187, ASC.

Potentilla bicornata Rydberg, N, 2, K, openings, 2100–2500 m, Hodgson 2257, ASU.

Potentilla biennis Greene, nKP, N, 1, GK, Swamp Ridge, 2230–2360 m, Rink 8767, ASC.

Potentilla crinita A. Gray, N, 3, GK, throughout, 2100–2720 m, Rink 6411, ASC. Potentilla crinita may grade with P. hippiana on the KP.

Potentilla hippiana Lehmann, N, 3, GK, throughout, 2280–2750 m, Rink 6433, ASC. See note under P. crinita.

Potentilla norvegica Limnaeus, N, 3, GK, mesic meadows, 2280–2730 m, Rink 6423, ASC.

Potentilla pensylvanica Limnaeus, N, 1, K, Ertter 2901, NY.

Potentilla pulcherrima Lehmann., nKP, N, 1, G, Thompson Canyon, 2640 m, Rink 7590, ASC.

Potentilla recta Limnaeus, E, 1, K, Pine Hollow, 2230 m, Fertig 22063, NY.

Potentilla subviscosa Greene, N, 2, K, 2530 m, Holmgren 11142, ASC.

Poterium sanguisorba Limnaeus (Sanguisorba minor Scop.), E, 1, K, disturbed sites, 2300–2700 m, Rink 10694, ASC.

Prunus virginiana Limnaeus, N, 1, K, fringes, 2130–2500 m, Goodding 385-48, ARIZ.

Purshia stansburiana (Torr.) Henrickson, N, 4, GK, throughout, 2100–2440 m, Hodgson 155890, DES.

Purshia tridentata (Pursh) DC., H+, 1, K, Cooper Ridge, McCulloch m., ASC. According to specimen label, planted by the USFS.

Rosa stellata Woot. subsp. abyssa A.M. Phillips, N, 1, G, Dutton Point, 2270 m, Koopman 68, ASC.

Rosa woodsii Lindl. subsp. arizonica (Ryderberg) W.H. Lewis & Ertter, N, 3, GK, throughout, 2100–2710 m, Rink 6547, ASC.
Rubus idaeus Linnaeus subsp. strigosus (Michx.) Focke., N, 3, GK, forested areas, 2310–2700 m, Rink 6384, ASC.
Rubus neomexicanus A. Gray, nKP, N, 1, G, mesic slopes, 2590 m, Rink 10644a, ARIZ.
Sorbus scopulina Greene, N, 2, G, subalpine forests, 2530–2730 m, Rink 6514, ASC.

Rubiaceae
Galium aparine Linnaeus, N, 2, GK, mesic areas, 2310–2500 m, Rink 11355, ASC.
Galium bifolium S. Watson., N, 2, K, North Canyon, Greenwood Lake, Walhalla Plateau, 2400–2620 m, Rink 10696, ASC.
Galium mexicanum Kunth., nKP, N, 1, G, Green-land Spring, 2470 m, Rink 6592, ASC.
Galium stellatum Kellogg., nKP, N, 1, G, Point Sublime, 2270 m, Rink 8889, ASC.
Galium trifidum Linnaeus var. subflorum (Wiegand) Piper (G. t. L. var. pusillum A. Gray, G. tincto-rium (L.) Scop. var. subflorum (Wiegand) Fern-ald, G. brandegeei A. Gray), N, 2, GK, springs and lakes, 2370–2690 m, Rink 6212, ASC.
Galium triflorum Michx., N, 1, GK, springs and mesic areas, 2100–2470 m, Goodding 378-48, ARIZ.
Galium wrightii A. Gray, N, 2, GK, plateau margins, 2130–2720 m, Rink 6550, ASC.
Houstonia wrightii A. Gray, N, 1, K, 2130 m, Go517-48, ARIZ.
Kelloggia galioides Torr., N, 2, GK, mesic forests, 2310–2660 m, Rink 7539, ASC.

Rutaceae
Ptelea trifoliata Linnaeus subsp. pallida (Greene) V. Bailey, N, 2, K, mountain brush, 2250–2320 m, Hodgson 5893, DES.

Saliaceae
Populus tremuloides Michx., N, 4, GK, 2200–2710 m, Hodgson 15971, DES.
Salix bebbiana Sarg., N, 2, G, springs, 2310–2520 m, Rink 6576, GRCA.
Salix exigua Nuttall, N, 2, GK, Oak Canyon, also along the road to Pt. Sublime, 2130–2560 m, Rink 6523, GRCA.
Salix fragilis Linnaeus, nKP, H, 1, K, Big Springs, 2130 m, Rink 12246a, ASC.
Salix scouleriana Barratt ex Hook., N, 2, GK, dry slopes, 2280–2690 m, Rink 6371, GRCA.

Santalaceae
Comandra umbellata (Linnaeus) Nuttall subsp. pallida (A. DeCandolle) Piehl, N, 2, GK, east rim, 2190–2680 m, Hodgson 6271, GRCA.

Sapindaceae
(includes Aceraceae)
Acer glabrum Torrey var. diffusum (Greene) Smiley, N, 2, GK, shaded slopes, 2180–2680 m, Hodg-son H-2269, DES. Variety glabrum probably also occurs on the KP.
Acer grandidentatum Nuttall var. grandidentatum, N, 2, GK, shaded slopes, 2300–2660 m, Hodgson 14733, DES.
Acer negundo Linnaeus, N, 2, GK, along Big Springs Road, Cliff Springs, 2300–2510 m, Hodgson 11830, DES.

Saxifragaceae
Heuchera parvifolia Bartl., N, 2, GK, mostly meadows, 2360–2750 m, Rink 6451, ASC. Petioles vary from glabrous to glandular and from sparsely hairy to long spreading hairy. We follow the treatment in FNA in not recognizing infraspecific taxa.
Heuchera rubescens Torr. (H. r. var. versicolor (Greene) M.G. Stewart), N, 2, GK, rocky slopes and cliffs, 2100–2560 m, Hodgson 7355, ASU.
Lithophragma tenellum Nuttall, N, 2, GK, plateau margins, 2300–2690 m, Hodgson 26237, DES.
Saxifraga rhomboidea Greene, N, 3, GK, mostly meadows, 2470–2750 m, Rink 8618, ASC.

Scrophulariaceae
Genera previously found in Scrophulariaceae are now found in Phrymaceae, Plantaginaceae, and Oro-banchaceae.)
Limosella aquatica Linnaeus, nKP, N, 1, G, Milk and Robber’s Roost Springs, 2510–2520 m, Rink 7653, ASC.
Verbascum thapsus Linnaeus, E, 2, GK, through-out, 2100–2600 m, Hodgson 15936, DES.

Solanaeae
Nicotiana attenuata Torr. ex S. Watts. N, 2, K, plateau margins, pinion-juniper open wood-land, 2130–2157 m, Hodgson 28820, DES.
Physalis hederifolia Gray var. fendleri, N, 2, G, 2250–2320 m, plateau margins, Rink 7949, ASC.
Physalis hederifolia Gray var. palmeri (A. Gray) C.L. Hitchc., N, 2, GK, plateau margins, 2100–2500 m, Rink 6542, ASC.
Solanium jamesii Torr., N, 2, K, pine forests, 2130–2140 m, Hodgson 28784, DES.
Solanium nigrum Linnaeus, N, 1, GK, disturbed areas, pine forests, 2160–2690 m, Rink 8955, ASC.
Solanium triflorum Nuttall, N, 1, GK, disturbed areas, 2130–2530 m, Hodgson 29104, ASC.

Urticaceae
Urtica dioica Linnaeus, N, 4, K, mesic margins, esp. prevalent in side canyons to Nail Canyon, 2100–2500 m, Rink 9934, ASC.

Verbenaceae
Verbena bracteata Lag. & Rodr., N, 3, GK, disturbed areas, 2100–2500 m, Rink 10030, ASC.
Verbena macdougalii Heller., N, 2, GK, disturbed areas, 2100–2690 m, Rink 6611, ASC.

Violaceae
Viola canadensis Linnaeus, N, 2, GK, throughout, 2310–2630 m, Rink 7619, ASC.
Viola nephrophylla Greene (V. arizonica Greene, V. nephrophylla var. arizonica (Greene) Kearney & Peebles, N, 1, G, throughout, 2310–2660 m, Rink 7648, ASC.

**Viscaceae**

Arceuthobium abietinum Engelm. ex Munz, N, 2, GK, parasitic on Abies concolor, 2500–2720 m, Mathiasen 7556, ARIZ.

Arceuthobium divaricatum Engelm., N, 2, GK, parasitic on Pinus edulis, 2100–2270 m, Nelson 66892, ASC.

Arceuthobium douglasii Engelm., N, 2, GK, parasitic on Pseudotsuga menziesii, sometimes on Abies spp., 2190–2510 m, Moberg sn, ARIZ.

Arceuthobium microcarpum (Engelm.) Hawksworth & Wiens, N, 2, G, parasitic on Picea spp., 2530–2650 m, Mathiasen 2006, ASC.

Arceuthobium vaginatum (Wild.) J. Fresl subsp. cryptopodum (Engelm.) Hawksworth & Wiens, N, 2, K, parasitic on Pinus ponderosa, 2460–2680 m, Hodgson 18557, DES.

Phoradendron juniperinum Engelm. ex A. Gray., N, 1, K, probably G, parasitic on Juniperus spp., 2100–2270 m, Wright 524-48, DES.

**MONOCOTELYDONOUS PLANTS**

**Agavaceae**

Agave utahensis Engelm. subsp. kaibabensis (McKelvey) Gentry, N, 2, G, 2100–2380 m, rim margins, Hodgson 5877, DES.

Yucca baccata Torr., N, 1, G, plateau margins, 2240–2280 m, Hodgson 5878, DES.

**Alismataceae**

Alisma triviale Linnaeus (A. plantago-aquatica Linnaeus var. americanum Schultes & Schultes), N, 1, GK, Swamp Lake, 2330–2500 m, Rink 8806, ASC.

**Amaryllidaceae**

Allium bisceptrum S. Watson var. palmeri (S. Watson) Cronquist, N, 2, GK, pine and oak forests, 2100–2320 m, Rink 4814a, ASC.

Allium macroptelatum Rydberg, N, 1, K, ponderosa forest, 2250 m, Hodgson 2300, DES.

**Asparagaceae**

Maianthemum racemosum (Linnaeus) Link, N, 2, GK, steep slopes, 2100–2680 m, Rink 6495, DES.

Maianthemum stellatum (Linnaeus) Link, N, 3, GK, throughout, 2290–2760 m, Hodgson 18448, DES.

Prosartes trachycarpa S. Watson, N, 2, GK, steep, shaded slopes, 2100–2680 m, Rink 6491, ASC.

**Cyperaceae**

Carex aquatilis Wahlenb., N, 1, K, Bear Lake, 2780 m, Rink 9974, ASC. Formerly thought to be more widespread on the KP due to mis-determinations.

Carex athrostachya Olney, N, 3, GK, lake margins, 2280–2730 m, Goodding 220-48, ARIZ.

Carex aurea Nuttall, nKP, N, 1, GK, Cliff Spring, Milk Creek, Big Springs, 2120–2520 m, Rink 7635, ASC.

Carex bella Bailey, N, 2, GK, forests, 2470–2650 m, Rink 7537, ASC.

Carex curvatorum Stacey, nKP, N, 1, G, hanging gardens in canyon, 2100 m, Rink 4852, ASC.

Carex douglasii Boott, N, 2, GK, open areas, 2320–2690 m, Goodding 180-49, ASC.

Carex duriuscula C.A. Mey, nKP, N, 2, K, pine forests, 2300–2400 m, Rink 12762, ASC.

Carex geophila Mackenzies, N, 2, G, rim edges, 2300–2470 m, Rink 10631, DES. Probably more common than the three collections indicate.

Carex microptera Mackenzies, N, 2, G, parasitic on Pinus ponderosa, 2120–2680 m, Rink 6720, ASC.

Carex nebrascensis Dewey, N, 3, GK, disturbed wet places, 2120–2680 m, Rink 7634, ASC.

Carex obtusata Lilj., nKP, N, 2, G, Widforss Trailhead, Walla Valley, probably more common, Rink 10676, ASC.

Carex occidentalis Bailey, N, 3, GK, dry areas in forests, 2150–2500 m, Goodding 49-48, ARIZ.

Carex oreocharis Holm, N, 1, GK, subalpine meadows, 2590–2750 m, Fritts 69-12, ARIZ.

Carex pellito Muhl ex Willd., N, 3, GK, wet places throughout, 2150–2700 m, Goodding 138-48, ARIZ. Hybridization between Carex pellito and C. utriculata is indicated by specimens collected at Little Park Lake, Zola sn, ASU and Rink 6226, ASC.

Carex petaurata Dewey, N, 3, GK, meadows, 2440–2730 m, Storm 275, RM.

Carex praegracilis W. Boott, N, 2, K, springs and subalpine meadows, 2120–2660 m, Licher 3147, ASC.

Carex rossii Boott, N, 3, GK, dry hillsides, 2370–2760 m, Rink 4812b, ASC.

Carex siccata Dewey, N, 4, GK, subalpine forests, 2050–2710 m, Korstian 94, RM & BRY. Often the dominant ground cover.

Carex subfusca W. Boott, N, 3, GK, lakehores, 2290–2710 m, Rink 6363, ARIZ.

Carex utriculata W. Boott, N, 4, GK, subalpine lakes, 2560–2780 m, Rink 6229, ASC. The dominant emergent aquatic in nearly every lake.

Carex vallicola Dewey, N, 2, GK, mostly rim edges and pine forests, 2100–2500 m, Rink 10660, ASC.

Carex vesicatoria Linnaeus, N, 3, GK, common in lakes, shoreward from C. utriculata, 2520–2700 m, Clifton 13535, PUAS.

Carex wootonii Mackenzies, N, 2, GK, meadows, 2440–2780 m, Rink 7663, ASC.

Eleocharis acicularis (Linnaeus) Roemer & J.A. Schultes, N, 4, GK, lake margins, 2350–2760 m, Rink 6214, ASC.
Eleocharis engelmannii Steud., N, 1, GK, West Lake and Greenland Lake, 2270–2590 m, Rink 8960, ASC.

Eleocharis palustris (Linnaeus) Roemer & J.A. Schultes, N, 3, GK, common at lakes, 2300–2650 m, Zola sn, ASC.

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Juncus saximontanus
Juncus nevadensis Wieg., N, 2, G, wet areas, 2380–
Juncus interior
Greene, N, 2, GK, springs, 2420–

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2490–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.

Sisyrinchium demissum Greene, N, 2, GK, springs and meadows, 2500–2650 m, Rink 7692, ASC.

Juncaceae
Juncus balticus Willd. subsp. ater (Rydb.) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, Rink 7617, ASC.

Juncus bufonius
Juncus confusus

Sisyrinchium demissum
Juncus dudleyi Wieg., N, 2, G, springs, 2420–

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla, nKP, N, 1, K, Fracas Lake, 2520 m, Rink 11597, ASC.

Iridaceae
Iris missouriensis Nutt., N, 1, G, Neal Spring, 2490 m, Collom sn, GRCA.
Beckmannia syzigachne (Steu.) Fern., N, 2, G, vicinity of Neal and Thompson springs and Greenland Lake, 2380–2590 m, Rink 6387, DES.

Blepharoneuron tricholepis (Torr.) Nash., N, 4, GK, mostly meadows, 2130–2720 m, Rink 7886, ASC.

Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths, N, 4, GK, throughout, 2100–2600 m, Rink 6421, ASC.

Bromus carinatus Hook. & Arn. var. marginatus (Nees) Barkworth & Anderson, N, 1, G, 2330 m, Reif 10799, ASC.

Bromus ciliatus E. C. Vahli, E, 1, K, Jacob Reservoir/ below Tater Spring, 2410 m, Goodeing 114–48, GRCA.

Bromus diandrus Roth subsp. rigidus (Roth) Lainz, E, 1, G, Harvey Meadow, 2560 m, Hurst 274, GRCA.

Bromus frondosus (Shear) Woot. & Standl., N, 2, GK, throughout, 2130–2770 m, Rink 8000, ASC.

Bromus inermis Leyss., E, 4, GK, throughout, 2100–2710 m, Rink 7625, ASC.

Bromus lanatipes (Shear) Rydberg, N, 1, GK, Waldalla Plateau, Sokolo sn, GRCA.

Bromus polyanthus Scribn., N, 1, G, Kanabovnits Spring meadow, 2410 m, Reichardt KR 76, ARIZ.

Bromus porteri (J. M. Coult.) Nash, N, 2, GK, throughout, 2370–2710 m, Rink 11637, ASC. See note under B. ciliatus.

Bromus richardsonii Link, N, 2, GK, throughout, 2100–2690 m, Rink 8021, ASC. See note under B. ciliatus.

Bromus rubens Linnaeus, E, 1, G, near Pt. Sublime Road, Reif 10816, ASC.

Bromus sterilis Linnaeus, E, 1, G, upper BA Trail, 2290 m, Rink 7191, ASC.

Bromus tectorum Linnaeus, E, 2, GK, throughout, 2100–2560 m, Goodeing 85–48, ASC.

Calamagrostis scopulorum M.E. Jones, N, 1, G, Cliff Spring, 2310 m, Rink 6543, ASC. Some of our plants have intermediate characters between this and the following.

Calamagrostis stricta (Timm.) Koeler subsp. inexpressa (A. Gray) C.W. Greene, N, 1, K, Bear Lake, 2770 m, Stevens 1180, ASC. We are not completely satisfied with this determination as the ligules are truncate and ciliate on this specimen rather than long-pointed, which would be characteristic of C. stricta subsp. stricta.

Calamagrostis stricta (Timm.) Koeler subsp. stricta (C. neglecta (Ehrh.) Gaertn.), N, 1, G, Kaibab Basin, 2470 m, Merkle 351, GRCA.

Cinna latifolia (Trev. ex Goepp.) Griseb., N, 1, K, North Canyon, 2380–2440 m, Rink 11351, ASC.

Dactylis glomerata Linnaeus, E, 3, GK, throughout, 2080–2720 m, Rink 6381, ASC.

Danthonia californica Boland, N, 1, G, Hades Lake/Robber’s Roost Spring/Swamp Point, 2480–2570 m, Rink 7681, ASC.

Danthonia intermedia Vasey, N, 2, GK, openings in mixed conifer forest, 2560–2760 m, Rink 9967, ASC.

Deschampsia caespitosa (Linnaeus) Beav., N, 3, GK, upper-elevation meadows, 2490–2750 m, Rink 6441, ASC.

Deschampsia elongata (Hook.) Munro., N, 1, G, upper-elevation meadows, Robber’s Roost, 2530 m, Merkle 244, GRCA.

Elymus elymoides (Raf.) Swezey subsp. brevifolius (J.G. Sm.) Barkworth, N, 3, GK, throughout, 2100–2720 m, Rink 7670, ASC.

Elymus glaucus Buckl., N, 3, GK, throughout, 2150–2740 m, Rink 7604, ASC.

Elymus lanceolatus (Scribn. and J.G. Sm.) Gould subsp. lanceolatus (Scribn.) & J.G. Gould, N, 1, K, Crane Lake, Darrow 2920, MNA.

Elymus lanceolatus (Scribn. and J.G. Sm.) Gould subsp. riparius (Scribn. & J.G. Sm.) Barkworth, N, 2, K, margins, Goodeing 446–48, ASC.

Elymus repens (Linnaeus) Gould, E, 1, K, Crane and Murray Lakes, 2270–2600 m, Rink 11304, ASC.

Elymus trachycaulus (Link) Gould ex Shimmers subsp. trachycaulus, N, 3, GK, throughout, 2130–2710 m, Goodeing 507–48, ASC.

Elymus virginicus Linnaeus, uC, N, 2, GK, springs and ponds, 2370–2760 m, Rink 6572, ASC.

Elymus ×pseudorepens (Scribn. & J.G. Sm.) Barkworth & D.R. Dewey (Agropyron caillantianum (Wulf. & Schreb.) Trautv. ex Besser.), N, 1, GK, 2440–2480 m, Kearney 13748, ARIZ.

Eragrostis curvula, (Schrad.) Nees, H, 1, K, roadside (planted for erosion control), 2440 m, Seager, GRCA.

Eragrostis mexicana (Hornem.) Link, N, 1, GK, 2440 m, Seager sn, GRCA.

Festuca calligera Rydberg, N, 3, GK, high meadows, 2280–2730 m, Goodeing 246–48, ARIZ. We cannot reliably discern E calligera from E saximontana.

Festuca idahoensis Elmer, N, 3, GK, throughout, 2260–2680 m, Rink 7574, ASC.

Festuca ovina Linnaeus, E, 2, GK, Rainbow Plateau and Pleasant Valley, 2290–2620 m, Reetien 2284, ASC.

Festuca rubra Linnaeus, N, 2, GK, high meadows, 2590–2730 m, Rink 6174, ARIZ.

Festuca saximontana Rydberg var. saximontana, N, 3, GK, throughout, 2130–2720 m, Rink 8046, ASC. We cannot reliably discern E calligera from E saximontana.
**Leymus salinus**  
**Koeleria macrantha**  
**Hordeum murinum**  
**Hordeum jubatum**  
**Leymus cinereus**  
**Muhlenbergia montana**  
**Muhlenbergia filiformis**  
**Muhlenbergia curtifolia**  
**Scribn., N, 2, GK, 2130–2670 m, Rink 7606, ASC.**

**Hesperostipa comata** (Trin. & Rupr.) Barkworth subsp. comata (Stipa comata Trin. & Rupr. var. comata), N, 2, GK, rim edges, 2100–2590 m, Rink 7606, ASC.  
**Hesperostipa comata** (Trin. & Rupr.) subsp. intermedia (Scribn. & Tweedy) Barkworth (Stipa comata Trin. & Rupr. var. intermedia Scribn. & Tweedy), N, 2, GK, meadows, 2100–2710 m, Rink 7553, ASC.  
**Hordeum brachyantherum** Nevski, N, 2, K, wet areas, 2370–2690 m, Rink 8918, ASC. Most of the KP collections appear to be subsp. californicum (Covas & Stebbins) Bothmer, N. Jacobsen & Seberg, having densely pubescent basal sheaths, although according to *Flora of North America*, this species is restricted to California. We may also have subsp. brachyantherum, *Hodgson 18458*.

**Hordeum jubatum** Linnaeus, N, 2, K, lakes, disturbed sites, 2350–2600 m, Rink 11470, ASC.  
**Hordeum murinum** Linnaeus subsp. *glauca* (Steud.) Tzelev, nKP, E, 1, K, Castle Springs, 2230 m, Rink 11298, MNA.  
**Koeleria macrantha** (Lede.) J.A. Schultes. (Koeleria nitida Nutt.), N, 3, GK, throughout, 2130–2730 m, Rink 7566, ASC.  
**Leymus cinereus** (Scribn. & Merr.) Á. Löve (Elymus cinereus Scribn. & Merr.), nKP, N, 1, K, tank 9022 east of Hwy. 67, 2740 m, Rink 10019, ASC.  
**Leymus salinus** (M.E. Jones) Á. Löve (Elymus salina M.E. Jones), N, 1, K, plateau margins, <2350 m, *Goodding 417-48*, ASC. Barkworth and Atkins (UTC) annotated *Goodding 249-49*, collected at "The Gut"[?] and Oak Canyon, to possibly be "a hybrid between *L. salina* & *L. cinereus*, ARIZ.

**Lotus perenne** Linnaeus, nKP, E, 1, K, Moquitch Tank/Allen’s Riding Corral, 2410–2560 m, Rink 10902, ASC.  
**Muhlenbergia andina** (Nuttall) A.S. Hitchc., N, 2, GK, springs, 2130–2500 m, Rink 6188, ASC.  
**Muhlenbergia curtisfolia** Scribn., N, 2, GK, 2130–2490 m, Rink 4514, ASC.  
**Muhlenbergia filiformis** (Thurb. ex S. Watson) Rydberg, N, 2, GK, open areas, 2280–2750 m, *Goodding 224-48*, ASC.  
**Muhlenbergia montana** (Nuttall) Hitchc., N, 4, GK, throughout, 2130–2720 m, Rink 8094, ASC. Many specimens we previously determined as *M. filiculmis* Vasey are depauperate forms of *M. montana*.  
**Muhlenbergia racemosa** (Michx.) Britton, Sterns & Poggenb., N, 2, K, lower canyons, 2100–2440 m, *Goodding 368-48*, ASC.  
**Muhlenbergia richardsonis** (Trin.) Rydberg, N, 3, GK, meadows, 2280–2660 m, *Goodding 312-48*, ASC.  
**Muhlenbergia thurberi** Rydberg, N, 1, G, Bright Angel Pt., 2500 m, *Merkle 710*, GRCA.  
**Muhlenbergia wrightii** Vasey ex Coul., N, 3, GK, throughout, 2440–2560 m, Rink 8002, ASC.  
**Munroa squarrosa** (Nuttall) Torr., N, 1, K, Warm Springs Canyon, *Goodding 297-48*, ASC.  
**Pascopyrum smithii** (Rydberg) Á. Löve (Pascopyrum smithii) *P. smithii*, nKP, E, 1, K, pine forest, 2100–2380 m, *Bones 20*, USFS–TEUI.

**Pleum alpinum** Linnaeus, N, 2, GK, mostly in meadows, 2280–2780 m, *Rink 7645*, ASC.  
**Pleum pratense** Linnaeus, E, 2, GK, mostly in meadows, 2200–2710 m, *Rink 7620*, ASC.  
**Piptatherum microanthum** (Trin. & Rupr.) Barkworth, N, 2, GK, throughout, 2130–2580 m, *Goodding 252-49*, ASC.  
**Poa annua** Linnaeus, E, 1, K, East Lake, 2650 m, *Goodding 314-48*, ASC.  
**Poa bulbosa** Linnaeus, E, 2, GK, disturbed areas, *Rink 15589*, ASC.  
**Poa compressa** Linnaeus, E, 2, GK, disturbed areas, 2300–2690 m, *Rink 7671*, ASC.  
**Poa fendleriana** (Steud.) Vasey var. fendleriana, N, 4, GK, throughout, 2130–2650 m, *Go178-49*, ASC.  
**Poa fendleriana** (Steud.) Vasey var. longiligula (Scribn. & T.A. Williams) Soreng, N, 4, GK, throughout, 2120–2650 m, *Goodding 130-49*, ARIZ.  
**Poa palastris** Linnaeus, N, 1, K, Big Spring, 2150 m, *Stevens 1521*, ASC.  
**Poa pratensis** Linnaeus, H, 4, GK, wet places, 2130–2670 m, *Rink 6573*, ASC.  
**Polygogon monspeliensis** (L.) Desf., E, 1, K, Big Springs Canyon in an old corral, 2130 m, *Goodding 160-48*, ASC. *Goodding’s elevation for this collection is not accurate.*  
**Schedonorus armindacaeus** (Schreb.) Dumort., nKP, E, 2, GK, throughout in disturbed areas, 2120–2690 m, *Rink 10019*, ASC.  
**Schedonorus pratensis** (Huds.) P. Beauv., nKP, E, 2, G, 2390 m, *Rink 6577*, ASC.

**Secale cereale** Linnaeus, E, 1, K, Jacob Reservoir, 2130 m, *Goodding 105-48*, ASC.  
**Sporobolus cryptandrus** (Torr.) A. Gray, N, 2, GK, rim edges and lower elevations, also in Pleasant Valley, 2100–2600 m, *Rink 8085*, ASC.  
**Thinopyrum intermedium** (Host) Barkworth & D.R. Dewey, E, 4, K, throughout, 2100–2710 m, *Rink 8061*, ASC.  
**Thinopyrum ponticum** (Podp.) Z.-W. Liu & R.-C. Wang, E, 1, K, Joe’s Mud Hole, Deer Lake, along Hwy. 67, 2300–2660 m, *Rink 8065*, ASC.  
**Torreyochloa pallida** (Torr.) Church var. *pacifico* (J. Presl) J.I. Davis, nKP, N, 1, G, South fork of
upper Big Spring Canyon, 2560 m, *Rink 9991*, ASC.

*Trisetum spicatum* (Linnaeus) Richter, N, 2, GK, high meadows, 2330–2660 m, *Rink 9887*, ASC.

*Triticum aestivum* Linnaeus, E, 1, G, heliport, disturbed or seeded areas, 2530 m, *Hurst 244*, GRCA.

**Potamogetonaceae**

(includes *Zannichelliaceae*)

*Potamogeton alpinus* Balbis, nKP, N, 1, K, Three Lakes, 2520 m, *Rink 11539*, ASC.

*Potamogeton foliosus* Raf. subsp. *foliosus*, N, 2, K, northern lakes, 2490–2600 m, *Rink 10889*, ASC.

*Potamogeton gramineus* Linnaeus, N, 3, GK, lakes, 2370–2670 m, *Rink 8858*, ASC.

*Potamogeton natans* Linnaeus, N, 3, GK, lakes, 2570–2780 m, *Collom 13*, ASC.

*Potamogeton nodosus* Poir., N, 1, GK, Little Park and Frank’s Lakes, 2630–2690 m, *Rink 10686*, ASC.

*Potamogeton pusillus* Linnaeus subsp. *pusillus*, N, 1, G, Greenland Lake, 2550 m, *Rink 10905*, ASC.

*Zannichellia palustris* Linnaeus, nKP, N, 1, K, North Glenn Lake, 2660 m, *Rink 11558*, ASC.

**Typhaceae**

(includes *Sparganiaceae*)

*Sparganium emersum* Rehmann, N, 2, GK, emergent in lakes, 2280–2690 m, *Goodding 251–48*, ARIZ. We follow *Flora of North America* (FNA 1993–2016) that suggests *S. emersum* may be a stable hybrid that differs from the species as known in Europe, or that *S. angustifolium* is a variable species that includes *S. emersum*.

*Typha angustifolium* Michx., N, 2, GK, emergent in lakes, 2280–2690 m, *Goodding 251–48*, ARIZ.

*Typha latifolia* Linnaeus, nKP, N, 1, K, Frank’s Lake, 2650 m, *Rink 10892*, ASC.
### Appendix 2. Lakes visited as part of our collecting effort. Some lakes are not named, so we assigned numbers for them on our field maps. The last 2 columns are our observations at each lake. Blanks under the “condition” or “habitat” column indicate that those observations were not recorded.

| Lake       | Easting     | Nothing | Elevation (m) | Quadrangle       | Condition | Habitat |
|------------|-------------|---------|---------------|------------------|-----------|---------|
| West       | −112.3795   | 36.52465| 2274          | Sowats           | wet       | meadow  |
| Castle     | −112.3030   | 36.34135| 2332          | King Arthur Castle| dry       | meadow  |
| Swamp Lake | −112.3146   | 36.33139| 2347          | Kanabowits Springs| wet       | meadow  |
| Lamb       | −112.2529   | 36.69699| 2530          | Warm Springs Canyon| wet       | meadow  |
| Warm Springs| −112.2522  | 36.69016| 2330          | Warm Springs Canyon| wet       | meadow  |
| Buck       | −112.3016   | 36.70271| 2330          | Warm Springs Canyon| wet       | meadow  |
| Jacob Lake | −112.2290   | 36.70672| 2400          | Jacob Lake       | wet       | meadow  |
| Corral     | −112.2506   | 36.61774| 2490          | Telephone Hill   | wet       | meadow  |
| Tyo        | −112.1124   | 36.24629| 2518          | Bright Angel     | wet       | forested|
| Three Lakes| −112.2217   | 36.63862| 2520          | Jacob Lake       | wet       | meadow  |
| Pracas Lake| −112.2379   | 36.6305 | 2520          | Jacob Lake       | wet       | forested|
| Mile and Half| −112.2166  | 36.61814| 2530          | Telephone Hill   | wet       | meadow  |
| Hades      | −112.0824   | 36.2619 | 2566          | Little Park Lake | wet       | meadow  |
| Oquer      | −112.2226   | 36.50268| 2559          | Telephone Hill   | wet       | meadow  |
| Murray Lake| −112.1985   | 36.63444| 2590          | Jacob Lake       | wet       | meadow  |
| Coffee     | −112.1743   | 36.31116| 2590          | Kanabowits Springs| wet       | forested|
| Greenland  | −111.9904   | 36.24271| 2591          | Wahalla Plateau  | wet       | forested|
| Crane      | −112.1496   | 36.52992| 2606          | Telephone Hill   | wet       | meadow  |
| Snipe      | −112.2082   | 36.53124| 2610          | Telephone Hill   | wet       | meadow  |
| Frank’s    | −112.1833   | 36.51199| 2640          | Telephone Hill   | wet       | meadow  |
| East       | −112.1804   | 36.57188| 2640          | Telephone Hill   | wet       | meadow  |
| Little Little Park| −112.1121 | 36.33436| 2652          | Little Park Lake | wet       | meadow  |
| Deer       | −112.1296   | 36.40205| 2690          | Demotte Park     | wet       | meadow  |
| Glenn      | −112.1967   | 36.56491| 2690          | Telephone Hill   | wet       | meadow  |
| Lookout    | −112.1866   | 36.45512| 2697          | Demotte Park     | wet       | meadow  |
| Cougar     | −112.1907   | 36.45276| 2676          | Demotte Park     | wet       | meadow  |
| Dog Lake   | −112.0906   | 36.42217| 2680          | Dog Point        | wet       | forested|
| Indian     | −112.1138   | 36.32508| 2688          | Demotte Park     | wet       | meadow  |
| V.T.       | −112.1271   | 36.44592| 2690          | Demotte Park     | wet       | meadow  |
| 33         | −112.2197   | 36.26679| 2333          | Kanabowits Springs| wet       | meadow  |
| 34         | −112.22652  | 36.26696| 2417          | Kanabowits Springs| dry       | forested|
| 32         | −112.23006  | 36.320233| 2410          | Kanabowits Springs| dry       | meadow  |
| Gravel pit | −112.06349  | 36.25956| 2487          | Bright Angel     | dry       | meadow  |
| 35         | −112.14519  | 36.260967| 2522          | Kanabowits Springs| dry       | forested|
| 36a        | −112.14771  | 36.261382| 2533          | Kanabowits Springs| dry       | forested|
| 31         | −112.18224  | 36.316208| 2530          | Kanabowits Springs| wet       | meadow  |
| 38         | −112.14327  | 36.261154| 2530          | Kanabowits Springs| dry       | forested|
| 14         | −112.19454  | 36.3068 | 2545          | Kanabowits Springs| dry       | open    |
| Lake               | Easting  | Nothing | Elevation (m) | Quad                  | Condition | Habitat   |
|--------------------|----------|---------|---------------|-----------------------|-----------|-----------|
| Little Park        | 36.342008 | 2678    | 2682          | Little Park Lake      | wet       | meadow    |
| 23                 | 36.340521 | 2713    | 2719          | Abbey                | dry       | forested  |
| N Little Park      | 36.321381 | 2682    | 2682          | Little Park Lake     | dry       | meadow    |
| 7                  | 36.340521 | 2713    | 2719          | Abbey                | dry       | forested  |
| Abbey              | 36.319266 | 2682    | 2682          | Kanabownits Spring   | dry       | forested  |
| 13                 | 36.321381 | 2682    | 2682          | Little Park Lake     | dry       | meadow    |
| South Fork         | 36.35512  | 2754    | 2754          | Kanabownits Spring   | dry       | forested  |
| Baby Bear          | 36.326052 | 2754    | 2754          | Little Park Lake     | dry       | forested  |
| South Fork         | 36.326052 | 2754    | 2754          | Little Park Lake     | dry       | forested  |
| Little Bear        | 36.326052 | 2754    | 2754          | Little Park Lake     | dry       | forested  |
| Bear               | 36.326052 | 2754    | 2754          | Little Park Lake     | dry       | forested  |
| 26                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 27                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 28                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 29                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 30                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 31                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 32                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 33                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 34                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 35                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 36                 | 36.328691 | 2647    | 2647          | Kanabownits Spring   | dry       | meadow    |
| 37                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 42                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 43                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 44                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 45                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 46                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| 47                 | 36.262304 | 2545    | 2545          | Bright Angel         | dry       | forested  |
| Little Bear        | 36.37167  | 2765    | 2765          | Kanabownits Spring   | wet       | meadow    |
| Bear               | 36.36956  | 2768    | 2768          | Kanabownits Spring   | wet       | forested  |

APPENDIX 2. Continued
### Appendix 3

Springs visited as part of our collecting effort. Some springs are not named, so we assigned numbers for them on our field maps. The last 2 columns are our observations at each spring. Blanks under the “condition” or “habitat” column indicate that those observations were not recorded.

| Spring             | Easting  | Northing     | Elevation (m) | Quadrangle              | Condition | Habitat |
|--------------------|----------|--------------|---------------|-------------------------|-----------|---------|
| Tilton             | -112.34087 | 36.65899     | 2073          | Warm Springs Canyon     | wet       | forested|
| Oak                | -112.33716 | 36.67736     | 2120          | Warm Springs Canyon     | dry       | forested|
| Big                | -112.34925 | 36.60215     | 2134          | Big Springs             | wet       | forested|
| Moquitch           | -112.32845 | 36.63667     | 2170          | Warm Springs Canyon     | wet       | forested|
| Mangum             | -112.34577 | 36.62523     | 2179          | Big Springs             | wet       | forested|
| Biggs              | -112.32636 | 36.56148     | 2150          | Big Springs             | not found |         |
| Mourning Dove      | -112.34944 | 36.61694     | 2182          | Big Springs             | wet       | forested|
| Castle             | -112.34154 | 36.58604     | 2230          | Big Springs             | wet       | forested|
| Lower Two          | -112.17273 | 36.36819     | 2316          | King Arthur Castle      | dry       | forested|
| Clifford           | -111.95301 | 36.12344     | 2320          | Walhalla Plateau       | wet       | forested|
| Parasawampitts     | -112.31639 | 36.41333     | 2362          | Timp Point              | wet       | meadow  |
| Dead Fawn          | -112.08159 | 36.40729     | 2370          | Dog Point               | wet       | forested|
| Upper Two          | -112.29876 | 36.36699     | 2377          | King Arthur Castle      | dry       | meadow  |
| Quaking Aspen      | -112.2813  | 36.37537     | 2377          | Timp Point              | wet       | meadow  |
| Aconitum           | -112.09076 | 36.30957     | 2380          | Dog Point               | wet       | forested|
| Neol               | -112.00125 | 36.25682     | 2387          | Little Park Lake       | dry       | meadow  |
| Bee                | -112.31791 | 36.450829    | 2390          | Timp Point              | wet       | meadow  |
| Pasture            | -112.29739 | 36.37365     | 2393          | Timp Point              | wet       | forested|
| Stonelly           | -112.08463 | 36.40847     | 2400          | Dog Point               | wet       | forested|
| Timp               | -112.29531 | 36.38777     | 2408          | Timp Point              | wet       | meadow  |
| Kanabowints        | -112.21236 | 36.25555     | 2423          | Kanabowints Spring     | wet       | border  |
| BA Spring          | -112.0678  | 36.2196      | 2430          | Bright Angel            | dry       | forested|
| Outlet             | -112.1002  | 36.22816     | 2438          | Bright Angel            | wet       | forested|
| Greenland          | -112.0011  | 36.24512     | 2438          | Bright Angel            | dry       | forested|
| Watts              | -112.25377 | 36.37399     | 2438          | Timp Point              | wet       | forested|
| Squaw              | -112.25487 | 36.39468     | 2454          | Timp Point              | wet       | forested|
| Locust             | -112.28495 | 36.40049     | 2454          | Timp Point              | wet       | border  |
| Barrel             | -112.203   | 36.29503     | 2469          | Kanabowints Spring     | wet       | meadow  |
| Cistern            | -111.9739  | 36.21979     | 2475          | Greenland Lake         | wet       | forested|
| Tipover            | -112.22217 | 36.34432     | 2490          | Kanabowints Spring     | dry       | forested|
| Fuller             | -112.05159 | 36.23414     | 2499          | Bright Angel            | dry       | border  |
| unnamed            | -112.05127 | 36.39872     | 2500          | Dog Point               | wet       | forested|
| Basin              | -112.10278 | 36.26350     | 2500          | Little Park Lake       | dry       | meadow  |
| Robber’s Roost     | -112.08813 | 36.27869     | 2510          | Little Park Lake       | wet       | meadow  |
| Milk               | -112.13854 | 36.27746     | 2520          | Kanabowints Spring     | wet       | meadow  |
| Oquer              | -112.24205 | 36.52393     | 2530          | Telephone Hill         | wet       | meadow  |
| Upp.Thompson        | -112.05519 | 36.25749     | 2550          | Little Park Lake       | wet       | forested|
| Crystal            | -112.09526 | 36.38910     | 2560          | Dog Point               | wet       | meadow  |
| Spring                | Easting      | Northing     | Elevation (m) | Quad          | Condition | Habitat   |
|-----------------------|--------------|--------------|---------------|---------------|-----------|-----------|
| North Canyon          | -112.08446   | 36.39674     | 2560          | Dog Point     | wet       | forested  |
| Slanty                | -112.04806   | 36.3924      | 2570          | Dog Point     | wet       | forested  |
| Bear                  | -112.17522   | 36.3695      | 2652          | Kanabowmints Spring | wet     | meadow    |
| Fawn                  | -112.22217   | 36.34432     | 2670          | Kanabowmints Spring | wet     | meadow    |
| Limonite              | -112.260885  | 36.307532    | 2235          | King Arthur Castle | wet      | forested  |
| South Big 1           | -112.289128  | 36.316234    | 2312          | King Arthur Castle | wet      | forested  |
| South Big 2           | -112.257192  | 36.31721     | 2328          | King Arthur Castle | dry      | forested  |
| Subsurface            | -112.25869   | 36.31696     | 2332          | King Arthur Castle | dry      | forested  |
| Tater Canyon          | -112.070503  | 36.495819    | 2347          | Dog Point     | wet       | forested  |
| South Big 1           | -112.252797  | 36.3196      | 2352          | King Arthur Castle | dry      | forested  |
| Ike’s                 | -112.271747  | 36.347111    | 2420          | King Arthur Castle | dry      | forested  |
| Upper Outlet          | -112.094736  | 36.243173    | 2470          | Bright Angel  | wet       |          |
| Sewage effluent       | -112.0669    | 36.21755     | 2500          | Bright Angel  | wet       | forested  |
| E of Basin            | -112.097086  | 36.263201    | 2500          | Little Park Lake | dry     | meadow    |
| N of Outlet           | -112.093088  | 36.247912    | 2520          | Bright Angel  | wet       |          |
| South Canyon          | -112.03675   | 36.33903     | 2530          | Little Park Lake | wet     | forested  |
| Lo. Thompson          | -112.05773   | 36.23991     | 2536          | Bright Angel  | wet       | forested  |
| US of Milk            | -112.14406   | 36.27843     | 2536          | Kanabowmints Spring | wet     | forested  |
| 5                     | -112.144473  | 36.258679    | 2545          | Kanabowmints Spring | wet     | meadow    |
| 11                    | -112.135198  | 36.292159    | 2545          | Kanabowmints Spring | dry     | meadow    |
| 11                    | -112.135198  | 36.292159    | 2545          | Little Park Lake | dry      | meadow    |
| 22b                   | -112.133471  | 36.344431    | 2590          | Kanabowmints Spring | wet     | forested  |
| 73                    | -112.183338  | 36.344431    | 2590          | Kanabowmints Spring | wet     | forested  |
| 44                    | -112.061463  | 36.254867    | 2597          | Little Park Lake | dry      | forested  |
| Glorious              | -112.138396  | 36.349066    | 2598          | Kanabowmints Spring | wet     | meadow    |
| 45                    | -112.063832  | 36.25719     | 2606          | Little Park Lake | dry      | forested  |
| Pair, North           | -112.20455   | 36.45465     | 2667          | Demotte Park  | dry       | forested  |
| Pair, South           | -112.20291   | 36.45373     | 2667          | Demotte Park  | dry       | forested  |
| Buffalo               | -112.06285   | 36.312118    | 2691          | Little Park Lake | wet     | meadow    |
| Warm Springs          | -112.31117   | 36.69497     | 2133          | Warm Springs Canyon | wet     | forested  |
APPENDIX 4. Tanks that were targets of this inventory effort. Some tanks do not have names, so we assigned names or numbers for them on our field maps. Blanks under the “condition” column indicate that condition observations were not recorded.

| Tank                | Easting  | Northing           | Quadrangle | Elevation (m) | Condition |
|---------------------|----------|--------------------|------------|---------------|-----------|
| Orderville Cyn      | −112.1671| 36.68977           | Jacob Lake | 2316          |           |
| Moquitch            | −112.2117| 36.5647            | Telephone Hill | 2560        | wet       |
| Joe’s Mud Hole      | −112.2101| 36.57447           | Telephone Hill | 2570        | wet       |
| Barn                | −112.0138| 36.30739           | Little Park Lake | 2679       | wet       |
| Jacob Reservoir     | −112.23099| 36.707175       | Jacob Lake | 2270          | wet       |
| Lower Moquitch      | −112.29083| 36.610131       | Big Springs | 2408         | not found |
| Jack                | −112.22713| 36.67588          | Jacob Lake | 2438          |           |
| Warm Springs        | −112.22808| 36.665241         | Jacob Lake | 2445          | dry       |
| Ridge tank          | −112.16711| 36.695602         | Jacob Lake | 2447          | no tank   |
| Mud                 | −112.27326| 36.62294          | Big Springs | 2484         |           |
| Dog Canyon          | −112.26383| 36.586622         | Big Springs | 2500         | wet       |
| 8310                | −112.23786| 36.570038         | Telephone Hill | 2533        |           |
| Upper Moquitch      | −112.21172| 36.5647           | Big Springs | 2557         | dry       |
| Spare               | −112.00186| 36.303341         | Little Park Lake | 2652       | wet       |
| John’s              | −112.05045| 36.338714         | Little Park Lake | 2783       |           |

APPENDIX 5. Sinks that were targets of this inventory effort. Few sinks have names, but we often assigned numbers or names for them on our field maps.

| Sink                | Easting  | Northing           | Elevation (m) | Quadrangle |
|---------------------|----------|--------------------|---------------|------------|
| Billy               | −112.20479| 36.69845           | 2414          | Jacob Lake |
| E of Red Pt.        | −112.13207| 36.58283           | 2414          | Telephone Hill |
| Jolly               | −112.18499| 36.6879            | 2438          | Jacob Lake |
| 58                  | −112.2697 | 36.56592           | 2480          | King Arthur Castle |
| Big dry             | −112.213  | 36.65122           | 2500          | Jacob Lake |
| Small dry           | −112.2106| 36.65062           | 2500          | Jacob Lake |
| Large               | −112.2131| 36.63714           | 2500          | Jacob Lake |
| Three Lakes Sink    | −112.2238| 36.64111           | 2500          | Jacob Lake |
| 56a                 | −112.29072| 36.341228          | 2335          | King Arthur Castle |
| 56b                 | −112.28667| 36.342462          | 2393          | King Arthur Castle |
| 68                  | −112.21840| 36.274466          | 2408          | Kanabownts Spring |
| 58                  | −112.21840| 36.27446           | 2408          | Swamp Ridge |
| 34                  | −112.22652| 36.265964          | 2427          | Kanabownts Spring |
| 52                  | −112.23006| 36.320233          | 2460          | Kanabownts Spring |
| 18a                 | −112.22350| 36.323159          | 2487          | Kanabownts Spring |
| 18b                 | −112.22657| 36.321654          | 2487          | Kanabownts Spring |
| 18a                 | −112.22508| 36.323159          | 2487          | Big Spring |
| 18b                 | −112.22687| 36.321654          | 2457          | Big Spring |
| 35                  | −112.14519| 36.26086           | 2522          | Kanabownts Spring |
| 36c                 | −112.14769| 36.262662          | 2530          | Kanabownts Spring |
| 38                  | −112.14327| 36.261154          | 2530          | Kanabownts Spring |
| 36b                 | −112.14761| 36.261662          | 2531          | Kanabownts Spring |
| 14                  | −112.19454| 36.3068            | 2545          | Kanabownts Spring |
| 37                  | −112.14460| 36.262304          | 2545          | Kanabownts Spring |
| 15                  | −112.20459| 36.340938          | 2560          | Kanabownts Spring |
| 17                  | −112.22069| 36.337547          | 2575          | Kanabownts Spring |
| 29a                 | −112.18066| 36.333576          | 2622          | Kanabownts Spring |
| 29b                 | −112.18729| 36.331952          | 2622          | Kanabownts Spring |
| 12c                 | −112.15950| 36.31964           | 2627          | Kanabownts Spring |
| 27                  | −112.16858| 36.335958          | 2652          | Kanabownts Spring |
| 24b                 | −112.15432| 36.332978          | 2667          | Kanabownts Spring |
| 28                  | −112.17625| 36.338894          | 2670          | Kanabownts Spring |
| Dog sink            | −112.09178| 36.418125          | 2682          | Dog Point |
| 8843                | −112.27550| 36.398455          | 2695          | Timp Point |
| 46                  | −112.05301| 36.296952          | 2720          | Little Park Lake |
| Mble sinkhole       | −112.06136| 36.379             | 2737          | Dog Point |

APPENDIX 4

APPENDIX 5
APPENDIX 6. Mostly through herbarium review, we eliminated 230 taxa, mostly based on records from SEINet. These taxa were based on vouchers that we annotated to other taxa. Others were poorly georeferenced and could not be assigned to the flora area. After each plant name, we provide the results of our herbarium reviews. For example, *Equisetum palustre* remains undocumented for the Kaibab Plateau (KP). Many ASC specimens recorded on SEINet but not found were Goodding specimens annotated to *E. laevigatum*. We have not reviewed the specimens, but they seem unlikely for the KP, so are, for now, discounted.

Equisetaceae

*Equisetum palustre* Linnaeus, ASC and GRCA specimens annotated to *E. laevigatum*.

Selaginellaceae

*Selaginella leucobryoides* Maxon, ASC specimen annotated to *S. watsonii*.

DICOTYLEDONOUS PLANTS

Amaranthaceae

*Chenopodium desiccatum* A. Nelson, Stevens sn, MNA specimen too immature for accurate determination; GRCA specimens annotated to *C. pratericola*.

*Chenopodium incanum* (S. Wats.) Heller var. *occidentale* Crawford, RM specimen annotated to *C. i. var. incanum*.

*Chenopodium oleri* Aellen, ARIZ specimen annotated to *C. capitatum*.

*Chenopodium subglabrum* (S. Wats.) A. Nelson, DES specimen not found.

Anacardiaceae

*Rhus glabra* Linnaeus, one specimen at DES annotated to *Sorbus dumosa*.

Apiaceae

*Cicuta douglasii* (DC.) Coulth. & Rose, we follow the *Intermountain Flora* (Cronquist et al. 1997) interpretation that *C. douglasii* is not in Arizona.

*Conioselinum scopulorum* (A. Gray) Coulth. & Rose, ASC specimen annotated to *Pseudocymopterus montanus*.

*Cymopterus fendleri* (Pursh) Raf., ARIZ specimen annotated to *Pseudocymopterus montanus*.

*Cymopterus grayanus* Tidestr., UTC specimen not examined, probably *Pseudocymopterus montanus*.

*Cymopterus purpurascens* (A. Gray) M.E. Jones, BRY specimen not reviewed by authors. This taxon is generally known from lower elevations surrounding the KP and is often confused with other taxa.

*Lomatium mohavense* (Coulth. & Rose) Coulth. & Rose, ASU specimen annotated to *Apiaceae*, probably *L. leptotcarpum*.

*Perideridia gairdneri* (Hook. & Arn.) Mathias, reported by Phillips et al. (1987), ASC & GRCA specimens annotated to *Perideridia parishii*.

Asteraceae

*Amphipappus fremontii* Torr. & Gray subsp. *spinuosus* (A. Nels.) Keck, SEINet location data entry error.

*Artemisia tridentata* var. *tridentata* Nutt., RM specimen by Swapp S-9 not in reproductive condition.

*Aster tephrodes* (A. Gray) S.F. Blake, ASC specimen annotated to *Dieteria mucronata* var. *bigelowii*.

*Brickellia baccharidea* A. Gray, specimen at ASC not found, probably annotated but not databased.

*Brickellia rusbyi* Gray, specimen at ASC annotated to *B. grandiflora*.

*Brickelliastrum fendleri* (Gray) King & H.E. Robins., DES specimen annotated to *Brickellia grandiflora*.

*Cirsium calcareum* (M.E. Jones) Woot. & Standl., all specimens annotated to *C. wheeleri* or *C. arizonicum* var. *bipinnatum*.

*Cirsium undulatum* (Nuttall) Spreng., all specimens annotated to other *Cirsium* species, primarily *Cirsium wheeleri*.

*Conyza coulteri* (A. Gray) G.L. Nesom, UCR specimen annotated to *C. schiedeana*.

*Dieteria asteroides* Torrey, ARIZ and UCR duplicates annotated to *M. bigelowii* var. *mucronata*.

*Dieteria canescens* (Pursh) Nuttall var. *canescens*, all specimens either annotated to something else, or not found.

*Dieteria canescens* (Pursh) A. Gray subsp. *incana* (Lindl.) A. Gray, MNA specimens annotated to *Dieteria canescens* var. *aristata* and *Dieteria canescens* var. *ambigua*.

*Dieteria canescens* var. *arenaria* (L.C. Anders.) G.L. Nesom & Baird, DES specimen annotated to *E. parryi* subsp. *nevadensis*.

*Ericameria nauseosa* (Pallas ex Pursh) G.L. Nesom & Baird var. *mohavensis* (Pall. ex Pursh) G.L. Nesom & Baird, specimens were collected below our elevation cutoff.

*Ericameria nauseosa* (Pallas ex Pursh) G.L. Nesom & Baird var. *auriculata* (A. Nels.) G.L. Nesom & Baird, specimens annotated to *E. parryi* subsp. *nevadensis*.

*Ericameria nauseosa* (Pallas ex Pursh) G.L. Nesom & Baird var. *oreophila* (A. Nels.) G.L. Nesom & Baird, specimens annotated to *E. parryi* subsp. *nevadensis*.

*Ericameria parryi* (A. Gray) G.L. Nesom & G.I. Baird var. *howardii* (Parry ex Gray) Hall & Clements, DES specimen annotated to *E. p. var. nevadensis*. 
Ericameria parryi (A. Gray) G.L. Nesom & Baird var. parryi, UTC specimen annotated to E. p. var. nevadensis.

Erigeron bellidiastrum Nuttall, DES specimen annotated to E. fornsiosissimus.

Erigeron nudiflorus A. Gray, ASC specimen annotated to E. fornsiosissimus.

Erigeron punitus Nuttall var. subglaber (Cronquist) G.L. Nesom, DES specimen annotated to E. divergens.

Erigeron tener (A. Gray) A. Gray, MNA specimen not found.

Erigeron ursinus D.C. Eat., two ASU specimens, one annotated to E. divergens, the other to E. fornsiosissimus. DES specimen not found.

Erigeron utahensis Gray, Goодding 352-48, ASC and ARIZ specimens determined as E. divergens.

Gaillardia parryi Greene, SEINet location data entry error.

Helianthella uniflora (Nuttall) Torr. & Gray, GRCA specimen annotated to H. quinquervinis.

Helianthus nuttallii Torr. & A. Gray, DES and UCR duplicates annotated to Helianthella quinquervinis.

Helioemeris longifolia (Robins. & Greenm.) Cockerell, DES and ASC duplicates annotated to Helioemeris multiflora.

Heterotheca villosa (Pursl.) Shinners var. foliosa (Nuttall) Harms, according to Semple (FNA), this variety does not occur on the KP.

Heterotheca viscida (A. Gray) Harms, specimens annotated to H. villosa.

Hymenoxys lenmonii (Greene) Cockerell, two ASU specimens annotated to H. subintegra

Hymenoxys richardsonii (Hook.) Cockerell, all specimens at TES and DES annotated to H. subintegra.

Hymenoxys rubgyi (A. Gray) Cockerell, two ASU specimens annotated to H. subintegra.

Macæranthera asteroides (Torr.) Greene, specimens at UCR and ARIZ annotated to D. bigelovii var. mucronata.

Macæranthera linearis Greene, GRCA specimen annotated to Dieteria canescens.

Macæranthera pariflora A. Gray, DES specimen annotated to Dieteria canescens var. ambiguia.

Onopordum acanthium Linnaeus, reported by GRCA staff in the Walla Valley, near the Widforss Trailhead, and on the Wallalla Plateau, w/o voucher. Since determined as Cirsium vulgare.

Pseudognaphalium luteoalbum (Linnaeus) Hilliard & Burtt, TES specimen annotated to P. macounii.

Pseudognaphalium pringlei (A. Gray) A. Anderb., ASC specimen annotated to P. macounii.

Pseudognaphalium viscosum (Kunth) W.A. Weber, RM specimen annotated to P. macounii.

Solidago canadensis Linnaeus, many specimens, probably either C. altissima (which may be synonymous with S. canadensis) or S. velutina.

Solidago simplex Kunth, specimens at ASC and ARIZ annotated to S. multiradiata.

Solidago spathulata DC. var. nana (A. Gray) Cronquist, specimen at ASU annotated to S. nana. Solidago spathulata var. nana is synonymous with Solidago simplex var. nana, which is a Pacific NW taxon.

Solidago wrightii A. Gray, DES specimen annotated to S. aff. altissima.

Symphyotrichum pumilum (L.) T orr. A. Nelson, many specimens, Solidago simplex var. nevadensis.

Symphyotrichum divergens (Fisch & C.A. Mey.) Ganders, MNA specimen annotated to Lithospermum multiflorum.

Cryptantha capitata (Eastw.) I.M. Johnston, MNA specimen annotated to C. confertiflora. GRCA specimen: SEINet location data entry error.

Cryptantha flava (A. Nelson) Payson, Hodgson 7095, ASU without fruit, determination uncertain; DES duplicate determined as C. confertiflora by Hodgson.

Eucrypta micrantha (Torr.) Heller, SEINet location data entry error.

Hesperochiron punitus (Douglo. ex Griseb.) Porter, reported in Phillips et al. (1987). No SEINet records.

Lappula occidentalis (S. Watson) Greene var. cupulata, SEINet location data entry error.

Lithospermum viridiflorum DC., DES specimen annotated to Lithospermum multiflorum.

Phacelia fremontii Torr., SEINet location data entry error.

Phacelia egina (Greene ex Brand) Greene ex J.T. Howell (Phacelia magellanica (Lam.) Coville p.p.) We concur with Cronquist et al. (1984) that these closely related plants can be treated as one binomial. We treat them as P. heterophylla, which is how most of them are presently determined.

Brassicaceae

Arabis demissa Greene, TES specimen annotated to B. pendulina.

Arabis drummondii A. Gray, specimens either not found, or annotated to Boechera stricta.

Arabis holboellii Hornem., three ASC specimens annotated to B. gracilipes.

Descurainia incana (Benn. ex Fisch. & C.A. Mey.) Dorn, ASC specimen annotated to D. incisa. GRCA specimen sterile, but probably D. incisa.

Boraginaceae

Amsinekia menziesii (Lehm.) A. Nelson & J.F. Macbr. var. intermedia (Fisch & C.A. Mey.) Ganders, MNA specimen annotated to Lithospermum multiflorum.
Descurainia incisa (Engelm. ex A. Gray) Britton subsp. passembly (Detling) Rollins, all specimens seen have ascending pedicels, characteristic of subs. incisa.

Descurainia paradisa (A. Nels. & Kennedy) O.E. Schulz, DES specimen not found.

Descurainia richardsonii O.E. Schulz, ASC specimen annotated to D. incisa.

Draba crossiifolia Graham, ARIZ specimen poor, not included; ASC specimen annotated to Draba rectifica.

Erysimum asperum (Nuttall) DC., ASC specimens annotated to E. capitatum var. purshii. Varietal recognition for E. capitatum may not be justified as some specimens have three-forked hairs (a character of var. capitatum), but other characters of var. purshii.

Lepidium lasiocarpum Nuttall, GRCA specimen not found, but presumed to have location data error.

Physaria fallax prov. sp., BRY specimen collected and provisionally named by S. O’Kane, that may not be a valid taxon per O’Kane (personal communication 2015).

Rorippa obtusa (Nuttall) Britton, ARIZ specimen annotated to R. curvipes.

Rorippa sinuata (Nuttall) Hitchc., ASC and GRCA specimens annotated to R. curvipes.

Rorippa teres (Michx.) R. Stuckey, ASC specimen not found.

Schoenocrambe linifolia (Nuttall) Greene, ASC specimen not found.

Cactaceae

Opuntia erinacea Engelm. & J.M. Bigelow ex Engelm. var. hystericina (Engelm. & J.M. Bigelow) L.D. Benson, GRCA specimens annotated to O. polyacantha var. erinacea.

Opuntia erinacea Engelm. & J.M. Bigelow ex Engelm. var. utahensis (Engelm.) L.D. Benson, DES specimen annotated to O. polyacantha var. erinacea.

Caprifoliaceae

Symphoricarpos Duham. ssp., nomenclature and taxonomy in this genus is unclear for the KP.

Valeriana capita Pall ex Link, GRCA specimen annotated to V. acutiloba.

Caryophyllaceae

Arenaria aberrans M.E. Jones, MNA specimen annotated to Erenegone fendleri.

Arenaria aculeata S. Watson, MNA specimen annotated to Erenegone fendleri.

Minuartia filorum (Maguire) McNeil, GRCA specimens annotated to either M. macrantha or Erenegone fendleri.

Minuartia nuttallii (Pax) Briq., DES specimen annotated to Phlox austromontana.

Sagina decumbens (Elliott) Torr. & A. Gray, ASC specimen annotated to S. saginoides.

Silene noctiflora Linnaeus, two specimens at GRCA annotated to Silene latifolia var. alba

Stellaria calycantha (Ledeb.) Bong., ASC specimen annotated to S. umbellata.

Stellaria longipes Goldie, MNA specimen annotated to Stellaria longifolia.

Euphorbiaceae

Euphorbia alta J.B.S. Norton, ARIZ specimen not found, probably E. brachycera.

Euphorbia palmeri Engelm. ex S. Watson, three ASU specimens may be E. brachycera.

Fabaceae

Acmiopson rigidus (Benth.) Brouillet, two RM specimens annotated to L. wrightii.

Astragalus argophyllus Nuttall var. panguicenis (M.E. Jones) M.E. Jones, ASC specimen annotated to A. castaneiformis.

Astragalus brandegee Porter, ASC specimen annotated to A. miser.

Astragalus greenei A. Gray, two ASC specimens not found.

Astragalus hallii A. Gray, MNA specimen annotated to A. subcinereus.

Astragalus huiristratus A. Gray var. hosackiae (Greene) M.E. Jones, two RM specimens annotated to A. h. var. tenerrimus.

Astragalus lentiginosus Douglas ex Hook. var. mokiaeensis (A. Gray) M.E. Jones, reported for near Cliff Springs (Phillips et al. 1987), GRCA specimen w/o reproductive parts, annotated to Astragalus sp.

Astragalus praelongus Sheldon var. praelongus, DES specimen annotated to A. lentiginosus.

Astragalus tephrades A. Gray, specimen at TEUI in flower, but no fruit. This taxon occurs at lower elevations, mostly south of the Grand Canyon; unlikely on the KP.

Astragalus vootonii Sheldon, ASC specimen annotated to A. oophorus.

Dalea flavesens (S. Wats.) S.L. Welsh, ARIZ specimen annotated to D. candida var. oligophylla.

Lathyrus parvifolius S. Watson, GRCA specimen annotated to L. laetivirens.

Lotus plebeius (Brandegee) Barneby, all specimens annotated to L. utahensis.

Lupinus hillii Greene var. osterhoutianus (C.P. Sm.) Harmon, GRCA specimens annotated as L. hillii var. hillii.

Lupinus brevicaulis S. Watson, USFS-TEUI specimen annotated to L. kingii.

Lupinus caudatus Kellogg (incl. L. aduncus Greene), all specimens annotated to L. argenteus.

Melilotus indicus (Linnaeus) All., ASC and DES specimens annotated to M. officinalis.

Oxytropis lambertii Pursh, DES and RM specimens annotated to O. oreophilus.

Trifolium macruronum Willd. ex Spreng., two DES specimens annotated to T. pinetorum.
Fagaceae
Quercus grisea × turbinella, Merk 752 at GRCA annotated to Q. arizonica.

Gentianaceae
Gentianella tenella (Rottb.) Börner, GRCA specimen annotated to Campanula parryi.

Hydrangeaceae
Fendlera wrightii (A. Gray) A. Heller, RM specimen annotated to GRCA specimen annotated to F. wrightii.

Hippuridaceae
Hippuris vulgaris, Hippuridaceae

Hypericaceae
Hypericaceae

Loasaceae
Mentzelia multiflora (Nuttall) A. Gray, GRCA specimen annotated to M. rusbyi. Mentzelia multiflora does not occur in Arizona, specimens det. as such are M. longiloba.

Malvaceae
Abutilon incanum (Link) Sweet, SEINet location data error.

Plantaginaceae
Callitriche palustris Linnaeus, ARIZ specimens annotated by Hellquist to other Callitriche species.

Polemoniaceae
Aliciella hutchinsifolia (Rydberg) J.M. Porter, SEINet location data error.

Polemoniaceae
Ipomopsis macrosiphon (Kearney & Peebles) V.E. Grant & Wilken, many collections have been determined as such, but we believe the only large-flowered Ipomopsis on the KP is I. tenuttaba. See annotation in species list, Appendix 5.

Polemoniaceae
Ipomopsis tridactyla (Rydberg) S.L. Welsh, Hook sn incorrectly attributed to the KP.

Polemoniaceae
Phlox amabilis Brand, ASC specimen annotated to P. longifolia
Phlox pseudoputus Brand, ASU specimen annotated to P. pseudoputus × barbatus, or in one case to P. putus.

Polemoniaceae
Veronica anagallis-aquatica Linnaeus, MNA specimen annotated to V. americana
Veronica arcensis Linnaeus, ASC, DES, and GRCA specimens annotated to V. serpyllifolia.

Polemoniaceae
Aliciella hutchinsifolia (Rydberg) J.M. Porter, SEINet location data error.

Polemoniaceae
Ipomopsis macrosiphon (Kearney & Peebles) V.E. Grant & Wilken, many collections have been determined as such, but we believe the only large-flowered Ipomopsis on the KP is I. tenuttaba. See annotation in species list, Appendix 5.

Polemoniaceae
Ipomopsis tridactyla (Rydberg) S.L. Welsh, Hook sn incorrectly attributed to the KP.

Polemoniaceae
Phlox amabilis Brand, ASC specimen annotated to P. longifolia
Phlox pseudoputus Brand, ASU specimen annotated to P. pseudoputus × barbatus, or in one case to P. putus.

Polemoniaceae
Veronica anagallis-aquatica Linnaeus, MNA specimen annotated to V. americana
Veronica arcensis Linnaeus, ASC, DES, and GRCA specimens annotated to V. serpyllifolia.
Polygonaceae

Eriogonum abertianum Torr., specimen at RM not reviewed by authors; ASC specimen not found. This taxon at lower elevations in southern Arizona; unlikely to occur on the KP.

Eriogonum capillare Small, ASC specimen not located, occurrence unlikely for this location on the KP.

Eriogonum corrigens Benth. var. aureum (M.E. Jones) Reveal, Goodding 357-48 at ASC annotated to E. c. var. glutinosum.

Eriogonum ericifolium Torr. & A. Gray, GRCA specimen annotated to E. microthecum var. simpsonii.

Eriogonum fasciculatun Benth., three GRCA and one ASC (Goodding 521-48) specimens annotated to E. microthecum var. simpsonii.

Eriogonum flavum Nuttall, three GRCA specimens annotated to E. arcuatum var. arcuatum.

Eriogonum inflatum Torr. & Frém., SEINet location data error.

Eriogonum jamesii Benth., all specimens annotated to either E. arcuatum var. arcuatum or Eriogonum umbellatum var. suburidum, or not found.

Eriogonum leptophyllum (Torr. & A. Gray) Wooton & Standl., ASC specimen not found, occurrence very unlikely for this location on the KP.

Eriogonum ocalifolium Nuttall var. purpureum (Nuttall) Durand, SEINet location data error.

Eriogonum palmerianum Reveal, SEINet location data error; Goodding 257-49.

Eriogonum pulchrum Eastw., GRCA specimen annotated to E. microthecum var. simpsonii.

Eriogonum subreniforme S. Watson, Goodding 37-48 at ASC annotated to E. cernuum.

Eriogonum umbellatum Torr. var. junipinorum Reveal, NY specimen not reviewed by authors. ASC and DES specimens annotated to E. heracleoides. Taxon not known for Arizona.

Polygonum bellardii All., ARIZ specimen not found, probably P. polygaloides subsp. kelloggii.

Polygonum minimum S. Watson, ASC specimen annotated to P. sarawetense.

Rumex latisinus Alph. Wood, GRCA specimen annotated to R. crispus.

Rumex maritimus Linnaeus, recorded in SEINet as observation only, no specimen found. Rumex occidentalis S. Wats., ASC specimen not found.

Portucaceae

Talinum brevifolium Torr., reported by Phillips et al. (1987), GRCA specimen annotated to Sedum lanceolatum.

Primulaceae

Dodecachaeon pulchellum (Raf.) Merr., specimens annotated to D. alpinum.

Ranunculaceae

Actaea arizonica (S. Watson) J. Compton, reports from North Canyon with no voucher, probably Actaea rubra mistaken as A. arizonica.

Delphinium parishii A. Gray, GRCA specimen annotated to D. nuttallianum.

Delphinium seaposum Greene, DES specimen annotated to D. nuttallianum.

Myosurus apetalus Gay var. borealis Whittemore, DES specimen annotated to M. apetalus var. montanus.

Myosurus aristatus auct. non Benth., ARIZ specimen annotated to M. apetalus var. montanus.

Ranunculus macrocarp Britton, ASC specimen annotated to R. uncinatus.

Rosaceae

Argentina anserina (Linnaeus) Rydberg ASC specimen annotated to Potentilla hippiana.

Geum aleppicum Jacq., GRCA specimen annotated to G. macrophyllum var. pericinis.

Potentilla diversifolia Lehm., all specimens annotated to P. gracilis var. fastigiat or P. hippiana. Potentilla diversifolia not recognized in FNA.

Prunus serotina Ehrh., DES specimen annotated to P. virginiana.

Rubiaceae

Calium watsonii (A. Gray) A. Heller, GRCA specimen annotated to G. trifidum.

Salicaceae

Salix gooddingii C.R. Ball, reported by Phillips et al. (1987), GRCA specimen annotated to S. exigua.

Sapindaceae

Acer negundo Linnaeus subsp. neomexicanum (Greene) E. Murray. Reported in Phillips et al. (1987), appears not to be a valid name.

Solanaceae

Physalis crassifolia Benth., Mead sn at GRCA annotated to P. hederacea var. palmisi.

Solanum douglasii Dunal, ASC specimen annotated to S. nigrum.

Sparganiaceae

Sparganium natans Linnaeus, ASC specimen not found. This is a more northern species.

Violaceae

Viola nutallii Pursh, ASU specimen not found.

MONOCOTYLEDONOUS PLANTS

Asparagaceae

Hesperocallis undulata A. Gray, ARIZ 92344 not found. Extremely unlikely.

Cyperaceae

Carex alma L.H. Bailey, ASC specimen annotated to C. occidentalis.

Carex hassei L.H. Bailey, C. hassei specimens probably are immature C. aerea.

Carex haydeniana Olney, reported in Phillips et al. (1987), probably from a misdetermined Collom specimen.
Carex retrorsa Schwein., PUA specimen annotated to C. vesicaria.
Carex scoparia Schkuhr ex Willd., two specimens at ASC and one at GRCA annotated to C. petasata.
Carex senta Booth, ASC specimen annotated to another Carex taxon.
Carex vulpinoides Michx., ASC specimen annotated to another Carex taxon.
Carex zeranitica L.H. Bailey, three DES specimens annotated to C. petaseta.

Eleocharis obtusa (Willd.) Schult., all specimens annotated to E. engelmannii.
Eleocharis parishii (Roth.) Roem. & Schult., GRCA specimen annotated to E. engelmannii.
Eleocharis parvula (E. Mey., ASC specimen not located.
Eleocharis quinqueflora (Hartman) O. Schwarz, MNA specimen annotated to E. acicularis.

Fimbristylis (Roem. & Schult.) Vahl, ASC specimen not located.

Juncus effusus (Vasey) Barkworth, GRCA specimens not found.
Juncus mertensianus (Vasey) Barkworth, all specimens annotated to J. saximontanus.
Juncus xiphioides (Vasey) Barkworth, BRY specimen annotated to A. lettermannii; this taxon poorly documented or nonexistent in Arizona. The KP has Achnatherum species that are similar.

Agrostis idahoensis Nash, DES specimen annotated to A. scabra.

Aristida purpurea Nuttall. var. longiseta (Steud.) Vasey, GRCA specimen annotated to Aristida purpurea var. fendleriana.

Bouteloua hieracifolia Lag., reported in Phillips et al. (1987), no specimen.

Bromus anomalus Rupr. ex Fourn., endemic to West Texas, ours are B. ciliatus, B. porteri, or B. richardsonii.

Deschampsia elongata (Hook.) Monro, ASC and GRCA specimen annotated to D. caespitosa.

Elymus canadensis Linnaeus, RM specimen annotated to E. elymoides; GRCA specimens annotated to E. elymoides and E. virginicus.

Elymus trachycaulus var. subsecundus (Link) Á. Löve & D. Löve, one ASC specimen, two ASU specimens and four GRCA specimens annotated to E. trachycaulus, or E. trachycaulus subsp. trachycaulus.

Festuca arizonica Vasey, GRCA specimen not found, other specimens annotated to other taxa.

Muhlenbergia filiculmis Vasey, GRCA specimen annotated to M. montana. NY specimen annotated to M. filiformis.

Muhlenbergia repens (J. Presl) Hitchc., ASC specimen not found. GRCA specimens annotated to M. richardsonis.

Nassella viridula (Trin.) Barkworth, RM specimen annotated to Achnatherum nelsonii subsp. nelsonii.

Phalaris arundinacea Linnaeus, reported in Phillips et al. (1987). GRCA specimen annotated to Calamagrostis scopulorum.

Poa arida Vasey, GRCA specimen annotated to Poa pratensis.

Poa bigelowii Vasey & Scribn., ASC specimen annotated to Poa sp.; MNA specimens annotated to Poa pratensis or Poa sp. or not found.

Poa interior Rydberg, ASC specimens annotated to Poa pratensis.

Poa nemoralis Linnaeus subsp. interior (Rydberg) W.A. Weber, all MNA specimens annotated to Poa pratensis.

Setaria viridis (Linnaeus) P. Beauv., ARIZ specimen not collected on the KP, but rather in Oak Creek Canyon, north of Sedona.

Sporobolus contractus Hitchc., RM specimen annotated to S. cryptandrus.

Stipa arida Jones, reported in Phillips et al. (1987), GRCA specimen annotated elsewhere.

Vulpia octoflora (Walter) Rydberg, GRCA specimen annotated to Festuca ovina.