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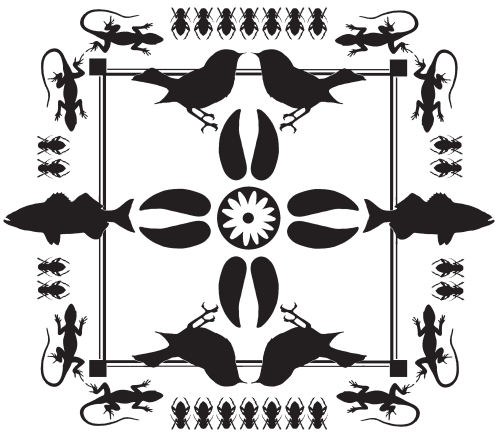
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Checklist of the vascular flora of the Kaibab Plateau, Coconino County, Arizona

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Abstract.—Seven hundred and ninety-two vascular plant taxa were documented for the Kaibab Plateau through a review of herbarium records (primarily online) and targeted fieldwork focusing on springs, natural ponds, cattle tanks, and sinkholes. Taxa not previously published or currently recorded on SEINet for the Kaibab Plateau include 7 taxa for Grand Canyon National Park, 4 taxa for the Kaibab National Forest, 51 taxa for the Kaibab Plateau, 6 taxa for Coconino County, and 5 taxa for the state of Arizona. Two hundred and thirty previously published records or records on SEINet were eliminated from the flora area by reviewing specimens that were either misidentified or mismapped.

Resumen.—Se documentaron setecientos noventa y dos plantas vasculares en la Meseta de Kaibab a través de una revisión de los registros herbarios (principalmente en línea) y trabajo de campo enfocado a manantiales, estanques naturales, tanques de ganado y sumideros de agua. El estudio del taxón no previamente publicado o actualmente en el portal en línea de SEINet en la Meseta de Kaibab incluye 7 taxones del Parque Nacional del Gran Cañón, 4 taxones del Bosque Nacional Kaibab, 51 taxones de la Meseta de Kaibab, 6 taxones del Condado de Coconino y 5 del Estado de Arizona. Se eliminaron doscientos treinta registros o registros publicados en SEINet del área de la flora ya sea porque fueron mal identificados o mal ubicados.

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).

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Fig. 1. Map showing the vicinity of the Kaibab Plateau and the area studied.

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 km (60 mi) by 55 km (35 mi) and 2980 km^2 (1152 mi^2), our study area is ca. 1880 km^2 (725 mi^2).

The northern two-thirds (ca. 1450 km^2 [560 mi^2]) of our study area is Kaibab National Forest (KNF) administered by the North Kaibab Ranger District (NKRD), while the southern third (ca. 430 km^2 [166 mi^2]) 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, Kanabownits Spring, King Arthur Castle, Little Park Lake, Point Imperial, Powell Plateau, Shiva Temple, Sowats Spring, Tapeats Amphitheater, Telephone Hill, Timp Point, Walhalla

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Fig. 2. Shaded relief map of the Kaibab Plateau, showing its sky island nature, with the higher elevations in white (more or less coincident with the study area) surrounded by lower elevations in brown. © Maphill/CC BY-ND. http://www.maphill.com/united-states/arizona/coconino-county/maps/physical-map/shaded-relief-outside

Plateau, and Warm Springs Canyon (USDA 2014b).

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, Kanabownits 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*

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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-QWFssMTFXeXplSW1ZOXc), 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*		AZ	F1	
Apiacaeae	*Aletes macdougalii* subsp. *breviradiatus*	GRCA	AZ		
Apiacaeae	*Pteryxia petraea*	GRCA	AZ		
Asclepiadaceae	*Asclepias hallii*				
Asteraceae	*Hymenoxys subintegra*	GRCA			
Asteraceae	*Dieteria bigelovii* var. *mucronata*	GRCA			
Boraginaceae	*Phacelia filiformis*	GRCA			
Brassicaceae	*Boechera gracilipes*	GRCA			
Brassicaceae	*Draba asprella* var. *kaibabensis**	GRCA			Fletcher 1978b
Brassicaceae	*Draba asprella* var. *stelligera*	GRCA		F1	Fletcher 1978b
Brassicaceae	*Draba rectifructa*			F1	
Brassicaceae	*Physaria arizonica*			F2	
Brassicaceae	*Physaria kingii* subsp. *kaibabensis**		AZ	F1	Fletcher 1987; Phillips III 1992c–k, 1993a–f; Rink 2016; Spence 2006, 2007
Cactaceae	*Coryphantha missouriensis*		AZ		
Cactaceae	*Pediocactus paradinei**		AZ	F1	Frye 1996a–b, 2011; Galeano 1985; Laurenzi and Warren 1988; Phillips 1993b, 2005b; Phillips et al. 1996; Phillips III 1992–1994; Shaw 1999; Warren et al. 1992a, 1992b
Caryophyllaceae	*Paronychia sessiliflora*	GRCA	AZ		
Caryophyllaceae	*Silene rectiramea**	GRCA	AZ		
Cyperaceae	*Carex oreocharis*			F1	
Ericaceae	*Phyllodoce empetriformis*	GRCA	AZ		
Fabaceae	*Astraglus amphioxys* var. *modestus*			F0	
Fabaceae	*Astraglus cremnophylax**	GRCA	AZ		Phillips III et al. 1981, 1982, 2001; Spence 2007
Fabaceae	*Astraglus humistratus* var. *tenerrimus*			F3	
Fabaceae	*Astraglus lentiginosus* var. *oropedii*			FP	

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Table 1. Continued

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

*Seven taxa marked with an asterisk are endemic to the KP and its immediate environs.

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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* (beardtongue), *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* (ninebark). 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 *Ericameria* 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), *Calamograstis scopulorum* (ditch reedgrass), *Aletes macdougalii* (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

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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

There is no direct evidence for the existence 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.

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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 manyfold 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 Kanabownits 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 Monument and the KNF. An act of Congress created GRCA in 1919, then transferred some KNF lands to the park in 1927 (Anderson 2000). The KNF plan (USDA 2014b) describes Frank's Lake Geologic Botanic Area (Warren 1991a, 1991b) and the *Pediocactus paradinei* Conservation Area.

Civilian Conservation Corps

The Civilian Conservation Corps (CCC) arrived in 1933. Two hundred CCC men first camped at Neal Spring for 6 weeks, later moving to the vicinity of the present-day North Rim Campground, where they remained for 5 seasons before moving to CC Hill for another 2 seasons. They developed Greenland Lake and perhaps Hades Lake and 16 springs including Thompson, Greenland, possibly Tipover, and others we visited during our fieldwork. They also built the northern boundary fence (presently out of service), Tiyo Point Road, and Kanabownits Lookout Tower, as well as removed thistles (probably native thistles since exotic thistles are rare within the park at present and were probably nonexistent then; Audretsch 2011).

Deer Irruption of the 1920s

Lessons in habitat carrying capacity and the role of predators were learned by land managers as events unfolded during a period of misguided management in the early 1900s (Leopold 1943, Freeman 1983, Dunlap 1988). Managers prohibited deer hunting with the creation of the Game Preserve in 1906, when the deer herd was estimated at 4000 animals (Rasmussen 1941). The government employed hunters to kill predators (Mann and Locke 1931), killing 816 mountain lions, 30 wolves, 7388 coyotes, and 863 bobcats (Rasmussen 1941) between 1906 and 1939. Deer numbers irrupted in the 1920s, with herd size estimated at 100,000 by 1924 (Rasmussen 1941). The deer stripped the land of vegetation, severely damaging the habitat and limiting its carrying capacity, causing deer to die by the thousands from malnutrition and disease. In response, managers implemented various schemes to reduce the deer herd, including an unsuccessful attempt by 125 herders to move deer south through the Grand Canyon across the Colorado River to the South Rim (Mann and Locke 1931). Government hunters killed 1124 deer over 10 days in December 1928 (Hodgin 1962).

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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 irruption 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* (varileaf phacelia), *Geranium* spp. (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 Spring 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

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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 plant-collecting 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.

Rare plant work is cited in Table 1.

METHODS

We compiled records of thousands of KP specimens from SEINet that are curated in

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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	KNF, 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

regional herbaria including Northern Arizona University (ASC), University of Arizona (ARIZ), Arizona State University (ASU), Desert Botanical Garden (DES), Grand Canyon National Park (GRCA), Museum of Northern Arizona (MNA), New York Botanical Garden (NY), Pacific Union College (PAC), University of Wyoming (RM), and Tonto National Forest (USFS–TEUI). We also searched smaller herbaria within Arizona that are not on SEINet, including Northern Arizona University at Yuma and the Cochise College Herbarium. We reviewed every specimen vouchered in Appendix 1, and many where specimen determinations were suspect (due to their being the only record on the KP, well outside their known range, or in taxonomically difficult groups).

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 (Barneby 1964), and *The Cruciferae of Continental North America* (Rollins 1993). The *Manual of Cultivated Plants* (Bailey 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),

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Table 3. Numbers of new records and numbers of those records that are nonnative for various jurisdictions within this project area.

Jurisdiction	New native records	New nonnative records
Arizona	4	—
Coconino County	9	1
Kaibab National Forest	10	3
Grand Canyon National Park	12	1
Kaibab Plateau	68	10

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 databased, 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, Fawn, 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.

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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 knowledgable 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.

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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 for species 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 Kiabab 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 Kiabab 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 vouchered 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, Robber'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 & Haufler, nKP, N, 1, G, Neal Spring, 2390 m, *Rink 6566*, ASC. Determination by Windham.

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

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

Woodsia 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 6559*, ASC.

Pellaea glabella Mett. ex Kuhn, N, 1, GK, 2440–2680 m, meadows, *Windham 264B*, ASC.

CONIFEROPHYTA

Cupressaceae

Juniperus communis Linnaeus, N, 4, GK, understory in subalpine forests, 2370–2750 m, *Rink 6478b*, 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.

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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. monophyla* 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) Silba. Kral (1993) does not accept varieties within *P. monophylla*.

Pinus ponderosa P. & C. Lawson, N, 5, GK, throughout except the highest subalpine forests, 2100–2650 m, *Hodgson 15928*, DES.

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

GNETOPHYTA

Equisetaceae

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

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

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

Equisetum laevigatum 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. *zschackii* (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 66973, RM.

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

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 & Clemants, N, 4, K, ponderosa pine forests, 2130–2600 m, *Hodgson 29145*, DES.

Kochia scoparia (Linnaeus) Schrad., E, 1, K, along Hwy. 89, other disturbed areas, 2290 m, *Rink 11643*, ASC.

Krascheninnikovia lanata (Pursh) A.D.J. Meeuse & Smit, N, 2, K, lower areas, 2165 m, *Mann M-93*, RM.

Monolepis nuttalliana (J.A. Schultes) Greene, N, 2, K, Jacob Reservoir, 2130 m, *Goodding 10-48*, ASC.

Salsola paulsenii Litv., E, 1, K, above Tater Springs, *Hodgson 29110*, DES.

Salsola tragus Linnaeus, E, 1, K, along Hwy. 89, 2290 m, *Rink 11644*, ASC.

Anacardiaceae

Rhus aromatica Aiton var. *trilobata* (Nuttall) Gray ex S. Wats., N, 3, K, low areas, 2170–2280 m, *Rink 11376*, ASC.

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Apiaceae

Aletes macdougalii 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 *Intermountain Flora* (Cronquist et al. 1997) interpretation that *C. douglasii* is not in AZ.

Cymopterus purpureus S. Watson, N, 1, G, north of Cape Royal, 2440 m, *Halvorson 167*, ASU.

Ligusticum porteri Coult. & Rose, N, 3, GK, subalpine forests, 2100–2700 m, *Rink 9944*, ASC.

Lomatium foeniculaceum (Nuttall) Coult. & Rose subsp. *macdougalii* (Coult. & Rose) Theobald, N, 3, GK, most common on the Walhalla Plateau, 2100–2470 m, *Rink 4197*, ASC.

Lomatium leptocarpum (Torr. & A. Gray) Coult. & Rose, N, 3, G, Walhalla Plateau, 2430–2530 m, *Rink 10626*, ASC.

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

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 McDougal in calling all of our material *P. parishii*, rather than *P. gairdneri*, based on ternate rather than pinnate leaves.

Pseudocymopterus montanus (A. Gray) Coult. & Rose (*Cymopterus lemmonii* (J.M. Coult. & Rose) Dorn), N, 2, GK, subalpine, 2330–2750 m, *Goodding 79-49*, ASC.

Pteryxia petraea (M.E. Jones) Coult. & Rose (*Cymopterus 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, K, pine forests, 2110 m, *Hodgson 15904*, DES.

Asclepias asperula (Decne.) Woodson subsp. *asperula*, N, 2, GK, mostly pine forest, 2130–2500 m, *Hodgson 11803*, DES.

Asclepias hallii A. Gray, N, 1, K, Moquitch Canyon, 2540 m, *Fertig 22188*, NY.

Asclepias latifolia (Torr.) Raf., nKP, N, 1, G, below the rim, 2290 m, *Rink 6196*, ASC.

Asclepias speciosa Linnaeus, nKP, N, 1, K, pine forest, 2440–2480 m, *Rink 11380*, ASC.

Asclepias subverticillata (A. Gray) Vail., N, 1, K, Big Springs Canyon and Pleasant Valley, 2100–2700 m, *Goodding 121-48*, ASC.

Asteraceae

Achillea millefolium Linnaeus var. *occidentalis* DC., N, 4, GK, throughout, 2100–2710 m, *Collom sn*, ASC.

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

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

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

Agoseris glauca (Pursh) Rafinesque, N, 2, GK, mostly subalpine meadows, 2140–2750 m, *Rink 8060*, ASC. Distinctions between varieties *dasycephala* and *glauca* appear blurred on the KP.

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

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

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

Ambrosia 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. *arida* distinguished by the presence of glands beneath the stem tomentum, which seem indiscernable.

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

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

Arctium 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. *pacifica* (Nuttall) H.M. Hall & Clements (*Artemisia pacifica*

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Nutt.), N, 3, GK, 2130–2660 m, *Rink 6408*, ASC.

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, 2140–2600 m, *Hodgson 11868*, 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, 2180–2470 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 eupatorioides (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, 2100–2660 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.

Centaurea stoebe Linnaeus subsp. *micranthos* (S.G. Gmelin ex Gugler) Hayek (*Centaurea 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 ericioides (Torr.) Nesom, nKP, N, 1, G, rim margins, 2380 m, *Rink 7970*, ASC.

Chrysothamnus depressus Nuttall, N, 2, GK, margins, 2180–2410 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*, N, 3, GK, throughout, 2180–2720 m, *Hodgson 2271*, DES.

Cirsium arizonicum (A. Gray) Petrak var. *bipinnatum* (Eastwood) D.J. Keil (*Cirsium nidulum* (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*.

Conyza 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 bigelovii (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. bigelovii* (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 *Dietaria canescens*.

Dieteria canescens (Pursh) Nuttall var. *ambigua* (B.L. Turner) D.R. Morgan & R.L. Hartman (*Machaeranthera canescens* (Pursh) A. Gray var. *ambigua* 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) Reveal & 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

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ssp. *nevadensis* (A. Gray) H.M. Hall & Clem., *Chrysothamnus parryi* (A. Gray) Greene var. *nevadensis* (A. Gray) Kittell), N, 4, GK, throughout, 2110–2700 m, *Hodgson 5904*, DES.

Erigeron canus A. Gray, N, 2, K, pine forest, 2180–2490 m, *McMaster 222*, ASC.

Erigeron concinnus (Hook. & Arn.) Torr. & A. Gray var. *concinnus*, N, 1, GK, Little Park Lake & DeMotte Park, 2140–2680 m, *Rink 6220*, ASC.

Erigeron divergens Torr. & A. Gray., N, 4, GK, 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 (Lindl.) DC., N, 4, GK, throughout, 2150–2750 m, *Rink 6177*, ASC. See note with *E. vreelandii*.

Erigeron tracyi D.C. Eat., N, 2, K, 2530–2670 m, *Braem sn*, ASC. Determination by Nesom.

Erigeron vreelandii Greene, N, 2, GK, throughout, 2300–2600 m, *Fowler 4731*, RMRS. *E. speciosus* and *E. vreelandii* seem to intergrade on the KP.

Gaillardia pinnatifida Torr., N, 1, K, Big Springs, 2130 m, *Mann 39*, RM.

Gaillardia pulchella Foug., H, 1, K, along Hwy. 67, 2520 m, *Rink 12190*, ASC.

Gnaphalium exilifolium A. Nelson, N, 3, GK, more common at higher elevations, 2280–2720 m, *Rink 11489*, ASC.

Grindelia squarrosa (Pursh) Dunal var. *serrulata* (Rydberg) Steyermark, N, 4, K, weedy places, 2080–2350 m, *Rink 11612*, ASC.

Gutierrezia microcephala (DC.) A. Gray, N, 1, G, BA Pt., 2440 m, *Collom sn*, GRCA.

Gutierrezia sarothrae (Pursh) Britt. & Rusby, N, 4, GK, throughout, 2100–2710 m, *Rink 10877*, ASC.

Helianthella parryi A. Gray, N, 1, K, Warm Springs, *Petit 120*, RMRS. This specimen could be a diminutive individual of *H. quinquenervis*.

Helianthella quinquenervis (Hook.) A. Gray, N, 2, GK, throughout, 2230–2680 m, *Goodding 333-48*, ASC.

Helianthus annuus Linnaeus, N, 2, K, roadside, 2060–2130 m, *Goodding 262-48*, ASC. Many specimens previously determined as *Helianthus annuus* are *Helianthella quinquenervis*.

Helianthus petiolaris Nuttall, N, 1, K, roadside, 2060 m, *Rink 11650*, ASC.

Heliomeris multiflora Nuttall var. *multiflora*, N, 2, GK, throughout, 2100–2710 m, *Goodding 47-48*, ARIZ.

Heliomeris 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 8951*, 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 15935*, DES. See note with *H. v.* var. *minor*.

Heterotheca villosa (Pursh) Shinners var. *pedunculata* (Greene) Harms ex Semple, N, 2, GK, throughout, 2454–2670 m, *Rink 7522*, ASC. See note with *H. v.* var. *minor*.

Heterotheca villosa (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.

Hymenopappus filifolius Hooker var. *lugens* Hooker, N, 2, GK, throughout, 2130–2440 m, *Rink 4843*, DES.

Hymenopappus filifolius Hooker var. *nanus* (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* (Rydb) 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.

Isocoma pluriflora (Torrey & A. Gray) Greene (*Haplopappus heterophyllus* (A. Gray) S.F. Blake; *H. pluriflorus* (Torrey & A. Gray) H.M. Hall; *Isocoma wrightii* (A. Gray) Rydberg), N, 1, G, Robber's Roost, 2515 m, *Collom sn*, GRCA.

Isocoma rusbyi Greene, N, 1, G, Timp Point, 2130 m, *Goodding 495-48*, ARIZ.

Iva axillaris Nuttall, N, 2, K, weedy places, 2270–2450 m, *Rink 9951*, ASC.

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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 discoidea 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 (*Lactuca pulchella* (Pursh) de Candolle; *L. tatarica* (Linnaeus) C.A. Meyer subsp. *pulchella* (Pursh) Stebbins), N, 1, GK, throughout, 2320–2680 m, *Rink 6503*, ASC.

Oreochrysum parryi (A. Gray) Rydberg (*Haplopappus parryi* A. Gray, *Solidago parryi* (A. Gray) Greene), N, 2, GK, throughout, 2470–2760 m, *Rink 10056*, ASC.

Packera multilobata (Torr. & A. Gray ex A. Gray) W.A. Weber & Á. Löve (*Senecio multilobata* (Torrey & A. Gray) W.A. Weber & Á. Löve), N, 4, GK, throughout, 2070–2720 m, *Rink 7936b*, ASC.

Packera neomexicana (A. Gray) W.A. Weber & Á. Löve (*Senecio neomexicana* (A. Gray) W.A. Weber & Á. Löve), N, 2, GK, forests, 2500–2680 m, *Rink 7668*, ASC.

Packera werneriifolia (A. Gray) W.A. Weber & Á. Löve (*Senecio werneriifolia* (A. Gray) A. Gray), N, 2, GK, mostly meadows, 2410–2760 m, *Hodgson 2249*, DES.

Perityle congesta (M.E. Jones) Shinners, N, 2, G, rim edges on limestone cliffs, 2130–2380 m, *Hodgson 6825*, ASU.

Perityle gracilis (M.E. Jones) Rydberg, N, 1, K, Nail Canyon, 2130 m, *Jones 6050e*, POM29980. This is the holotype.

Petradoria pumila (Nuttall) Greene var. *graminea* (Woot. & Standl.) S.L. Welsh, N, 4, GK, throughout, 2050–2590 m, *Hodgson 28761*, DES.

Petradoria pumila (Nuttall) Greene var. *pumila*, N, 2, GK, throughout, 2050–2360 m, *Hodgson 2594*, NY.

Pleiacanthus spinosus (Nuttall) Rydberg (*Lygodesmia spinosa* Nuttall, *Stephanomeria spinosa* (Nuttall) Tomb), N, 2, K, pine forests, 2140–2550 m, *Rink 7872*, ASC.

Pseudognaphalium macounii (Greene) Kartesz, N, 4, GK, disturbed areas, 2130–2730 m, *Rink 7943*, ASC.

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–TEUI.

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, 2380 m, *Collom 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.) Reveal & 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 hesperius* A. Gray, *A. lanceolatus* Willdenow

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subsp. *hesperius* (A. Gray) Semple & Chmielewski, *Symphyotrichum hesperium* (A. Gray) Á. Löve and 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.

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

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

Tetraneuris ivesiana Greene, N, 1, K, East Rim View, 2560–2680 m, *Hodgson 7357*, DES.

Thelesperma subnudum A. Gray, nKP, N, 1, K, east side, 2160 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 (Linnaeus) 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, GK, probably more widespread, 2380–2500 m, *Rink 10893*, 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

(includes Hydrophyllaceae)

Cryptantha cinerea (Greene) Cronquist var. *abortiva* (Greene) Cronquist, N, 2, GK, rim edges, lower slopes and rocky slopes within the canyon, 2180–2500 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, 2180–2710 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 incisum Lehm., N, 2, K, lower areas, 2160–2300 m, *Schaack 1229*, ASC.

Lithospermum multiflorum Torr. ex A. Gray, N, 3, GK, throughout, 2100–2680 m, *Rink 7941*, ASC.

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

Mertensia macdougalii Heller, N, 1, GK, 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, 2270–2630 m, *Rink 8879*, ASC.

Arabis hirsuta (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) Á. Löve & D. Löve (*Arabis divaricarpa* A. Nelson), N, 1, GK, 2500–2670 m, *Rink 6472*, ASC.

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Boechera fendleri (S. Watson) W.A. Weber (*A. fendleri* (S. Watson) Greene), N, 2, GK, pine forests, 2130–2650 m, *Rink 9896*, ASC.

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

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

Boechera perennans (S. Watson) W.A. Weber (*Arabis perennans* S. Watson), N, 1, GK, pine forests, 2130–2650 m, *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, 2330–2770 m, *Rink 6210*, ASC.

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

Cardaria draba (Linnaeus) Desv., nKP, E, 1, K, Castle Springs, 2230 m, *Rink 11307*, ASC.

Caulanthus crassicaulis (Torr.) S. Watson, N, 1, GK, plateau margins, 2000–2300 m, *Rink 4502*, GRCA.

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

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

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

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

Descurainia pinnata (Walter) Britt. subsp. *ochroleuca* (Wooton) Detling, N, 2, GK, pine forest, 2130–2590 m, *Hodgson 29095*, DES.

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

Draba asprella Greene var. *asprella*, N, 1, G, Walhalla Plateau, 2340–2530 m, *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, 2190–2650 m, *Hodgson 15345*, DES.

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

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

Erysimum capitatum (Douglas ex Hook.) Greene var. *purshii* (Durand) Rollins, N, 3, GK, throughout, 2130–2730 m, *Deaver 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 inconspicuum (S. Watson) MacMill., nKP, N, 1, K, pine forest, 2400 m, *Rink 12183*, ASC.

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

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

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

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

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

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

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

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

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

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

Physaria intermedia (S. Watson) O'Kane & Al-Shehbaz (*Lesquerella intermedia* (S. Watson) Heller), N, 1, K, pine forests, 2130 m, *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, 2480–2690 m, *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, 2270–2380 m, *Go200-49*, ASC.

Physaria rectipes (Woot. & Standl.) O'Kane & Al-Shehbaz (*Lesquerella rectipes* Woot. & Standl.), N, 1, G, plateau margins, 2100–2270 m, *Hodgson 29094*, DES.

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

Rorippa palustris (Linnaeus) Besser, N, 1, K, Crane Lake, 2590 m, *Oxford 655*, ASU. Determination by Andrew Salywon, Arizona State Brassicaceae expert. This specimen has wavy margined leaves, which is not an attribute of *R. palustris*; it could be an undescribed taxon.

Rorippa sphaerocarpa (A. Gray) Britt., N, 1, K, Warm Springs Lake, 2350–2690 m, *Rink 11665*, ASC.

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Rorippa sylvestris (Linnaeus) Bess., E, 1, K, lakeshores, 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 8881*, ASC.

Thlaspi arvense Linnaeus, E, 1, K, Castle Springs/Ryan, 1900–2230 m, *Rink 11297*, ASC.

Turritis glabra Linnaeus (*Arabis glabra* (Linnaeus) Bernh.), N, 2, GK, wet places, 2100–2740 m, *Rink 6582*, ASC.

Cactaceae

Coryphantha missouriensis (Sweet) Britt. & Rose, N, 1, K, 5 miles north of Jacob Lake, 2180 m, *Cazier B[1]*, ASC.

Coryphantha vivipara (Nuttall) Britt. & Rose, N, 2, GK, fringes, mostly Walhalla Plateau, 2220–2450 m, *Hodgson 26233*, DES.

Echinocereus coccineus Engelm. subsp. *concinnus*, N, 1, GK, fringes, mostly Walhalla Plateau, 2220–2560 m, *Hodgson 26247*, DES.

Echinocereus mojavensis (L.D. Benson) Parfitt, N, 2, GK, fringes, mostly Walhalla Plateau, 2100–2570 m, *Hodgson 26226*, DES.

Opuntia fragilis (Nuttall) Haw., nKP, N, 1, K, Moquitch Spring, 2170 m, *Rink 11373*, ASC. Some plants appear to be hybrids between *O. fragilis* and perhaps *O. pinkavae* or *O. polyacantha*, *Hodgson 26225*, DES.

Opuntia macrorhiza Engelm., N, 1, GK, plateau margins, 2100–2340 m, *Butterfield 562*, ASU.

Opuntia phaeacantha Engelm., N, 2, GK, plateau margins, 2100–2430 m, *Hodgson 7330*, DES.

Opuntia pinkavae B.D. Parfitt, N, 2, GK, plateau margins, 2100–2410 m, *Hodgson 26228*, DES. See note with *O. fragilis*.

Opuntia polyacantha Haw. var. *erinacea* (Engelm. & J.M. Bigelow) B.D. Parfitt, N, 1, G, Walhalla Plateau, Pt. Sublime, 2290–2560 m, *Hodgson 26231*, DES. See note with *O. fragilis*.

Pediocactus paradinei B.W. Benson, N, 1, K, east side, 2100–2200 m, *Hodgson 29060*, DES.

Campanulaceae

Campanula parryi A. Gray, N, 2, GK, meadows, 2400–2750 m, *Goodding 362-48*, ASC.

Cannabaceae

Humulus lupulus Linnaeus var. *lupuloides* E. Small., N, 2, GK, canyons/mesic areas, 2130–2670 m, *Goodding 155-48*, ARIZ.

Caprifoliaceae

(includes Linneaceae, Valerianaceae)

Linnaea borealis Linnaeus, N, 2, GK, shaded subalpine forests, 2440–2660 m, *Goodding 182-48*, ASC.

Lonicera arizonica Rehd., nKP, N, 2, GK, shaded forests, 2320–2650 m, *Rink 7507*, ASC.

Symphoricarpos oreophilus A. Gray, N, 2, GK, throughout, 2130–2710 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 exsertion, 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 acutiloba Rydberg, nKP, N, 1, GK, 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* Rydb.), 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.

Paronychia 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)

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C.L. Hitchcock & Maguire occurs in Arizona. This variety is characterized by having nodding inflorescences; our KP specimens have erect inflorescences.

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

Spergularia rubra (Linnaeus) J. 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 gonomischa* Boivin.), N, 2, GK, open areas, 2470–2750 m, *Rink 7541*, ASC.

Celastraceae

Paxistima myrsinites (Pursh) Raf., N, 3, GK, throughout, 2110–2590 m, *Rink 4200*, ASC.

Cleomaceae

Peritoma serrulata (Pursh) DC. (*Cleome serrulata* Pursh), N, 1 K, Jacob Reservoir, 2130 m, *Goodding 8748*, ASC.

Convolvulaceae

Convolvulus 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 Parry, N, 2, GK, rim edges, 2130–2360 m, *Hodgson 25732*, ASU.

Elatinaceae

Elatine triandra Schkuhr., N, 1, K, Crane Lake, 2590 m, *Smith 653*, ASU.

Ericaceae

(includes Pyrolaceae)

Arctostaphylos patula Greene, N, 2, GK, dry forests, 2440–2680 m, *Hodgson 14771*, ASC.

Arctostaphylos pungens Kunth, N, 2, GK, 2130–2300 m, *Hodgson 6284*, DES.

Chimaphila umbellata (Linnaeus) W. Bart., N, 2, G, mixed conifer forest, 2500–2740 m, *Rink 6171*, ASC.

Orthilia secunda (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.) Woot. & 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. palmeri* 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 diminuitive form suggestive of *A. cremnophyllax* Barneby.

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

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

Astragalus humistratus A. Gray var. *humivagans* (Rydberg) 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* (Rydberg) 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

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ex Hook. var. *albiflorus* (Gray) Shoener)., nKP, N, 1, GK, Cliff Spring and La Fevre Ridge, 2220–2320 m, *Rink 6197*, ASC.

Astragalus lentiginosus Douglas ex Hooker var. *oropedii* Barneby, N, 1, GK, 2160–2470 m, *Rink 9942*, ASC.

Astragalus miser Dougl. var. *oblongifolius* (Rydberg) Cronquist, N, 2, GK, meadow edges and sparse subalpine forests, 2280–2750 m, *Goodding 244-48*, ARIZ. Reaches the southern extent of its range on the KP.

Astragalus oophorus S. Watson var. *caulescens* (M.E. Jones) M.E. Jones., N, 1, GK, Cliff Spring, Moquitch Spring, 2120–2500 m, *Rink 11372*, ASC.

Astragalus subcinereus Nuttall, N, 3, GK, throughout, 2130–2690 m, *Rink 6383*, ASC.

Cercis occidentalis Torr. ex A. Gray var *orbiculata* (Greene) Tidestrom, N, 2, G, within the canyon, 2190–2270 m, *Hodgson 6258*, DES.

Dalea candida Michx. ex Willd. var. *oligophylla* (Torr.) Shinners, N, 2, GK, northern margins, 2130–2440 m, *Rink 12166*, ASC.

Lathyrus laetivirens Greene ex Rydberg, N, 2, GK, rim edges, 2300–2560 m, *Hodgson 20305*, DES.

Lotus corniculatus Linnaeus, E, 2, GK, at lakes and along roadways, 2390–2680 m, *Rink 9924*, ASC.

Lotus utahensis Ottley, N, 3, GK, throughout, 2130–2680 m, *Rink 4516*, ASC.

Lotus wrightii (A. Gray) Greene, N, 3, GK, throughout, 2100–2690 m, *Rink 11585*, ASC.

Lupinus argenteus Pursh subsp. *argenteus*, N, 3, GK, throughout, 2130–2560 m, *Hodgson 2301*, DES.

Lupinus barbiger S. Wats. (*Lupinus sericeus* Pursh var. *barbiger* (S. Watson) S.L. Welsh), N, 3, GK, throughout, 2280–2690 m, *Goodding 319-48*, ASC.

Lupinus hillii Greene var. *hillii* (*Lupinus argenteus* Pursh var. *hillii* (Greene) Barneby, *L. h.* var. *osterhoutianus* (C.P. Sm.) Harmon), N, 3, GK, throughout, 2100–2750 m, *Goodwin 1089*, ASC.

Lupinus kingii S. Wats., N, 3, GK, throughout, 2130–2600 m, *Goodding 99-48*, ASC.

Lupinus palmeri S. Wats., N, 3, GK, throughout, 2330–2660 m, *Rink 11631*, ASC.

Medicago lupulina Linnaeus, E, 3, GK, throughout, 2130–2660 m, *Hodgson 14700*, DES.

Medicago sativa Linnaeus, E, 2, GK, throughout, 2100–2710 m, *Rink 8983*, ASC. Within GRCA, only known from Vista Encantada, an east rim viewpoint.

Melilotus officinalis (Linnaeus) Lam., E, 3, K, throughout, 2130–2750 m, *Rink 6580*, ASC.

Oxytropis oreophila A. Gray var. *oreophila*, N, 2, K, open areas, 2280–2700 m, *Goodding 324-48*, ASC.

Psoralidium tenuiflorum (Pursh) Rydberg, N, 2, K, 2300–2490 m, *Goodding 210-48*, ASC.

Robinia neomexicana A. Gray, N, 4, GK, throughout, 2130–2710 m, *Hodgson 15982*, DES.

Trifolium andinum Nuttall, N, 1, G, plateau margins, 2310–2440 m, *Collom sn*, ASC.

Trifolium gymnocarpon Nuttall, N, 2, K, Jacob Reservoir, 2380 m, *Rink 8911*, ASC.

Trifolium hybridum Linnaeus, E, 2, GK, lakes, 2440–2690 m, *Rink 10663*, ASC.

Trifolium longipes Nuttall, N, 3, GK, mostly meadows, 2440–2690 m, *Goodding 303-49*, ASC.

Trifolium pinetorum Greene, N, 3, GK, mostly meadows, 2420–2690 m, *Goodding 361-48*, ASC.

Trifolium pratense Linnaeus, E, 1, K, south of Jacob Lake, 2560 m, *Sanders 7332*, UCR.

Trifolium repens Linnaeus, E, 3, GK, 2470–2710 m, *Hodgson 14728*, DES.

Fagaceae

Quercus arizonica Sarg., N, 1, G, Tiyo Point, 2370 m, *J. & C. Merkle 752*, GRCA.

Quercus gambelii Nuttall, N, 5, GK, throughout, 2160–2750 m, *Hodgson 5906*, DES.

Quercus turbinella Greene, N, 4, GK, slopes below rim, 2130 m, *Goodding 493-48*, ASC.

Quercus ×*pauciloba*, N, 2, G, below rim, 2270 m, *Hodgson 6263*, DES.

Garryaceae

Garrya flavescens S. Watson, N, 2, GK, below rims, 2130–2440 m, *Rink 7961*, ASC.

Gentianaceae

Frasera speciosa Dougl. ex Griseb., N, 2, GK, throughout, 2290–2750 m, *Goodding 241-48*, ASC.

Gentiana parryi Engelm., N, 2, GK, subalpine meadows, 2440–2760 m, *Hodgson 14864*, DES.

Gentianella amarella (Linnaeus) Boerner, N, 3, GK, throughout, 2270–2710 m, *Ri8048*, ASC. Varieties of *Gentianella amarella* on the KP are blurred, with individual plants exhibiting characteristics of both varieties *acuta* and *heterosepala*.

Geraniaceae

Erodium cicutarium (Linnaeus) L'Her. ex Ait., E, 1, GK, Big Springs RS/Kaibab Trail, 2130 m, *Hodgson 15924*, DES.

Geranium caespitosum James, N, 3, GK, throughout, 2130–2720 m, *Rink 7570*, ASC. Varieties of *Geranium caespitosum* are distinguished by glandular vestiture and appear to not be significant on the KP. See note under *Geranium richardsonii*.

Geranium richardsonii Fisch. & Trautv., N, 3, GK, throughout, 2130–2750 m, *Goodding 376-48*, ASC. In the *Intermountain Flora*, *Geranium caespitosum* and *G. richardsonii* are distinguished largely based on leaf size, shape of the leaf divisions, length of the sepal awns and often habitat (mesic vs. dry). I see complete gradation of these characters on the KP. One

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end of the spectrum is occupied by plants short in stature, with bunched stems, short sepal awns, strongly glandular sepals, 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 sepals, or with fewer glands on the sepals, and white flowers. These plants, botanists have usually called *G. cespitosum*.

Grossulariaceae

Ribes cereum Douglas var. *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 sn*, 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 61-48*, ARIZ.

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

Ribes viscosissimum 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. wrightii* (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 5887*, ASC.

Hypericaceae

Hypericum anagalloides Cham. & Schlecht., N, 2, GK, pond margins and other wet areas, 2440–2650 m, *Rink 6606*, ASC.

Hypericum scouleri 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 8802*, 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 aristatum 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 lewisii Pursh, N, 2, GK, throughout, 2100–2730 m, *Rink 7998*, ASC.

Linum puberulum (Engelm.) Heller, N, 1, K, 2290–2480 m, *Rink 11626*, ASC.

Loasaceae

Mentzelia laevicaulis Torr. & A. Gray var. *laevicaulis*, E*, 1, G, CC Hill 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, *Aven Nelson 2807*, 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 rusbyi Woot. (*M. nuda* (Pursh) Greene var. *rusbyi* (Woot.) Harrington), N, 2, GK, Big Springs and Warm Springs canyons, Pt. Sublime, 2130–2350 m, *Goodding 122-48*, ASC.

Malvaceae

Alcea rosea Linnaeus, nKP, E, 1, K, Big Springs, 2110 m, *Rink 12252*, 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.

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Montia chamissoi (Ledeb. ex Spreng.) Greene, nKP, N, 1, G, Robber's Roost and Milk Springs, 2510–2530 m, *Rink 7690*, ASC.

Phemeranthus 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, 2130–2580 m, *Rink 7884*, ASC.

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

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

Oleaceae

Fraxinus cuspidata Torr. subsp. *macropetala* (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 6353*, ASC.

Epilobium halleanum 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.

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

Gayophytum diffusum Torr. & A. Gray subsp. *parviflorum* F.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, GK, 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, *Goodding 132-48*, 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 Dougl. 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.

Orthocarpus luteus Nuttall, N, 3, GK, meadows, 2200–2760 m, *Rink 6445*, ASC.

Orthocarpus 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) Shinners, 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 (*Mimulus guttatus* DC.), N, 1, K, North Canyon, 2290 m, *Conway sn*, ASC.

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

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

Erythranthe suksdorfii (A. Gray) N.S. Fraga (*Mimulus 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*.

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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, *Conway 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 linarioides A. Gray var. *sileri* A. Gray, N, 3, GK, throughout, 2100–2490 m, *Rink 7910*, 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 Kellogg, N, 3, GK, rim edges, 2130–2690 m, *Rink 7909*, 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 Benth., 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, 2280–2660 m, *Goodding 249-48*, ASC.

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

Veronica americana Schwein. ex Benth., 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 6352*, 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, 2370–2560 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, 2370–2560 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* Benth., misapplied), N, 3, GK, meadows and rims, 2150–2720 m, *Rink 8090*, ASC.

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Eriogonum cernuum Nuttall, N, 2, K, plateau margins, 2100–2200 m, *Hodgson H 2505*, DES.

Eriogonum corymbosum Benth. 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. *argense* (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, *Goodding 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 (*Polygonum convolvulus* Linnaeus), E, 1, K, Oak and Warm Springs Canyons, 2120 m, *Goodding 46-48*, ASC.

Persicaria amphibia (Linnaeus) A. Gray, N, 2, GK, pond emergent, 2270–2650 m, *Rink 8076*, ASC.

Persicaria lapathifolia (Linnaeus) A. Gray, nKP, N, 1, K, Warm Springs Lake, 2350 m, *Rink 11610*, ASC.

Polygonum aviculare Linnaeus, E, 3, GK, mostly open areas, 2100–2600 m, *Rink 8032*, ASC.

Polygonum douglasii Greene, N, 2, GK, mostly meadows, 2310–2710 m, *Goodding 236-48*, ASC.

Polygonum polygaloides Meisn. subsp. *kelloggii* (Greene) Hickman, N, 2, GK, meadows, 2410–2750 m, *Rink 6165*, ASC.

Polygonum sawatchense Small subsp. *sawatchense*, N, 3, GK, throughout, 2130–2650 m, *Goodding 22-48*, ASC.

Rumex acetosella Linnaeus, E, 2, GK, meadows and ponds, 2510–2720 m, *Hodgson 14854*, DES.

Rumex crispus Linnaeus, nKP, E, 2, GK, springs and ponds, 2340–2580 m, *Goodding 82-48*, ASC.

Rumex patientia Linnaeus, E, 1, K, along AZ 67, 2500 m, *Nelson 66834*, RMRS.

Rumex salicifolius Weinm., N, 2, GK, meadows and ponds, 2270–2530 m, *Rink 11456*, ASC.

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

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

Portulacaceae

Portulaca oleracea Linnaeus, N, 1, K, plateau margins, 2140–2280 m, *Hodgson 28803*, 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* (Rydb.) 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. hunnewellii* 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 coerulea E. James, N, 2, GK, throughout, 2560–2640 m, *Goodding 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, *Hawbecker sn*, GRCA.

Caltha leptosepala DC., N, 1, K, V.T. Park, 2660–2680 m, *Rink 10615*, ASC.

Ceratocephala testiculata (Crantz) Roth (*Ranunculus testiculatus* Crantz), 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 4847*, ASC.

Clematis hirsutissima Pursh var. *hirsutissima*, N, 1, GK, Pleasant Valley and near Basin Spring, 2480–2630 m, *Hodgson 18545*, DES.

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Clematis ligusticifolia Nuttall, N, 2, GK, mesic areas, 2130–2500 m, *Rink 6544*, ASC.

Delphinium nuttallianum Pritz. ex Walp., N, 2, GK, throughout, 2310–2680 m, *Rink 7109*, ASC.

Myosurus apetalus Gay var. *montanus* (G.R. Campbell) Whittemore, 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 Pursh., 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 7659*, ASC.

Thalictrum fendleri Engelm. 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 Mociño 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 6289*, DES. Introgresses with *C. ledifolius* on the KP.

Chamaebatiaria 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) Soják, *Potentilla glandulosa* Lindley subsp. *arizonica* (Rydberg) D.D. Keck, *P. macdougalii* 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.) Staudt L., N, 2, GK, throughout, 2470–2660 m, *Rink 7534*, ASC.

Geum macrophyllum Willd. var. *perincisum* (Rydberg) Raup, N, 1, GK, mesic areas, 2250–2320 m, *Rink 7905*, ASC.

Holodiscus dumosus (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, seepy cliffs below the rim, 2120–2530 m, *Rink 4500*, ASC.

Petrophytum caespitosum (Nuttall) Rydberg, N, 2, GK, cliffs, 2100–2320 m, *Hodgson 5885*, DES.

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

Potentilla bicrenata 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 Lehm., N, 3, GK, throughout, 2280–2750 m, *Rink 6433*, ASC. See note under *P. crinita*.

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

Potentilla pensylvanica Linnaeus, N, 1, K, *Ertter 2901*, NY.

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

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

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

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

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

Purshia stansburiana (Torr.) Henrickson, N, 4, GK, throughout, 2100–2440 m, *Hodgson 15890*, DES.

Purshia tridentata (Pursh) DC., H*, 1, K, Cooper Ridge, *McCulloch sn*, 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* (Rydberg) W.H. Lewis & Ertter, N, 3, GK, throughout, 2100–2710 m, *Rink 6547*, ASC.

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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, Greenland Lake, Walhalla Plateau, 2400–2620 m, *Rink 10696*, ASC.

Galium mexicanum Kunth., nKP, N, 1, G, Greenland Spring, 2470 m, *Rink 6592*, ASC.

Galium stellatum Kellogg, N, 1, G, Point Sublime, 2270 m, *Rink 8889*, ASC.

Galium trifidum Linnaeus var. *subbiflorum* (Wiegand) Piper (*G. t.* L. var. *pusillum* A. Gray, *G. tinctorium* (L.) Scop. var. *subbiflorum* (Wiegand) Fernald, *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*, ASC.

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, 2280–2320 m, *Hodgson 5893*, DES.

Salicaceae

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, *Hodgson 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 Orobanchaceae.)

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, throughout, 2100–2600 m, *Hodgson 15936*, DES.

Solanaceae

Nicotiana attenuata Torr. ex S. Watts. N, 2, K, plateau margins, piñon-juniper open woodland, 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.

Solanum jamesii Torr., N, 2, K, pine forests, 2130–2140 m, *Hodgson 28784*, DES.

Solanum nigrum Linnaeus, N, 1, GK, disturbed areas, pine forests, 2160–2590 m, *Rink 8955*, ASC.

Solanum 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.

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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, *Mathiason 7565*, ARIZ.

Arceuthobium divaricatum Engelm., N, 2, GK, parasitic on *Pinus edulis*, 2100–2270 m, *Nelson 66992*, 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 2006-30*, ASC.

Arceuthobium vaginatum (Willd.) J. Presl 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

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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 macropetalum 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, 2280–2760 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 misdeterminations.

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 curatorum 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 Mackenzie, N, 2, G, rim edges, 2300–2470 m, *Rink 10631*, DES. Probably more common than the three collections indicate.

Carex microptera Mackenzie, N, 2, GK, wet places throughout, 2310–2680 m, *Rink 6205*, 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, 2150–2800 m, *Goodding 49-48*, ARIZ.

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

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

Carex petasata 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, lakeshores, 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 vesicaria Linnaeus, N, 3, GK, common in lakes, shoreward from *C. utriculata*, 2520–2700 m, *Clifton 13535*, PUA.

Carex wootonii Mackenzie, 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.

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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.

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* (Rydberg) Snogerup, N, 2, G, ponds and springs, 2500–2510 m, *Rink 7617*, ASC.

Juncus bufonius Linnaeus, N, 1, G, Outlet Canyon, 2500 m, *Rink 10016*, GRCA.

Juncus confusus Coville, N, 3, GK, wet areas, 2370–2780 m, *Goodding 259-48*, ARIZ.

Juncus dudleyi Wieg., N, 2, G, springs, 2420–2560 m, *Collom sn*, GRCA.

Juncus interior Wieg., N, 2, G, wet areas, 2380–2590 m, *Rink 8865*, ASC.

Juncus longistylis Torr., N, 2, GK, springs and wet meadows, 2450–2670 m, *Rink 7643*, ASC.

Juncus nevadensis S. Watson, N, 2, GK, meadows, springs, lake margins, 2650–2780 m, *Goodding 216-48*, ASC.

Juncus saximontanus A. Nelson, N, 3, GK, springs, 2310–2670 m, *Rink 7709*, ASC.

Liliaceae

Calochortus ambiguus (M.E. Jones) Ownbey, N, 2, GK, pine forest, 2130–2500 m, *Rink 12763*, ASC.

Calochortus nuttallii Torr. & A. Gray, N, 2, GK, 2130–2560 m, *Christie 1485*, ASC.

Fritillaria atropurpurea Nuttall, N, 2, GK, mostly pine forests, 2100–2560 m, *Rink 7110*, GRCA.

Melanthiaceae

Anticlea elegans (Pursh) Rydberg (*Zigadenus elegans* Pursh), N, 2, GK, throughout, 2120–2680 m, *Rink 6473*, GRCA.

Zigadenus vaginatus (Rydberg) J.F. Macbr., N, 1, G, springs below the rim, 2100 m, *Rink 4873*, GRCA.

Orchidaceae

Calypso bulbosa (Linnaeas) Oakes var. *americana* (R. Brown) Luer, N, 1, G, forests, 2500–2750 m, *Rink 7881*, ASC.

Corallorrhiza maculata (Raf.) Raf., N, 2, GK, throughout, 2260–2630 m, *Rink 8036*, ASC.

Corallorrhiza striata Lindl., N, 1, GK, forests, 2100–2500 m, *Rink 4870*, ASC.

Corallorrhiza wisteriana Conrad, N, 1, K, Jacob Lake, 2700 m, *Holmgren 11157*, ASU.

Epipactis gigantea Dougl. ex Hook., N, 1, G, Cliff Spring, 2320 m, *Merkle 290*, GRCA.

Goodyera oblongifolia Raf., N, 2, GK, forests, 2100–2600 m, *Rink 10052*, ASC.

Platanthera sparsiflora (S. Watson) Schlechter, nKP, N, 2, G, springs and mesic places on the west side, 2120–2320 m, *Rink 7907*, ASC.

Spiranthes romanzoffiana Cham., N, 2, GK, wet meadows, 2430–2750 m, *Rink 6608*, ASC.

Poaceae

Achnatherum hymenoides (Roemer & J.A. Schultes) Barkworth (*Oryzopsis hymenoides* (Roem. & Schult.) Ricker ex Piper, *Stipa hymenoides* Roemer & Schultes), N, 1, GK, rim edges, 2080–2560 m, *Rink 7955*, ASC.

Achnatherum lettermanii (Vasey) Barkworth, N, 3, GK, throughout, 2100–2720 m, *Goodding 217-48*, ASU.

Achnatherum nelsonii (Scribn.) Barkworth subsp. *dorei* (Barkworth & J. Maze) Barkworth, N, 3, GK, throughout, 2300–2700 m, *Hodgson 14709*, DES.

Achnatherum nelsonii subsp. *nelsonii* (Scribn.) Barkworth, N, 3, GK, throughout, 2130–2700 m, *Rink 7607*, ASC.

Achnatherum perplexum Hoge and Barkworth, nC, N, 1, G, rim, 2510 m, *Rink 6394*, ASC.

Achnatherum speciosum (Trin. & Rupr.) Barkworth, nKP, N, 2, GK, rim edges, 2130–2500 m, *Rink 8873*, ASC.

Agropyron desertorum (Fisch. ex Link) J.A. Schultes, E, 2, K, throughout, 2100–2680 m, *Hodgson 15927*, DES.

Agrostis exarata Trin., N, 2, GK, throughout, 2190–2680 m, *Christie 1584*, ASC.

Agrostis gigantea Roth, E, 1, GK, meadows, probably more common than the few records would indicate, 2380–2660 m, *Goodding 213-48*, ASC.

Agrostis scabra Willd., N, 3, GK, throughout, 2280–2720 m, *Rink 6356*, ASC.

Agrostis stolonifera Linnaeus, N, 3, GK, throughout, 2370–2690 m, *Darrow 2918*, ARIZ.

Alopecurus aequalis Sobol. var. *aequalis*, N, 3, GK, lake margins, 2360–2680 m, *Rink 7582*, ASC.

Alopecurus geniculatus Linnaeus, N, 3, GK, lake margins, 2440–2680 m, *Rink 7684*, ASC.

Alopecurus pratensis Linnaeus, E, 1, K, near Mud Lake, 2470 m, *Higgins 25719*, Dixie College.

Andropogon hallii Hack., N, 1, G, unknown, 2377 m, *Seager sn*, GRCA.

Aristida purpurea Nuttall var. *fendleriana* (Steud.) Vasey, N, 1, K, Timp Point, 2130 m, *Goodding 498-48*, ASC.

Arrhenatherum elatius (Linnaeus) Beauv. ex J.& K. Presl, E, 1, K, Big Springs, 2130 m, *White sn*, MNA.

Avena fatua Linnaeus, E, 1, G, Greenland Lake, 2550 m, *Collum sn*, GRCA.

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Beckmannia syzigachne (Steud.) 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 catharticus Vahl, E, 1, K, Jacob Reservoir/below Tater Spring, 2130–2260 m, *Goodding 114-48*, ASC.

Bromus ciliatus Linnaeus, N, 3, GK, meadows, 2100–2720 m, *Rink 7599*, ASC. Minor differences in vestiture on glumes and lemmas separate *B. ciliatus*, *B. porteri*, and *B. richardsonii*. Perhaps they should be considered varieties.

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, Walhalla Plateau, *Sokolo sn*, GRCA.

Bromus polyanthus Scribn., N, 1, G, Kanabownits 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, *Goodding 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. *inexpansa* (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) Beauv., 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* (Scrib.) & 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, *Goodding 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 Shinners subsp. *trachycaulus*, N, 3, GK, throughout, 2130–2710 m, *Goodding 507-48*, ASC.

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

Elymus ×*pseudorepens* (Scribn. & J.G. Sm.) Barkworth & D.R. Dewey (*Agropyron vaillantianum* (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, *Goodding 246-48*, ARIZ. We cannot reliably discern *F. calligera* from *F. 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, *Tweiten 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 *F. calligera* from *F. saximontana*.

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Festuca sororia Piper, N, 1, K, North Canyon, *Goodding 370-48*, ASC.

Glyceria borealis (Nash) Batchelder, N, 4, GK, emergent in lakes, 2280–2690 m, *Goodding 250-48*, ASC.

Glyceria striata (Lam.) A.S. Hitchc., N, 2, GK, springs and meadows, 2400–2690 m, *Goodding 379-48*, 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*, DES.

Hordeum jubatum Linnaeus, N, 2, K, lakes, disturbed sites, 2350–2600 m, *Rink 11470*, ASC.

Hordeum murinum Linnaeus subsp. *glaucum* (Steud.) Tzelev, nKP, E, 1, K, Castle Springs, 2230 m, *Rink 11298*, MNA.

Koeleria macrantha (Ledeb.) 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 10075*, ASC.

Leymus salinus (M.E. Jones) Á. Löve (*Elymus salina* M.E. Jones), N, 1, GK, 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.

Lolium 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 curtifolia 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 Coult., 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, N, 1, K, pine forest, 2100–2380 m, *Boness sn*, USFS–TEUI.

Phleum alpinum Linnaeus, N, 2, GK, mostly in meadows, 2280–2780 m, *Rink 7645*, ASC.

Phleum pratense Linnaeus, E, 2, GK, mostly in meadows, 2200–2710 m, *Rink 7620*, ASC.

Piptatherum micranthum (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 palustris 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.

Polypogon 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 arundinaceus (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 8885*, 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 8068*, ASC.

Torreyochloa pallida (Torr.) Church var. *pauciflora* (J. Presl) J.I. Davis, nKP, N, 1, G, South fork of

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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 10086*, 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.

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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	Kanabownits Spring	wet	meadow
Lamb	−112.2529	36.69689	2350	Warm Springs Canyon	wet	meadow
Warm Springs	−112.2822	36.69016	2350	Warm Springs Canyon	wet	forested
Buck	−112.3016	36.70271	2350	Warm Springs Canyon	wet	meadow
Jacob Lake	−112.2290	36.706721	2400	Jacob Lake	wet	meadow
Corral	−112.2506	36.61774	2490	Telephone Hill	wet	meadow
Tiyo	−112.1124	36.24629	2518	Bright Angel	wet	forested
Three Lakes	−112.2217	36.63862	2520	Jacob Lake	wet	meadow
Fracas 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	2580	Telephone Hill	wet	meadow
Murray Lake	−112.1985	36.63444	2590	Jacob Lake	wet	meadow
Coffee	−112.1743	36.3116	2590	Kanabownits Spring	wet	forested
Greenland	−111.9904	36.24271	2591	Walhalla 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	36.32436	2652	Little Park Lake	wet	meadow
Deer	−112.1296	36.40205	2660	Demotte Park	wet	meadow
Glenn	−112.1807	36.56491	2660	Telephone Hill	wet	meadow
Lookout	−112.1866	36.46512	2667	Demotte Park	wet	meadow
Cougar	−112.1907	36.48276	2676	Demotte Park	wet	meadow
Dog Lake	−112.0896	36.42217	2680	Dog Point	wet	forested
Indian	−112.1138	36.32808	2688	Demotte Park	wet	meadow
V.T.	−112.1271	36.44592	2690	Demotte Park	wet	meadow
33	−112.2197	36.26679	2383	Kanabownits Spring	wet	meadow
34	−112.22652	36.266964	2427	Kanabownits Spring	dry	forested
52	−112.23006	36.320233	2460	Kanabownits Spring	dry	meadow
Gravel pit	−112.06340	36.225956	2487	Bright Angel	dry	meadow
35	−112.14519	36.260865	2522	Kanabownits Spring	dry	forested
36a	−112.14771	36.261824	2523	Kanabownits Spring	dry	forested
31	−112.18224	36.316208	2530	Kanabownits Spring	wet	meadow
38	−112.14327	36.261154	2530	Kanabownits Spring	dry	forested
14	−112.19454	36.3068	2545	Kanabownits Spring	dry	open

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Appendix 2. Continued

Lake	Easting	Nothing	Elevation (m)	Quad	Condition	Habitat
37	−112.14460	36.262304	2545	Kanabownits Spring	dry	forested
42	v112.05953	36.243706	2560	Bright Angel	dry	forested
15	−112.20459	36.340938	2560	Kanabownits Spring	dry	forested
71	−112.14957	36.297415	2560	Kanabownits Spring	dry	meadow
17	−112.22069	36.337547	2560	Kanabownits Spring	dry	forested
10a	−112.14911	36.297239	2560	Little Park Lake	dry	forested
10b	−112.14480	36.291421	2560	Little Park Lake	dry	forested
6	−112.14139	36.286224	2570	Kanabownits Spring	wet	forested
9	v112.14079	36.302908	2582	Kanabownits Spring	dry	meadow
30	v112.19692	36.324986	2583	Kanabownits Spring	wet	meadow
44	−112.06146	36.254867	2597	Little Park Lake	dry	forested
45	−112.06383	36.25719	2606	Little Park Lake	dry	forested
29a	−112.18066	36.335876	2621	Kanabownits Spring	dry	forested
29b	−112.18729	36.331952	2621	Kanabownits Spring	dry	forested
26	−112.16880	36.328691	2647	Kanabownits Spring	dry	meadow
27	−112.16858	36.335959	2652	Kanabownits Spring	dry	forested
28	−112.17625	36.338895	2670	Kanabownits Spring	dry	forested
25	−112.15205	36.330025	2674	Kanabownits Spring	dry	forested
Little Park	−112.11145	36.322882	2678	Little Park Lake	wet	meadow
23	−112.16297	36.342008	2678	Kanabownits Spring	wet	meadow
13	−112.14217	36.319266	2682	Kanabownits Spring	dry	forested
N Little Park	−112.11294	36.321381	2682	Little Park Lake	dry	meadow
7	−112.11564	36.307734	2700	Little Park Lake	dry	forested
Abbey	−112.12919	36.340521	2713	Kanabownits Spring	wet	meadow
8	−112.11646	36.310954	2713	Little Park Lake	dry	forested
46	−112.05301	36.296952	2719	Little Park Lake	dry	forested
Baby Bear	−112.1571	36.37081	2737	Kanabownits Spring	wet	forested
South Fork	−112.1485	36.35512	2754	Kanabownits Spring	dry	forested
47	−112.10498	36.326052	2755	Little Park Lake	dry	forested
Little Bear	−112.14263	36.37167	2765	Kanabownits Spring	wet	meadow
Bear	−112.1459	36.36956	2768	Kanabownits Spring	wet	forested

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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
Riggs	−112.32636	36.56148	2180	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
Cliff	−111.95301	36.12344	2320	Walhalla Plateau	wet	forested
Parasawampitts	−112.31639	36.41333	2362	Timp Point	wet	meadow
Dead Fawn	−112.081599	36.407256	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	−112.08076	36.39957	2380	Dog Point	wet	forested
Neal	−112.00125	36.25682	2387	Little Park Lake	dry	meadow
Bee	−112.317916	36.450829	2390	Timp Point	wet	meadow
Pasture	−112.29739	36.37735	2393	Timp Point	wet	forested
Stonefly	−112.08463	36.40847	2400	Dog Point	wet	forested
Timp	−112.29531	36.38777	2408	Timp Point	wet	meadow
Kanabownits	−112.21236	36.28555	2423	Kanabownits 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	−112.27579	36.37939	2438	Timp Point	wet	forested
Squaw	−112.28487	36.39468	2454	Timp Point	wet	forested
Locust	−112.28495	36.40049	2454	Timp Point	wet	border
Barrel	−112.203	36.29503	2469	Kanabownits Spring	wet	meadow
Cistern	−111.9739	36.21979	2475	Greenland Lake	wet	forested
Tipover	−112.22217	36.34432	2490	Kanabownits Spring	dry	forested
Fuller	−112.05159	36.23414	2499	Bright Angel	dry	border
unnamed	−112.08427	36.39872	2500	Dog Point	wet	forested
Basin	−112.10278	36.26250	2500	Little Park Lake	dry	meadow
Robber's Roost	−112.08813	36.27869	2510	Little Park Lake	wet	meadow
Milk	−112.13984	36.27746	2520	Kanabownits Spring	wet	meadow
Oquer	−112.24205	36.52593	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

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APPENDIX 3. Continued

Spring	Easting	Northing	Elevation (m)	Quad	Condition	Habitat
North Canyon	−112.08446	36.39674	2560	Dog Point	wet	forested
Slanty	−112.08206	36.3924	2570	Dog Point	wet	forested
Bear	−112.17522	36.3695	2652	Kanabownits Spring	wet	meadow
Fawn	−112.22217	36.34432	2670	Kanabownits Spring	wet	meadow
Limonite	−112.260885	36.307832	2255	King Arthur Castle	wet	forested
South Big 3	−112.259126	36.316234	2312	King Arthur Castle	wet	forested
South Big 2	−112.257192	36.31721	2328	King Arthur Castle	dry	forested
Subsurface	−112.25869	36.316896	2332	King Arthur Castle	dry	
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
Nr Outlet	−112.094736	36.243172	2505	Bright Angel	wet	meadow
53.5	−112.0935	36.251	2505	Kanabownits Spring	wet	
N of Outlet	−112.093088	36.247912	2520	Bright Angel	wet	meadow
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	−112.1406	36.27843	2536	Kanabownits Spring	wet	forested
5	−112.144473	36.28679	2545	Kanabownits Spring	wet	meadow
11	−112.155198	36.292159	2545	Kanabownits Spring	dry	meadow
11	−112.155198	36.292159	2545	Little Park Lake	dry	meadow
22b	−112.183471	36.344431	2590	Kanabownits Spring	wet	
73	−112.183338	36.344431	2590	Kanabownits Spring	wet	forested
44	−112.061463	36.254867	2597	Little Park Lake	dry	forested
Glorious	−112.183936	36.349366	2598	Kanabownits 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	−112.3117	36.69497	2133	Warm Springs Canyon	wet	forested

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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	2580	wet
Burn	−112.0138	36.30739	Little Park Lake	2679	wet
Jacob Reservoir	−112.230991	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	
Ds Up Moquitch	−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
Dog Canyon	−112.07678	36.450444	Dog Point	2591	
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	36.6411	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	Kanabownits Spring
58	−112.21840	36.27446	2408	Swamp Ridge
34	−112.22652	36.266964	2427	Kanabownits Spring
52	−112.23006	36.320233	2460	Kanabownits Spring
18a	−112.22508	36.323159	2487	Kanabownits Spring
18b	−112.22687	36.321654	2487	Kanabownits Spring
18a	−112.22508	36.323159	2487	Big Spring
18b	−112.22687	36.321654	2487	Big Spring
35	−112.14519	36.26086	2522	Kanabownits Spring
36c	−112.14769	36.262662	2530	Kanabownits Spring
38	−112.14327	36.261154	2530	Kanabownits Spring
36b	−112.14761	36.261662	2531	Kanabownits Spring
14	−112.19454	36.3068	2545	Kanabownits Spring
37	−112.14460	36.262304	2545	Kanabownits Spring
15	−112.20459	36.340938	2560	Kanabownits Spring
17	−112.22069	36.337547	2575	Kanabownits Spring
29a	−112.18066	36.335876	2622	Kanabownits Spring
29b	−112.18729	36.331952	2622	Kanabownits Spring
12c	−112.15950	36.31964	2627	Kanabownits Spring
27	−112.16858	36.335958	2652	Kanabownits Spring
24b	−112.15432	36.332978	2667	Kanabownits Spring
28	−112.17625	36.338894	2670	Kanabownits 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

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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 Kiabab Plateau (KP). Many ASC specimens recorded on SEINet but not found were Goodding collections. Some of these were annotated and then refiled without being databased, making it difficult to relocate the specimens. In some cases, we have not reviewed the specimens, but they seem unlikely for the KP, so are, for now, discounted.

FERNS

Equisetaceae

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

Selaginaceae

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

Conioselinum scopulorum (A. Gray) Coult. & 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 (Coult. & Rose) Coult. & Rose, ASU specimen annotated to Apiaceae, probably *L. leptocarpum*.

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

Asteraceae

Amphipappus fremontii Torr. & Gray subsp. *spinosus* (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. *bigelovii*

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. schiedeanna*.

Dieteria asteroides Torrey, ARIZ and UCR duplicates annotated to *M. bigelovii* 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 subsp. *nauseosa,* specimens annotated to *E. n.* var. *graveolens.*

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.*

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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. formosissimus.*

Erigeron nudiflorus A. Gray, ASC specimen annotated to *E. formosissimus*.

Erigeron pumilus 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. formosissimus.* DES specimen not found.

Erigeron utahensis Gray, *Goodding 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. quinquenervis*.

Helianthus nuttallii Torr. & A. Gray, DES and UCR duplicates annotated to *Helianthella quinquenervis*.

Heliomeris longifolia (Robins. & Greenm.) Cockerell, DES and ASC duplicates annotated to *Heliomeris multiflora*.

Heterotheca villosa (Pursh) 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 lemmonii (Greene) Cockerell, two ASU specimens annotated to *H. subintegra*

Hymenoxys richardsonii (Hook.) Cockerell, all specimens at TES and DES annotated to *H. subintegra*.

Hymenoxys rusbyi (A. Gray) Cockerell, two ASU specimens annotated to *H. subintegra*

Machaeranthera asteroides (Torr.) Greene, specimens at UCR and ARIZ annotated to *D. bigelovii* var. *mucronata*.

Machaeranthera linearis Green, GRCA specimen annotated to *Dieteria canescens*.

Machaeranthera parviflora A. Gray, DES specimen annotated to *Dieteria canescens* var. *ambigua*.

Onopordum acanthium Linnaeus, reported by GRCA staff in the Walla Valley, near the Widforss Trailhead, and on the Walhalla 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 stramineum (Kunth) W.A. Weber, RM specimen annotated to *P. macounii.*

Pseudognaphalium viscosum (Kunth) W.A. Weber, GRCA 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*.

Stephanomeria pauciflora (Torr.) A. Nels., GRCA specimens annotated to *S. minor* subsp. *minor*.

Symphyotrichum spathulatum (Lindl.) Nesom, DES specimens annotated to *S. ascendens*.

Tragopogon pratensis Linnaeus, DES specimen annotated to *T. dubius*.

Boraginaceae

Amsinckia menziesii (Lehm.) A. Nelson & J.F. Macbr. var. *intermedia* (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. confertifolia* by Hodgson.

Eucrypta micrantha (Torr.) Heller, SEINet location data entry error.

Hesperochiron pumilus (Dougl. ex Griseb.) Porter, reported in Phillips et al. (1987). No SEINet records.

Lappula occidentalis (S. Watson) Greene var. *cupulata*, SEINet location data entry error.

Macromeria viridiflora DC., DES specimen annotated to *Lithospermum multiflorum*.

Phacelia fremontii Torr., SEINet location data entry error.

Phacelia egena (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.

Brassicaeae

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 (Bernh. ex Fisch. & C.A. Mey.) Dorn, ASC specimen annotated to *D. incisa.* GRCA specimen sterile, but probably *D. incisa*.

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Descurainia incisa (Engelm. ex A. Gray) Britton subsp. *paysonii* (Detling) Rollins, all specimens seen have ascending pedicels, characteristic of subsp. *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 crassifolia Graham, ARIZ specimen poor, not included; ASC specimen annotated to *Draba rectifructa*.

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. spp., nomenclature and taxonomy in this genus is unclear for the KP.

Valeriana capitata Pall ex Link, GRCA specimen annotated to *V. acutiloba*.

Caryophyllaceae

Arenaria aberrans M.E. Jones, MNA specimen annotated to *Eremegone fendleri*.

Arenaria aculeata S. Watson, MNA specimen annotated to *Eremegone fendleri*.

Minuartia filiorum (Maguire) McNeill, GRCA specimens annotated to either *M. macrantha* or *Eremogone 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

Acmispon rigidus (Benth.) Brouillet, two RM specimens annotated to *L. wrightii.*

Astragalus argophyllus Nuttall var. *panguicensis* (M.E. Jones) M.E. Jones, ASC specimen annotated to *A. castaneiformis*.

Astragalus brandegeei 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 humistratus A. Gray var. *hosackiae* (Greene) M.E. Jones, two RM specimens annotated to *A. h.* var. *tenerrimus*.

Astragalus lentiginosus Douglas ex Hook. var. *mokiaensis* (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 tephrodes 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 wootonii Sheldon, ASC specimen annotated to *A. oophorus*.

Dalea flavescens (S. Wats.) S.L. Welsh, ARIZ specimen annotated to *D. candida* var. *oligophylla*.

Lathyrus parvifolius S. Watson, ASC 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 mucronatum Willd. ex Spreng., two DES specimens annotated to *T. pinetorum*.

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Fagaceae

Quercus grisea ×*turbinella*, *Merkle 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, *Goodding 478-48*, ARIZ 120684 has strigose leaves characteristic of *F. rupicola* rather than tomentose leaves, characteristic of *F. wrightii*.

Hippuridaceae

Hippuris vulgaris Linnaeus, ASC specimen not found.

Hypericaceae

Hypericum formosum Kunth, three ARIZ specimens annotated to *H. scouleri*.

Lamiaceae

Agastache urticifolia (Benth.) Kuntze, RM specimen annotated to *A pallidiflora*.

Hedeoma nana (Torr.) Briq., all specimens annotated to *H. oblongifolia*. *H. nana* is a desert species with 2–3 mm long calyx tubes, while *H. oblongifolia* is a forest species with 4–5 mm long calyx tube.

Salazaria mexicana Torr., SEINet location data error.

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.

Malva pusilla Sm., RM specimen annotated to *M. neglecta*.

Sphaeralcea ambigua A. Gray, both RM specimens annotated to *S. parvifolia*.

Sphaeralcea emoryi Torr. ex A. Gray, ASC specimen not found, *S. emoryi* known from lower elevations.

Sphaeralcea incana Torr. ex A. Gray, ASU specimen annotated to *S. parvifolia*.

Sphaeralcea laxa Wooton & Standl., ASU specimen not found.

Nyctaginaceae

Mirabilis albida (Walter) Heimerl, ARIZ specimen annotated to *M. decipiens*.

Onagraceae

Camissonia walkeri (A. Nelson) R.H. Raven, SEINet location data error.

Epilobium alpinum Linnaeus, both specimens at ASC annotated as small forms of *E. ciliatum*.

Gayophytum nuttallii Juss., ASC specimen annotated to *Gayophytum diffusum* subsp. *parviflorum*.

Gayophytum racemosum Torr. & A. Gray, one ASC specimen, one MNA specimen, and two RM specimens annotated to *G. diffusum* ssp. *parviflorum*.

Gayophytum ramosissimum Torr. & A. Gray, three specimens at NY not reviewed by the authors; all other specimens so determined annotated to *G. diffusum* subsp. *parviflorum*. *G. ramosissimum* is known from lower elevations surrounding the KP.

Orobanchaceae

Castilleja angustifolia (Nuttall) G. Don var. *dubia* A. Nelson, ASC specimen annotated to *C. linariifolia*.

Castilleja austromontana Standl. & Blumer, GRCA specimens annotated to *C. linariifolia* and to *C. miniata*.

Castilleja chromosa A. Nelson, GRCA specimen annotated to *C. kaibabensis*.

Orthocarpus purpurascens Benth., DES specimen annotated to *O. purpureo-albus*.

Phrymaceae

Mimulus floribundus Lindl., recorded as a SEINet observation, no specimen found. Likely to occur on the KP.

Plantaginaceae

Callitriche palustris Linnaeus, ARIZ specimens annotated by Hellquist to other *Callitriche* species.

Penstemon gairdneri Hook., GRCA specimens annotated to *P. pseudoputus*.

Penstemon lentus Pennell, reported by Phillips et al. (1987), GRCA specimen annotated to *P. rydbergii*.

Penstemon virgatus A. Gray, all specimens annotated to *P. pseudoputus*, *P. pseudoputus* × *barbatus*, or in one case to *P. putus*.

Veronica anagallis-aquatica Linnaeus, MNA specimen annotated to *V. americana*

Veronica arvensis Linnaeus, ASC, DES, and GRCA specimens annotated to *V. serpyllifolia*.

Polemoniaceae

Aliciella hutchinsifolia (Rydberg) J.M. Porter, SEINet location data error.

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. tenuituba*. See annotation in species list, Appendix 5.

Ipomopsis tridactyla (Rydberg) S.L. Welsh, *Hoak sn* incorrectly attributed to the KP.

Phlox amabilis Brand, ASC specimen annotated to *P. longifolia*

Phlox diffusa Benth. subsp. *carinata* Wherry, GRCA specimens annotated to *P. austromontana*.

Phlox hoodii Richardson, ARIZ specimen annotated to *P. austromontana*.

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Polygonaceae

Erigonum 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 corymbosum 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 fasciculatum 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. *subaridum*, or not found.

Eriogonum leptophyllum (Torr. & A. Gray) Wooton & Standl., ASC specimen not found, occurrence very unlikely for this location on the KP.

Eriogonum ovalifolium 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. *juniporinum* 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. sawatchense*.

Rumex latissimus 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

Dodecatheon 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 scaposum 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. apetalous* var. *montanus*.

Ranunculus macounii 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. *perincisum.*

Potentilla diversifolia Lehm., all specimens annotated to *P. gracilis* var. *fastigiata* or *P. hippiana*. *Potentilla diversifolia* not recognized in FNA.

Prunus serotina Ehrh., DES specimen annotated to *P. virginiana*.

Rubiaceae

Galium 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 to not be a valid name.

Solanaceae

Physalis crassifolia Benth., *Mead sn* at GRCA annotated to *P. hederaefolia* var. *palmeri*.

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 nuttallii 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. aurea*.

Carex haydeniana Olney, reported in Phillips et al. (1987), probably from a misdetermined Collom specimen.

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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 Boott, ASC specimen annotated to another *Carex* taxon.
Carex vulpinoidea Michx., ASC specimen annotated to another *Carex* taxon.
Carex xerantica L.H. Bailey, three DES specimens annotated to *C. petaseta*.
Eleocharis obtusa (Willd.) Schult., all specimens annotated to *E. engelmannii.*
Eleocharis ovata (Roth.) Roem. & Schult., GRCA specimen annotated to *E. engelmannii*.
Eleocharis parishii Britt., GRCA specimens annotated to *E. acicularis*.
Eleocharis parvula (Roem. & Schult.) Link ex Bluff, Nees & Schauer var. *anachaeta* (Torr.) Svenson, ASU specimen annotated to *E. acicularis*.
Eleocharis quinqueflora (Hartman) O. Schwarz, MNA specimen annotated to *E. acicularis*.
Fimbristylis Vahl, ASC specimen not located.

Juncaceae

Juncus drummondii E. Mey., ASC specimen not found, unlikely to occur in study area.
Juncus effusus Linnaeus, ASC specimen not found, unlikely to occur in study area.
Juncus ensifolius Wikstr., all specimens annotated to *J. saximontanus*. *J. ensifolius* does not occur in Arizona (Licher and Rink 2019).
Juncus mertensianus Bong., all specimens annotated to *J. nevadensis*. *Juncus mertensianus* does not occur in Arizona (Licher and Rink 2019).
Juncus tenuis Willd. var. *tenuis*, all specimens annotated to other *Juncus* taxa, *J. balticus*, *J. dudleyi*, or *J. interior*.
Juncus xiphioides E. Mey., all Goodding specimens from Big Springs Canyon annotated to *J. saximontanus.*

Liliaceae

Allium nevadense S. Watson, RM specimen reported at a higher elevation than possible for the verbal location, also mis-mapped on SEINet.
Calochortus aureus S. Watson, TES specimen annotated to *C. nuttallii.*
Calochortus flexuosus S. Watson, RM specimen annotated to *C. nuttallii.*

Orchidaceae

Platanthera hyperborea var. *gracilis*, GRCA specimens annotated to *P. sparsiflora*.

Poaceae

Achnatherum parishii (Vasey) Barkworth, GRCA specimens not found.
Achnatherum scribneri (Vasey) Barkworth, BRY specimen not reviewed by authors. ASC 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 hirsuta 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 bigelovii 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.*

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