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A FLORISTIC STUDY IN THE DIAMOND CREEK DRAINAGE AREA, GILA NATIONAL FOREST, NEW MEXICO

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ABSTRACT

The Diamond Creek drainage is one of the major watershed systems of the Gila National Forest in southwestern New Mexico. The purposes of this study were to catalog the vascular plants of a portion of this drainage area, describe the vegetation zones, locate any threatened, endangered, or sensitive plant species, and assess plant regeneration in areas that have been burned. The study area is located in the eastern portion of the Gila National Forest along the Black Range in the northwest corner of Sierra County. It covers approximately 5600 hectares (14000 acres) and ranges in elevation from 2250 to 3000 m (7400 to 9850 ft). Collected from the upper main Diamond Creek drainage area were 348 species including an additional six infraspecific taxa. The five largest families (by number of species and infraspecific taxa) in the study area were the Asteraceae (58), Poaceae (52), Fabaceae (24), Rosaceae (19), and Cyperaceae (17). The study area can be classified as Montane Coniferous Forest with most of the study area dominated by *Pinus ponderosa* and *Pseudotsuga menziesii* var. *glauca.* This overall vegetation type is fractured by narrow canyons, open meadows, perennial and intermittent streams, and rock outcrops. Three sensitive plant species were located in the study area: *Erigeron scopulinus, Senecio sacramentanus,* and *Draba mogollonica.* Two fires have occurred in the study area in recent times. These burned areas are primarily covered by shrubs including *Quercus gambelii, Robinia neomexicana* var. *neomexicana,* and *Populus tremuloides.*

Key words: fire, floristics, Gila National Forest, New Mexico, sensitive plant species.

INTRODUCTION

The first major floristic work for New Mexico was compiled by Elmer Ottis Wooton and Paul C. Standley (1915) in their *Flora of New Mexico.* They cataloged 2975 species and infraspecific taxa within New Mexico. The vascular plants that they recognized for the state comprised 145 families, 848 genera, and 2903 species. Three other major floristic works for the state were published after Wooton and Standley's initial treatment. The first of these was Ivar Tidestrom and S.T. Kittell's (1941) *A Flora of Arizona and New Mexico.* The second, *A Flora of New Mexico,* by William C. Martin and Charles R. Hutchins, was published in 1980 and 1981. Spellenberg and coworkers (1986) later added over 200 additions and changes to Martin and Hutchins's flora. The most recent floristic work, *A Working Index of New Mexico Vascular Plant Names* and its supplements (Roalson and Allred 1995), attempted a current listing of the vascular flora of New Mexico. It included additions to the state since Martin and Hutchins's Flora. This last work recognized 3468 species and an additional 482 infraspecific taxa for the state.

Although these floras have recorded the majority of the vascular plant taxa in the state, mapping the distribution of the plants has been problematic. The best way to increase our knowledge of the distribution of plants in the state, as well as to locate any taxa not presently known to occur there, is to compile local floras. In New Mexico, several local floristic studies have already been conducted (Bowers 1982; Bleakly 1996; Table 1). In the southwest part of the state, however, only two floristic studies have been completed. The first was W. L. Wagner's (1977) study of Animas Mountain in Hidalgo County. The second was J. T. Columbus's (1988) study of the Flora of Cooke's Range, the majority of which is located in northern Luna County.

The purposes of the present study were to catalog the vascular plant taxa in the upper main Diamond Creek drainage of the Gila National Forest and surrounding areas, to describe the vegetation zones in which these plants occur, to make general observations on plant regrowth in burned areas, and to locate and map any threatened, endangered, or sensitive plant species in the area.

What is now the Gila National Forest has a long history of plant collection. The first known collecting in the area was associated with the "Army of the West," commanded by Colonel Stephan Watts Kearney, which crossed southwestern New Mexico in 1846. Lieutenant William Hemsley Emory, acting as natu-

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Table 1. Floristic studies completed in New Mexico (Bowers 1982; Bleakly 1996) (NMSU = New Mexico State University; UNM = University of New Mexico; MA = Master of Arts Thesis; MS = Master of Science Thesis; Ph.D. = Doctor of Philosophy Dissertation; BLM = Bureau of Land Management). The entries marked with an asterisk (*) are lists kept by the associated National Monument, National Park, or are unpublished lists.

Author	Date	Location/Area of study
Bedker, E. J.	1966	A study of the flora of the Manzano Mtns. MA, UNM.
Bleakly, D. L.	1994	Flora and vegetation of El Malpais Natl. Mon. area, NM. MS, UNM.
Campbell, R. S. & I. F. Campbell	1938	Vegetation on gypsum soils of the Jornada Plain, NM. Ecology 19:572–577.
Capulin Mtn. Natl. Monument	1980	* Plant checklist: Capulin Mtn. Natl. Mon., NM.
Chaco Canyon Natl. Monument	1979	* Checklist of plants for Chaco Canyon Natl. Mon., NM.
Columbus, J. T.	1988	Flora of Cooke's Range, sw NM. MS, NMSU.
DeBruin, E. A.	1988	Vascular plants and lichens on lava and sandstone substrates in Cibola County, NM. MS, UNM.
Fletcher, R. A.	1978	A floristic assessment of the Datil Mtns. MS, UNM.
Fosberg, F. R.	1940	The aestival flora of the Mesilla Valley region, NM. Amer. Midl. Nat. 23: 573–593.
Gehlbach, F. R., B. H. Warnock, W.C. Martin, & H. K. Sharsmith	1969	* Vascular plants of Carlsbad Caverns Natl. Park, NM, and adjacent Guadalupe Mtns. (NM-TX).
Hall, H. H. & S. Flowers	1961	Vascular plants found in the Navajo Reservoir Basin, CO and NM. Pp. 47–90 in A. M. Woodbury, ed., Ecological studies of the flora and fauna of the Navajo Reservoir, CO and NM. Salt Lake City, UT: Univ. of Utah.
Hutchins, C. R.	1974	* A flora of the White Mtns. area, s Lincoln and n Otero counties, NM.
Little, E. L., Jr., & R. S. Campbell	1943	Flora of the Jornada Experimental Range, NM. Amer. Midl. Nat. 30:626–670.
Mackay, H. A.	1970	A comparative floristic study of the Rio Hondo Canyon—Lake Fork—Wheeler Peak locale, NM and the Huerfano River—Blanco Peak locale, CO. Ph.D., UNM.
Manthey, G. T.	1977	A floristic analysis of the Sevilleta Wildlife Refuge and Ladron Mtns. MS, UNM.
Martin, W. C., C. R. Hutchins, & R. G. Woodmansee	1971	A flora of the Sandia Mtns., NM. Albuquerque, NM: Sandia Press.
Martin, W. C. & W. L. Wagner	1974	Biological survey of Kirtland Air Force Base (East). Washington D.C.: Gov. Printing Office; SAND-74-0393.
Metcalfe, O. B.	no date	The flora of the Mesilla Valley (NM). Senior Th., NMSU.
Osborn, N. L.	1962	The flora of Mount Taylor. MS, UNM.
Osborn, N. L.	1966	A comparative study of Mount Taylor and Redondo Peak, NM. Ph.D., UNM.
Riffle, N. L.	1973	The flora of Mount Sedgwick and vicinity. MS, UNM.
Robertson, C. W.	1968	A study of the flora of the Cochiti and Bland Canyons of the Jemez Mtns. MS, UNM.
Schaffner, E. R.	1948	Flora of the White Sands Natl. Mon. of NM. MS, UNM.
Tatschl, A. K.	1966	A floristic study of the San Pedro parks wild area, Rio Arriba County, NM. MS, UNM.
Van Devender, T. R. & B. L. Everitt	1977	The latest Pleistocene and Recent vegetation of the Bishop's Cap, south central NM. Southw. Nat. 22:337–352.
Von Loh, J. D.	1977	A flora of the San Andreas Natl. Wildlife Refuge, Dona Ana County, NM. MS, UNM.
Wagner, W. L.	1977	Floristic affinities of Animas Mtns., sw NM. MS, UNM.
Wynhoff, J. T., E. Lehto, & D. J. Pinkava	1976	Vegetation of Cutler Canyon and vicinity, San Juan County, NM. Washington D.C.: U.S. Dept. of Int., BLM.

ralist for the expedition, made many collections along the route, which passed through the Mimbres Mountains and proceeded westward along the Gila River (McKelvey 1956). Important collections were made along the Gila River, in the Mimbres Mountains and along the Mimbres River, and in the vicinity of Santa Rita (including the areas of Copper Mines and Ben Moore) (Standley 1910). This was the beginning of several expeditions to find safe passage for immigrants to the West. In 1849, John Charles Frémont passed through the Mimbres Mountains and what would become the southern end of the Gila National Forest on his fourth expedition (McKelvey 1956). In 1851, Charles Wright traveled south of the National Forest area with the Boundary Commission and collected around Cooke's Peak (Shaw 1987). Wright also collected near Santa Rita and in the Mimbres Mountains (Standley 1910).

Collections in the Gila National Forest and surrounding areas are known from more than ten botanists between the mid-1800s and the early 1900s, with the most important of these being E. L. Greene, O. B. Metcalfe, and E. O. Wooton. Greene made many collections in the Gila area with the majority of these being gathered in the 1880s (Standley 1910). Collection areas included Bear Mountain (near Silver City), Fort Bayard (between Silver City and Santa Rita), along the Gila River, in the Mogollon Mountains, at Pinos Altos (northeast of Silver City), at Santa Rita, and at Silver City.

Metcalfe made important collections in the vicinity of the Gila National Forest primarily between 1903 and 1905 (Standley 1910). In 1903 he collected in the Burro Mountains, at Mangas Springs, and in the Mogollon Mountains. In 1904 and 1905 Metcalfe made his Black Range collection. This included collections at Animas Creek, Hillsboro, Iron Creek, Kingston, and Santa Rita, as well as collections throughout the south end of the Black Range. Around this time he also made collections at Bear Mountain (near Silver City), at Cliff (northwest of Silver City on the Gila River), along the Gila River, and at Silver City (Standley 1910).

Wooton, based at the New Mexico College of Agriculture and Mechanic Arts (New Mexico State University) in Las Cruces, made many collections in the Gila National Forest area during his term as botanist at the college between 1890 and 1911 (Allred 1993*a*). In the vicinity of the Gila National Forest, Wooton made collections at Frisco (on the San Francisco River), along the Gila River, at Mangas Springs, in the Mogollon Mountains, and at Silver City.

Since the early 1900s, many botanists have visited the Gila National Forest. None of the collections made by these botanists are known to be from the study area along the upper main Diamond Creek with one exception. Thomas K. Todsen, of New Mexico State University, camped along Diamond Creek in the spring of 1981 and collected *Erigeron scopulinus* and *Geum triflorum.*

Collections are known from nearby areas by K. W. Allred in 1984 and 1993; E. F. Castetter in 1952; D. Deardorf in 1982; T. Dunbar in 1982; R. Fletcher in 1979; W. E. Fox III in 1991; B. Hutchins in 1982; P. Knight in 1982; M. Miller in 1969; K. W. Parker in 1936; M. A. Pilsbry in 1915; and R. Spellenberg and colleagues in 1970 and 1982.

MATERIALS AND METHODS

Physical Setting

The Gila National Forest (originally called the Gila River Forest Reserve) was established in 1899 and is managed by the United States Forest Service. It is located in the southwestern part of New Mexico (Fig. 1). The study area is located in the eastern portion of the National Forest along the Black Range in the northwest corner of Sierra County (Fig. 1). Nearly all of the study area is located in the Aldo Leopold Wilderness Area. Two main drainage systems are included in the area: the upper main Diamond Creek and the upper Hoyt Creek (also known as Turkey Run) (Fig. 2). The study area covers approximately 5600 hectares (14000 acres) and is bounded on the south by Diamond Peak, the highest elevation of the drainage, which reaches 3000 m (9850 ft). The lowest elevation in the study area is where Diamond Creek runs south of Round Mountain at approximately 2250 m (7400 ft). The east edge of the drainage follows the Continental Divide. The drainage is nearly ten and a half air kilometers long and reaches just over eight air kilometers wide.

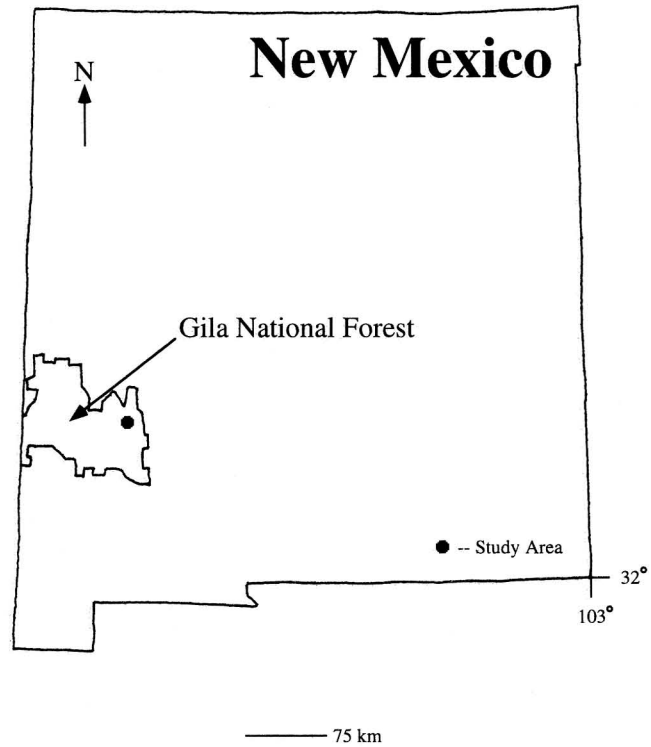

Fig. 1. Location of the Gila National Forest and the study area in New Mexico.

The upper main Diamond Creek drainage is dominated by Diamond Creek which flows from the southeast to the northwest through the study area. Downstream, Diamond Creek joins the east fork of the Gila River. Three major canyons radiate from the central stream valley. These are Hell Canyon, Doubtful Canyon, and Fisherman's Canyon (Fig. 2). Dick-Peddie (1993) categorized the habitats of this area as being Montane Coniferous Forest with the summit of Diamond Peak being Subalpine Coniferous Forest.

The geology of the Black Range is complex. As explained by Ericksen and Wedow (1976), during the

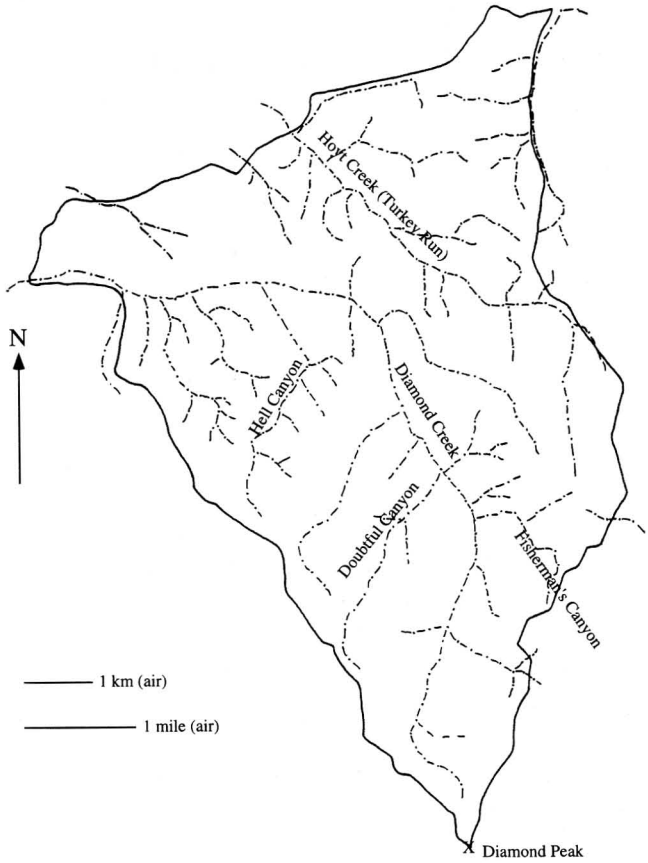

Fig. 2. Map of the study area. The boundary designates the fenceline of Diamond Pasture, South Fork Allotment, Black Range District, Gila National Forest.

late Cretaceous and early Tertiary eras, long domes were uplifted along the Black Range. This was followed by a volcanic period of active andesitic lava flows during the early Tertiary, which are known as the Datil Formation. The time periods following the Tertiary were dominated by large erosion events that led to the exposure of ore deposits containing tin, gold, silver, copper, lead, and zinc. Mining of these ores was prevalent in the late nineteenth and early twentieth centuries (Harley 1934). Some of the rhyolite brought to the surface in the Datil Formation is tin-bearing. These areas were mined around Taylor Creek, north of the study area. No tin-bearing rhyolite has been recorded within the study area (Ericksen and Wedow 1976).

The climate of the north end of the Black Range is characterized by warm, mild summers and cold winters. While few climatic data are available from the study area, four nearby climate stations allow inference of the climatic conditions. The four stations are Mimbres Ranger Station, Winston, Gila Hot Springs, and Beaverhead Ranger Station, with mean annual precipitation amounts of 433 mm (17 in), 315 mm (12 in), 392 mm (15 in), 346 mm (14 in), respectively (Kunkel 1984). Since all of the stations are at least

Table 2. Precipitation data collected along Diamond Creek in the summer of 1994 (Wood and Turner 1994).

	Jun. 2–Jul. 6	Jul. 6–Aug. 2	Aug. 2–Sep. 9	Sep. 9–Oct. 1
ppt. (mm)	12.70	52.07	75.57	9.14
ppt. (in)	1.85	2.05	2.98	0.36

223 m (730 ft) lower in elevation than the study area, it is expected that the actual precipitation in the study area is somewhat higher than those amounts reported here. A climatic station located along main Diamond Creek at approximately 2,300 m (7,800 ft) has gathered precipitation data during the months of June, July, August, and September (Wood and Turner 1994). A summary of these results is given in Table 2. These data indicate that the principal summer precipitation months are July and August. Due to the high elevation of the study area, at least this amount of additional precipitation would be expected in winter snowfall.

Although total precipitation varies from year to year, all stations reported that at least half of the average yearly precipitation came during the months of July, August, and September. This moisture occurs in the form of high-intensity, short-duration convectional rainstorms.

According to Kunkel (1984), the mean annual temperature for the Mimbres Ranger Station is 11 C (52 F), for Winston 11 C (53 F), for Gila Hot Springs 12 C (53 F), and for the Beaverhead Ranger Station 9 C (48 F). July is the hottest month at all stations with the mean temperature ranging from 19 C (67 F) to 22 C (72 F). Temperatures are coldest in January with the mean temperature ranging from −1 C (30 F) to 2 C (36 F) (Kunkel 1984). As with precipitation, these values were collected at elevations lower than the study area. The average starting date for the spring frost-free season is June 10. By September 20, the first killing frost has usually occurred (Tuan et al. 1973). This produces an average frost-free season of 102 days. The northern end of the Black Range receives normal annual sunshine in excess of 80 percent of that possible.

Survey Methodology

Plants were collected in the study area from late July 1993 to May 1995, excluding the winter months. All of the vegetation zones were sampled as often as possible throughout the growing season. Below average rainfall for 1994 may have affected the occurrence and abundance of plant species found during the collecting season. Collections were also made in areas north of the study area boundary, but within a range of about 5 air miles. These are listed in Appendix I.

Collections were made using standard 12 inch by 18 inch plant presses. Whenever possible, vegetative, reproductive, and fruiting material was collected for

each specimen. Notes were taken at each collection location and included information on plant community, abundance, soil characteristics, aspect, elevation, associated species, and the date of collection. Township-range-section information was added from maps at a later date. In the case of threatened, endangered, or sensitive (TES) plant species, the size of the population and any other pertinent population information was included. TES populations were also mapped for the study area.

Fire is a natural component of forests in the southwestern United States. In recent years, two forest fires, started from lightning strikes, have occurred within the boundary of the study area. The first, the "Divide Fire," occurred in 1989. This fire affected approximately 1300 hectares (3200 acres) of the study area. The most recent fire, the "Blackhawk Fire," was in the early summer of 1993 and affected approximately 390 hectares (960 acres). Notes were taken regarding regeneration of the burned areas over the course of the field seasons. These notes described general observations made on the age class of woody plant regeneration, distribution, general occurrence rate, and presence or absence of shrubs not located outside of the burned areas.

Nomenclature of the plants was based upon Kartesz (1994) and Roalson and Allred (1995). Author abbreviations are as suggested in Brummitt and Powell (1992). The main body of plant identifications were made using the following works: *A Flora of New Mexico* (Martin and Hutchins 1980–1981), *Arizona Flora* (Kearney and Peebles 1960), *A Field Guide to the Grasses of New Mexico* (Allred 1993*b*), *Flora of North America* (Flora of North America Editorial Committee 1994), and *Intermountain Flora* (Cronquist et al. 1977, 1994). All specimens were checked against specimens located in the following herbaria: New Mexico State University- Biology Herbarium (NMC), New Mexico State University- Range Science Herbarium (NMCR), Texas A&M University- S. M. Tracy Herbarium (TAES), The University of New Mexico Herbarium (UNM), and The University of Texas Herbarium at Austin (TEX/LL). Voucher specimens are deposited at NMCR and the Gila National Forest Black Range District Herbarium. Selected specimens are deposited in the Botanical Research and Consulting Herbarium (BRCH) in Bryan, Texas, and The University of Michigan Herbarium (MICH), Ann Arbor, Michigan.

RESULTS

Flora

The taxa found in this study represented 74 families. The five largest families (by number of species and infraspecific taxa) were the Asteraceae (58), Poaceae (52), Fabaceae (24), Rosaceae (19), and Cyperaceae (17). The largest genus found in the study area was *Carex* (Cyperaceae) with 13 species. The genus *Muhlenbergia* (Poaceae) was second largest with 10 species. Table 3 lists the total number of families, genera, species, and infraspecific taxa collected in the study area, collected by the authors north of the study area, and as well as totals for the state. The totals for the state were obtained from Roalson and Allred (1995). Twenty-six of the 354 species and infraspecific taxa in the study area are introduced, primarily from Europe. The Poaceae and Asteraceae dominate the introduced taxa list with half of the species occurring in these two families.

Table 3. Total number of families, genera, species, and total taxa at or below the species level found in the study area, in the vicinity of the study area collected by the first author, and in the state as per Roalson and Allred (1995).

	Study area	Additional collections in area	New Mexico
Families	74	21	148
Genera	228	33	914
Species	348	37	3468
Total species and infraspecific taxa	354	37	3950

Vegetation Zones

The study area can be classified as Montane Coniferous Forest (Dick-Peddie 1993). The canyon bottoms and higher elevations are Upper Montane Coniferous Forest (Dick-Peddie 1993) and are dominated by ponderosa pine (*Pinus ponderosa* var. *scopulorum*) and Douglas fir (*Pseudotsuga menziesii* var. *glauca*) with occasional white fir (*Abies concolor*), Engelmann spruce (*Picea engelmannii*), and southwestern white pine (*Pinus strobiformis*). The lower elevations, south-facing slopes, and rocky areas are Lower Montane Coniferous Forest (Dick-Peddie 1993) and are dominated by ponderosa pine, pinyon pine (*Pinus edulis*), and alligator juniper (*Juniperus deppeana*). The boundaries between these vegetation zones are blurred due to the large extent of burned areas. Most of the higher elevations were burned in 1989 so that the climax vegetation is difficult to determine. The Allotment Analysis Map for the South Fork Allotment (U.S.F.S., Gila National Forest, Black Range District) indicates Douglas fir and ponderosa pine as the dominants for all of these high elevation burned areas.

The habitat categories used in this treatment are riparian zones, open valley bottoms, slopes and ridges, high-elevation meadows, narrow canyons, and rock outcrops. These categories are based upon topography, moisture, and dominant vegetation.

Riparian zones include streambanks, ponds, and springs. The vegetation of these areas, though commonly surrounded by ponderosa pine, Douglas fir, and

other conifers, are characterized by the occurrence of various combinations of the following species: mountain alder (*Alnus incana* ssp. *tenuifolia*), willow (*Salix lucida* ssp. *lasiandra*), caric-sedges (*Carex* spp.), spike sedges (*Eleocharis* spp.), rushes (*Juncus* spp.), narrowleaf cottonwood (*Populus angustifolia*), cliff-bush (*Jamesia americana*), Rocky Mountain maple (*Acer glabrum*), red-osier dogwood (*Cornus sericea* ssp. *sericea*), shortawn foxtail (*Alopecurus aequalis*), American mannagrass (*Glyceria grandis*), Rocky Mountain iris (*Iris missouriensis*), bluegrasses (*Poa* spp.), pondweeds (*Potamogeton* spp.), sorrels (*Rumex* spp.), monkey-flower (*Mimulus glabratus* var. *jamesii*), self-heal (*Prunella vulgaris*), and water-starwort (*Callitriche heterophylla*).

Open valley bottoms occur where the main Diamond Creek canyon broadens and is dominated by ponderosa pine and the tree form of Gambel's oak (*Quercus gambelii*). The overstory is often open with large meadow areas. These meadows are dominated by Kentucky bluegrass (*Poa pratensis*), Louisiana wormwood (*Artemisia ludoviciana* ssp. *mexicana*), and poison ivy (*Toxicodendron rydbergii*). Many other forbs and grasses are common throughout this area.

Slopes and ridges can be further segregated into lower-elevation dry slopes as opposed to higher-elevation mesic slopes. The dry slopes are commonly dominated by pinyon pine, alligator juniper, mountain mahogany (*Cercocarpus montanus* var. *montanus*), Gambel's oak, gray oak (*Quercus grisea*), wavyleaf oak (*Quercus x undulata*), and scattered ponderosa pine. The three oak species commonly grow together and often intergrade completely. This is because wavyleaf oak is a hybrid between Gambel's oak and gray oak and may cross back to either parent (Tucker 1961). Banana yucca (*Yucca baccata*) is also rather common on these dry slopes.

The mesic slopes are commonly dominated by ponderosa pine and Douglas fir, often with varying amounts of white fir, southwestern white pine, and Engelmann spruce. Gambel's oak is also common on these slopes, usually as a shrub but occasionally as a tree. The understory is commonly dominated by various members of the Asteraceae and grasses.

The high-elevation meadows are openings in a predominately ponderosa pine/Douglas fir overstory on relatively level areas. These meadow areas are usually dominated by pine dropseed (*Blepharoneuron tricholepis*), mountain muhly (*Muhlenbergia montana*), and other muhly species (*Muhlenbergia* spp.). Various other forbs and grasses may be present.

The narrow canyons which feed into the main canyons of Diamond Creek and Hoyt Creek (Turkey Run) are usually much more heavily overgrown than other areas. These areas are dominated by Douglas fir and ponderosa pine, often with significant amounts of white fir and Engelmann spruce. The understory of these areas are dominated by a variety of grasses, sedges, and forbs, with members of the Asteraceae often dominant.

Rock outcrops were common throughout the study area. Vegetation occurring on these outcrops was sparse, with plants usually only growing in crevices and small soil pockets. Nearly all the vegetation was herbaceous, although mountain mahogany, banana yucca, pinyon pine, and alligator juniper were occasionally found growing out of these rock outcrops. Other taxa occurring on the outcrops were stonecrop (*Sedum stelliforme*), flameflower (*Talinum confertiflorum*), four-o'clocks (*Mirabilis longiflora, M. oxybaphoides*), Wright's gourd (*Echinopepon wrightii*), red-flowered hedgehog cactus (*Echinocereus coccineus* ssp. *coccineus*), plains pricklypear (*Opuntia macrorhiza* ssp. *macrorhiza*), New Mexico cliff fern (*Woodsia neomexicana*), Fendler's lip fern (*Cheilanthes fendleri*), rock fleabane (*Erigeron scopulinus*), and Mogollon whitlowgrass (*Draba mogollonica*).

Sensitive Species

Several species considered as threatened, endangered, or sensitive were thought to possibly occur in the study area (New Mexico Native Plant Protection Advisory Committee 1984). These included *Aletes filifolius* Mathias, Constance & Theobald, *Allium gooddingii* Ownbey, *Apacheria chiricahuensis* Mason, *Cirsium gilense* Wooton & Standley, *Crataegus wootoniana* Eggl., *Draba mogollonica* Greene, *Erigeron hessii* G. L. Nesom, *Erigeron scopulinus* G. L. Nesom & V. D. Roth, *Scrophularia macrantha* (A. Gray) Greene, *Senecio quaerens* Greene, *Senecio sacramentanus* Wooton & Standley, *Silene wrightii* A. Gray, and *Trifolium longipes* Nutt. var. *neurophyllum* (Greene) Martin ex Isely. This list includes those species that are known from elevation ranges and habitats present in the study area. Of the plants on this list, *Erigeron scopulinus, Senecio sacramentanus,* and *Draba mogollonica* were found in the study area. Also, two species of *Carex* (Cyperaceae), *C. amplifolia* and *C. rossii,* not previously known from New Mexico, were found in the study area (Roalson et al. 1995).

Erigeron scopulinus, rock fleabane, was first described by G. L. Nesom and V. D. Roth (1981). The description was based upon collections from two locations: the Chiricahua Mountains of southeastern Arizona and the Black Range of southwestern New Mexico. This species dwells in crevices of vertical and horizontal rock outcrops where little or no soil has developed. Rock fleabane has been found at elevations ranging from 1800 to 2800 m (6000 to 9000 ft). This species is listed as a state sensitive species because of

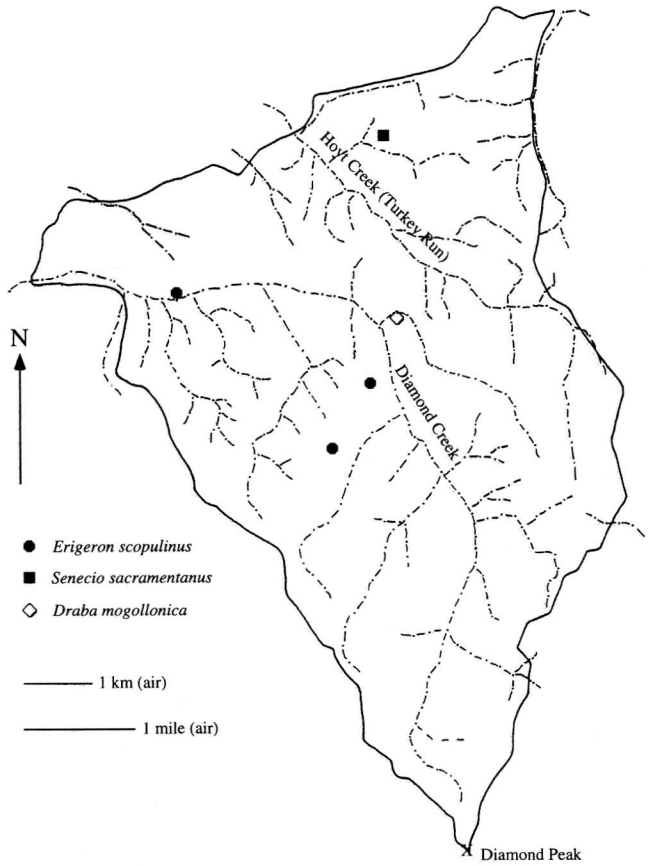

Fig. 3. Map of the distribution of sensitive plant species found in the study area.

its limited occurrence in New Mexico, but not endangered (Sivinski and Lightfoot 1995).

Three populations of *Erigeron scopulinus* were located in the study area (Fig. 3). The first of these was located by Thomas K. Todsen on a south-facing, flow-banded, white rhyolite cliff face along Diamond Creek and was used in the original description of the species. Todsen collected plants at this location on 24 May 1981 and 10 June 1981. During the course of this study, while making general collections, two additional populations were located. The first of these was located at approximately 2650 m (8700 ft) along a ridge between Hell Canyon and Diamond Creek (T11S R10W sec. 35 SW¼). The plants at this location spread across the horizontal rock faces of two rock outcrops separated by 10 m. This population consisted of 15 individuals with an average size of approximately 7.5 cm by 30 cm. This population was selectively collected on 28 June 1994 (*Roalson 911*).

The third population was found at approximately 2750 m (9000 ft) on a near-vertical south-facing cliff on a ridge between Hell Canyon and an unnamed canyon that runs into Diamond Creek (T12S R10W NW¼ sec. 2). Approximately 10 individuals were seen and they were of similar size as those individuals found at 2650 m.

The only perceived threat to *Erigeron scopulinus* is mining exploration (New Mexico Native Plants Protection Advisory Committee 1984), which does not occur in the study area. All three populations appeared to be vigorous and undisturbed.

Senecio sacramentanus, Sacramento groundsel, was described by E. O. Wooton and P. C. Standley (1913). This taxon is known from mountain meadows between the elevations of 2440 m and 3550 m (8000 to 11000 ft) in the central and western mountains of New Mexico. This species is listed as state priority 1 due to its limited distribution in the state. No threats to this taxon are known.

One population of Sacramento groundsel was found in the study area (Fig. 3). This population was selectively collected on 2 October 1995 (*Roalson & Allred 1202*) and occurred at approximately 2440 m (8,000 ft) in a side canyon to Hoyt Creek (Turkey Run) (T11S R10W sec. 23). The surrounding vegetation was dominated by ponderosa pine, Douglas fir, Gambel's oak, and wild rose (*Rosa woodsii*). Other Sacramento groundsel plants were occasionally seen in this area.

Draba mogollonica, Mogollon whitlowgrass, was described by E. L. Greene (1881). This taxon grows in "moist cliff faces, rock cracks, crevices, and steep, shaded slopes with little soil development" (New Mexico Native Plants Protection Advisory Committee 1984) and occurs from 1500 m to 2900 m (5000 to 9,000 ft) in the mountains of central and western New Mexico. It is listed as state priority 1. Recently, large populations have been located in the mountains of central New Mexico (New Mexico Native Plants Protection Advisory Committee 1984). There are no known threats to this species.

One population was found in a side canyon to Diamond Creek (Fig. 3), along Forest Trail 42, near its intersection with Forest Trail 40 (T11S R10W Sec. 35) on 30 April 1994 (*Roalson 776*). The population occurred in soil pockets on a northwest-facing cliff, and in the rocks below it, at the base of a waterfall. The surrounding vegetation included ponderosa pine, Douglas fir, white fir, Rocky Mountain maple, willow, Gambel's oak, and common choke cherry (*Prunus virginiana* var. *melanocarpa*).

Burned Areas

The Divide Fire and the Blackhawk Fire killed nearly all of the trees where they occurred. At the time of the study areas affected by the Divide Fire had developed significant amounts of ground cover, but those affected by the Blackhawk Fire were still mostly bare ground with some shrub regrowth and a few herbaceous plants occurring.

Areas burned in the Divide Fire have several different vegetation compositions, depending primarily

on what the preburn vegetation was. After being burned, the highest-elevation areas (around Diamond Peak) became dominated by quaking aspen (*Populus tremuloides*), New Mexico locust (*Robinia neomexicana* var. *neomexicana*), and ninebark (*Physocarpus monogynus*). Also common on these burned slopes were common chokecherry, Rocky Mountain maple, gooseberry (*Ribes pinetorum*), raspberry (*Rubus idaeus* ssp. *strigosus*), thimble-berry (*Rubus parviflorus*), and rock-spiraea (*Holodiscus dumosus*). Some areas had regrowth of Gambel's oak, but these areas were not very common at the higher elevations. Seedlings and juvenile ponderosa pine and Douglas fir were fairly common in this area and were up to approximately 6 dm (±2 ft) tall.

Narrow canyons that were burned in the Divide Fire (such as the upper end of Doubtful Canyon) predominantly had raspberry and thimble-berry regrowth with shrubs of pericome (*Pericome caudata*) common. Also occurring in these burned areas were gooseberry, New Mexico locust, and elderberry (*Sambucus caerulea* var. *neomexicana*). Seedlings of white fir up to approximately 3 dm (1 ft) tall were seen in large numbers in these areas.

Dry slopes that were burned in the Divide Fire were dominated by Gambel's oak, New Mexico locust, gooseberry, and raspberry. Also occurring on these areas were quaking aspen and elderberry. Seedlings of ponderosa pine and Douglas fir were seen in these areas, but they were not common.

Areas burned in the Blackhawk Fire remained, for the most part, bare ground. Some basal resprouting has occurred on Gambel's oak and elderberry with occasional herbs being predominantly members of the Asteraceae.

ANNOTATED CHECKLIST OF THE VASCULAR FLORA

The following checklist includes all vascular taxa collected or observed by the authors between 1993 and 1995. The families are arranged alphabetically under class or subclass headings with the genera within the families and the species within the genera also arranged alphabetically. New species records for the state are designated by a double plus (‡). Taxa considered sensitive by the Gila National Forest are designated by a dagger (†). Introduced species are designated by an asterisk (*). All vouchers were collected by E. H. Roalson and deposited in NMCR, unless otherwise noted. One taxon, *Toxicodendron rydbergii*, lacks a voucher specimen. Annotations accompanying each taxon are arranged in the following sequence:

SCIENTIFIC NAME. Taxonomic authority. [*Selected synonyms* with author(s)] Vegetation zone(s). Special comments. *Collection number* (VOUCHER LOCATION, if any, in addition to NMCR).

LYCOPODIAE

SELAGINELLACEAE

SELAGINELLA UNDERWOODII Hieron. Rock outcrops. *811.*

EQUISETAE

EQUISETACEAE

EQUISETUM ARVENSE L. Riparian and aquatic zones. *587.*

EQUISETUM LAEVIGATUM A. Braun. Riparian and aquatic zones. *637.*

FILICAE

DENNSTAEDTIACEAE

PTERIDIUM AQUILINUM (L.) Kuhn var. PUBESCENS Underw. Mesic slopes and ridges, narrow canyons. *827.*

DRYOPTERIDACEAE

WOODSIA NEOMEXICANA Windham. Rock outcrops. *671.*

PTERIDACEAE

CHEILANTHES FENDLERI Hook. Rock outcrops. *1170.*

GYMNOSPERMAE

CUPRESSACEAE

JUNIPERUS COMMUNIS L. var. DEPRESSA Pursh. Mesic slopes and ridges, narrow canyons. *843.*

JUNIPERUS DEPPEANA Steud. Dry slopes and ridges. *677.*

PINACEAE

ABIES CONCOLOR (Gordon & Glend.) Hildebrand. Mesic slopes and ridges, narrow canyons. *Roalson & Allred 551.*

PICEA ENGELMANNII Parry ex Engelm. var. ENGELMANNII. Mesic slopes and ridges, narrow canyons. The specimens collected seem to be grading into *Picea pungens* Engelm. *577.*

PINUS EDULIS Engelm. Dry slopes and ridges. *675.*

PINUS PONDEROSA Douglas ex Lawson & C. Lawson var. SCOPULORUM Engelm. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms, narrow canyons. *Roalson & Allred 533.*

PINUS STROBIFORMIS Engelm. Dry slopes and ridges, mesic slopes and ridges. *981.*

PSEUDOTSUGA MENZIESII (Mirb.) Franco var. GLAUCA (Mayr) Franco. Mesic slopes and ridges, narrow canyons. *Roalson & Allred 536.*

ANGIOSPERMAE—MONOCOTYLEDONES

AGAVACEAE

YUCCA BACCATA Torr. Dry slopes and ridges, rock outcrops. *Roalson & Allred 553.*

COMMELINACEAE

COMMELINA DIANTHIFOLIA Delile var. LONGISPATHA (Torr.) Brashier. Mesic slopes and ridges, open valley bottoms, rock outcrops. *597.*

TRADESCANTIA OCCIDENTALIS (Britton) Smyth var. OCCIDENTALIS. Rock outcrops. *606.*

CYPERACEAE

‡CAREX AMPLIFOLIA Boott. Riparian and aquatic zones. *879* (BRCH).

CAREX BELLA L. H. Bailey. Riparian and aquatic zones. *823.*

CAREX DEWEYANA Schwein. Mesic slopes and ridges, burned areas. *853.*

CAREX DISPERMA Dewey. Riparian and aquatic zones. *824.*
CAREX EBENEA Rydb. Riparian and aquatic zones. *794.*
CAREX MICROPTERA Mack. Riparian and aquatic zones. *856.*
CAREX NORVEGICA Retz. Riparian and aquatic zones. *889.*
CAREX OBTUSATA Lilj. Open valley bottoms. *770.*
CAREX OCCIDENTALIS L. H. Bailey. Riparian and aquatic zones, burned areas. *Roalson & Allred 1197.*
CAREX PRAEGRACILIS W. Boott. Riparian and aquatic zones, mesic slopes and ridges. *770.*
‡CAREX ROSSII Boott. Mesic slopes and ridges, burned areas. *975* (MICH).
CAREX STIPATA Muhl. ex Willd. var. STIPATA. Riparian and aquatic zones. *604.*
CAREX WOOTONII Mack. Riparian and aquatic zones. *Roalson & Allred 520.*
CYPERUS FENDLERIANUS Boeck. Dry slopes and ridges. *709.*
CYPERUS PARISHII Britton. Riparian and aquatic zones. *1063.*
CYPERUS SPHAEROLEPIS Boeck. [*C. fendlerianus* Boeck. var. *debilis* (Britton) Kük., *C. rusbyi* Britton]. Dry slopes and ridges. *1073.*
ELEOCHARIS PALUSTRIS (L.) Roem. & Schult. Riparian and aquatic zones. *857.*

IRIDACEAE

IRIS MISSOURIENSIS Nutt. Riparian and aquatic zones. *783.*
SISYRINCHIUM ARIZONICUM Rothr. Mesic slopes and ridges. *623.*

JUNCACEAE

JUNCUS CONFUSUS Coville. Riparian and aquatic zones. *566.*
JUNCUS SAXIMONTANUS A. Nelson. Riparian and aquatic zones. *574.*
JUNCUS TENUIS Willd. Riparian and aquatic zones. *835.*

LILIACEAE

ALLIUM CERNUUM Roth var. OBTUSUM Cockerell ex J. F. Macbr. Mesic slopes and ridges. *643.*
ALLIUM GLANDULOSUM Link & Otto. Open valley bottoms. *1059.*
ECHEANDIA FLAVESCENS (Schult. & Schult.f.) Cruden [*Anthericum f.* Schult. & Schult.f.]. Mesic slopes and ridges. *1054.*
MAIANTHEMUM RACEMOSUM (L.) Link [*Smilacina racemosa* (L.) Desf.]. Mesic slopes and ridges, Narrow canyons. *779.*
MAIANTHEMUM STELLATUM (L.) Link [*Smilacina stellata* (L.) Desf.]. Mesic slopes and ridges. *822.*
ZIGADENUS VIRESCENS (Kunth) J. F. Macbr. Mesic slopes and ridges, burned areas. *976.*

ORCHIDACEAE

MALAXIS WENDTII Salazar [*Malaxis ehrenbergii auct. non* (C. Rchb.) Kuntze]. Mesic slopes and ridges. *1015.*
MALAXIS MACROSTACHYA (Lex.) Kuntze. Open valley bottoms. *1153.*
PLATANTHERA SPARSIFLORA (S. Watson) Schltr. var. SPARSIFLORA [*Habenaria s.* S. Watson]. Mesic slopes and ridges. *Roalson & Allred 1200.*

POACEAE (GRAMINEAE)

AGROSTIS EXARATA Trin. var. MINOR Hook. Riparian and aquatic zones. *Roalson & Allred 1199.*
*AGROSTIS GIGANTEA Roth. Riparian and aquatic zones. *1148.*
AGROSTIS SCABRA Willd. Riparian and aquatic zones. *753.*
ALOPECURUS AEQUALIS Sobol. Riparian and aquatic zones. *589.*
BLEPHARONEURON TRICHOLEPIS (Torr.) Nash. Dry slopes and ridges, high elevation meadows. *694.*
BOUTELOUA CURTIPENDULA (Michx.) Torr. var. CURTIPENDULA. Dry slopes and ridges. *713.*
BOUTELOUA GRACILIS (Willd. ex Kunth) Lag. ex Griffiths. Dry slopes and ridges, open valley bottoms. *635.*
BROMUS CARINATUS Hook. & Arn. Mesic slopes and ridges. *636.*
BROMUS CILIATUS L. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms, high elevation meadows. *710.*
BROMUS FRONDOSUS (Shear) Wooton & Standl. Mesic slopes and ridges, high elevation meadows. *1114.*
*BROMUS JAPONICUS Thunb. ex Murray. Mesic slopes and ridges, burned areas. *865.5.*
*BROMUS TECTORUM L. Mesic slopes and ridges, burned areas. *865.*
*DACTYLIS GLOMERATA L. Open valley bottoms. *872.*
DANTHONIA SPICATA (L.) P. Beauv. ex Roem. & Schult. Mesic slopes and ridges, burned areas. *1119.*
ELYMUS ARIZONICUS (Scribn. & J. G. Sm.) Gould [*Agropyron arizonicum* Scribn. & J. G. Sm.]. Dry slopes and ridges, mesic slopes and ridges. *968.*
ELYMUS LONGIFOLIUS (J. G. Sm.) Gould [*Sitanion hystrix* (Nutt.) J. G. Sm.]. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *Roalson & Allred 527.*
ELYMUS TRACHYCAULUS (Link) Gould ex Shinners ssp. TRACHYCAULUS [*Agropyron trachycaulum* (Link) Malte ex H. F. Lewis]. Mesic slopes and ridges. Individuals were seen that appear to be hybrids between this species and other *Elymus* species (*Roalson & Allred 529*). These are often called *Elymus x pseudorepens* (Scribn. & J. G. Sm.) Barkworth & D. R. Dewey, but are not here distinguished from their parental types. *1032.*
ERAGROSTIS PECTINACEA (Michx.) Nees ex Steud. var. MISERRIMA (E. Fourn.) Reeder. Open valley bottoms. *1000.*
FESTUCA ARIZONICA Vasey. Dry slopes and ridges. *884.*
FESTUCA SORORIA Piper. Riparian and aquatic zones, mesic slopes and ridges. *958.*
GLYCERIA GRANDIS S. Watson. Riparian and aquatic zones. *877.*
HIEROCHLOE ODORATA (L.) P. Beauv. Riparian and aquatic zones, mesic slopes and ridges. *777.*
KOELERIA MACRANTHA (Ledeb.) Schult. [*K. cristata* of many authors]. Mesic slopes and ridges, high elevation meadows. *Roalson & Allred 522.*
*LOLIUM PERENNE L. var. ARISTATUM Willd. Mesic slopes and ridges, narrow canyons. *1033.*
*LOLIUM PERENNE L. var. PERENNE. Mesic slopes and ridges, narrow canyons. *864.*
LYCURUS SETOSUS (Nutt.) C. Reeder [*L. phleoides* of many authors]. Dry slopes and ridges, high elevation meadows. *695.*
MELICA PORTERI Scribn. var. PORTERI. Mesic slopes and ridges, rock outcrops. *631.*
MUHLENBERGIA BREVIS C. O. Goodd. Dry slopes and ridges, open valley bottoms. *Roalson & Allred 1188.*
MUHLENBERGIA DUBIA E. Fourn. ex Hemsl. Open valley bottoms. *1060.*
MUHLENBERGIA LONGILIGULA Hitchc. Dry slopes and ridges, open valley bottoms. *714.*
MUHLENBERGIA MINUTISSIMA (Steud.) Swallen. Open valley bottoms, high elevation meadows. *989.*
MUHLENBERGIA MONTANA (Nutt.) Hitchc. Dry slopes and ridges, mesic slopes and ridges, high elevation meadows, burned areas. *669.*
MUHLENBERGIA PAUCIFLORA Buckley. Dry slopes and ridges, mesic slopes and ridges. *607.*
MUHLENBERGIA RAMULOSA (Kunth) Swallen. Dry slopes and ridges, high elevation meadows. *Roalson & Allred 1181.*
MUHLENBERGIA SINUOSA Swallen. Dry slopes and ridges. *1166.*
MUHLENBERGIA STRAMINEA Hitchc. [*Muhlenbergia virescens* of NM works]. Dry slopes and ridges, open valley bottoms, high elevation meadows. *768.*
MUHLENBERGIA WRIGHTII Vasey ex J. M. Coult. Dry slopes and ridges, mesic slopes and ridges. *673.*
ORYZOPSIS MICRANTHA (Trin. & Rupr.) Thurb. Dry slopes and ridges. *1172.*
PANICUM BULBOSUM Kunth. Dry slopes and ridges, mesic slopes and ridges. *668.*

PANICUM CAPILLARE L. var. BREVIFOLIUM Vasey ex Rydb. & Shear. Open valley bottoms. *663.*

*PHLEUM PRATENSE L. Open valley bottoms. *Roalson & Allred 1204.*

PIPTOCHAETIUM FIMBRIATUM (Kunth) Hitchc. Mesic slopes and ridges. *1068.*

PIPTOCHAETIUM PRINGLEI (Beal) Parodi. Dry slopes and ridges, open valley bottoms. *701.*

*POA ANNUA L. Riparian and aquatic zones. *741.*

POA BIGELOVII Vasey & Scribn. Mesic slopes and ridges, open valley bottoms. *1042.*

POA FENDLERIANA (Steud.) Vasey ssp. FENDLERIANA. Riparian and aquatic zones, Mesic slopes and ridges, narrow canyons. *772.*

*POA PRATENSIS L. Riparian and aquatic zones, Mesic slopes and ridges, open valley bottoms. *793.*

SCHIZACHNE PURPURASCENS (Torr.) Swallen. Mesic slopes and ridges. *847.*

SCHIZACHYRIUM SCOPARIUM (Michx.) Nash [*Andropogon scoparius* Michx.]. Dry slopes and ridges. *685.*

SETARIA GRISEBACHII E. Fourn. Open valley bottoms. *736.*

STIPA SCRIBNERI Vasey [*Achnatherum s.* (Vasey) Barkw.]. Dry slopes and ridges. *1055.*

TRISETUM MONTANUM Vasey. Mesic slopes and ridges, narrow canyons. *959.*

ANGIOSPERMAE—DICOTYLEDONES

ACERACEAE

ACER GLABRUM Torr. Mesic slopes and ridges, narrow canyons, burned areas. *821.*

AMARANTHACEAE

AMARANTHUS PALMERI S. Watson. Open valley bottoms. *599.*

ANACARDIACEAE

RHUS GLABRA L. Mesic slopes and ridges. *1136.*

TOXICODENDRON RYDBERGII (Small ex Rydberg) Greene [*Rhus radicans* L. var. *rydbergii* (Small ex Rydberg) Rehder]. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *No voucher.*

APIACEAE (UMBELLIFERAE)

ALETES ACAULIS (Torr.) J. M. Coult. & Rose. Mesic slopes and ridges. *979.*

LIGUSTICUM PORTERI J. M. Coult. & Rose. Mesic slopes and ridges. *575.*

OSMORHIZA DEPAUPERATA Phil. Mesic slopes and ridges. *828.*

PSEUDOCYMOPTERUS MONTANUS (A. Gray) J. M. Coult. & Rose. Mesic slopes and ridges, burned areas. *562.*

APOCYNACEAE

APOCYNUM CANNABINUM L. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *883.*

ARALIACEAE

ARALIA RACEMOSA L. Mesic slopes and ridges, narrow canyons. *1178.*

ASTERACEAE (COMPOSITAE)

ACHILLEA MILLEFOLIUM L. var. MILLEFOLIUM. Dry slopes and ridges, mesic slopes and ridges, burned areas. *Roalson & Allred 530.*

AGOSERIS GLAUCA (Pursh) Raf. var. AGRESTIS (Osterh.) Q. Jones ex Cronquist. Mesic slopes and ridges. *1020.*

ANTENNARIA PARVIFOLIA Nutt. Mesic slopes and ridges, narrow canyons. *792.*

ARTEMISIA CAMPESTRIS L. ssp. PACIFICA (Nutt.) H. M. Hall & Clem. Mesic slopes and ridges. *1089.*

ARTEMISIA FRANSERIOIDES Greene. Mesic slopes and ridges, burned areas. *954.*

ARTEMISIA LUDOVICIANA Nutt. ssp. LUDOVICIANA. Dry slopes and ridges, mesic slopes and ridges, burned areas. *906.*

ARTEMISIA LUDOVICIANA Nutt. ssp. MEXICANA (Willd. ex Spreng.) D. D. Keck. Mesic slopes and ridges, open valley bottoms. *578.*

BRICKELLIA EUPATORIOIDES (L.) Shinners var. CHLOROLEPIS (Wooton & Standl.) B. L. Turner. Dry slopes and ridges. *702.*

BRICKELLIA GRANDIFLORA (Hook.) Nutt. var. GRANDIFLORA. Mesic slopes and ridges, open valley bottoms, rock outcrops. *756.*

CENTAUREA ROTHROCKII Greenm. Mesic slopes and ridges. *1135.*

CIRSIUM ARIZONICUM (A. Gray) Petr. Open valley bottoms, high elevation meadows. *914.*

CIRSIUM PARRYI (A. Gray) Petr. Riparian and aquatic zones, open valley bottoms. *940.*

CIRSIUM WHEELERI (A. Gray) Petr. Mesic slopes and ridges, narrow canyons, burned areas. *626.*

*CONYZA CANADENSIS (L.) Cronquist. Mesic slopes and ridges. *749.*

COSMOS PARVIFLORUS (Jacq.) Pers. Open valley bottoms, high elevation meadows. *993.*

ERIGERON DIVERGENS Torr. & A. Gray. Dry slopes and ridges, mesic slopes and ridges, burned areas. *763.*

ERIGERON FLAGELLARIS A. Gray. Dry slopes and ridges, open valley bottoms. *780.*

ERIGERON FORMOSISSIMUS Greene var. FORMOSISSIMUS. Dry slopes and ridges, mesic slopes and ridges, narrow canyons, burned areas. *555.*

ERIGERON NEOMEXICANUS A. Gray. Mesic slopes and ridges, burned areas. *963.*

†ERIGERON SCOPULINUS G. L. Nesom & V.D. Roth. Rock outcrops. *911.*

ERIGERON SPECIOSUS (Lindl.) DC. var. MACRANTHUS (Nutt.) Cronquist. Mesic slopes and ridges, burned areas. *973.*

EUPATORIUM HERBACEUM (A. Gray) Greene. Rock outcrops. *1141.*

*GALINSOGA PARVIFLORA Cav. Dry slopes and ridges, rock outcrops. *757.*

GNAPHALIUM MACOUNII Greene. Mesic slopes and ridges. *1138.*

GNAPHALIUM STRAMINEUM Kunth. Mesic slopes and ridges, burned areas. *983.*

GUTIERREZIA WRIGHTII A. Gray [*Xanthocephalum w.* (A. Gray) A. Gray]. Dry slopes and ridges, mesic slopes and ridges. *1021.*

HELIANTHELLA QUINQUENERVIS (Hook.) A. Gray. Mesic slopes and ridges, narrow canyons. *1084.*

HELIOMERIS MULTIFLORA Nutt. [*Viguiera m.* (Nutt.) S. F. Blake]. Dry slopes and ridges. *698.*

HETEROTHECA CANESCENS (DC.) Shinners [*Chrysopsis c.* (DC.) Torr. & A. Gray, non DC.]. Open valley bottoms. *717.*

HIERACIUM FENDLERI Sch. Bip. var. FENDLERI. Mesic slopes and ridges. *845.*

HIERACIUM RUSBYI Greene. Mesic slopes and ridges. *1075.*

HYMENOPAPPUS MEXICANUS A. Gray. Dry slopes and ridges, mesic slopes and ridges. *670.*

HYMENOXYS HOOPESII (A. Gray) Bierner [*Helenium h.* A. Gray]. Riparian and aquatic zones, mesic slopes and ridges, open valley bottoms. *602.*

LAENNECIA SCHIEDEANA (Less.) G. L. Nesom [*Conyza s.* (Less.) Cronquist]. Open valley bottoms. *1158.*

MACHAERANTHERA BIGELOVII (A. Gray) Greene. Mesic slopes and ridges, narrow canyons. *627.*

MACHAERANTHERA GRACILIS (Nutt.) Shinners. Mesic slopes and ridges, open valley bottoms, burned areas. *1092.*

MACHAERANTHERA TANACETIFOLIA (Kunth) Nees. Mesic slopes and ridges, burned areas. *1090.*

PERICOME CAUDATA A. Gray. Mesic slopes and ridges, narrow canyons, rock outcrops, burned areas. *1143.*

PERITYLE STAUROPHYLLA (Barneby) Shinners. Dry slopes and ridges, mesic slopes and ridges. *1027.*

RUDBECKIA LACINIATA L. Open valley bottoms. *601.*

SENECIO ACTINELLA Greene. Open valley bottoms. *834.*

SENECIO CYNTHIOIDES Greene. Mesic slopes and ridges, high elevation meadows, burned areas. *948.*

SENECIO EREMOPHILUS Richardson var. MACDOUGALII (A. Heller) Cronquist. Dry slopes and ridges, open valley bottoms. *700.*

SENECIO FLACCIDUS Less. Mesic slopes and ridges, burned areas. *1096.*

SENECIO NEOMEXICANUS A. Gray var. MUTABILIS (Greene) T. M. Barkley. Dry slopes and ridges, mesic slopes and ridges. *767.*

†SENECIO SACRAMENTANUS Wooton & Standl. Open valley bottoms. *Roalson & Allred 1202.*

SENECIO SPARTIOIDES Torr. & A. Gray. Mesic slopes and ridges, burned areas. *1095.*

SENECIO STREPTANTHIFOLIUS Greene. Mesic slopes and ridges. *769.*

SOLIDAGO MISSOURIENSIS Nutt. Dry slopes and ridges, mesic slopes and ridges. *560.*

SOLIDAGO PARRYI (A. Gray) Greene [*Oreochrysum p.* (A. Gray) Rydb.]. Mesic slopes and ridges. *618.*

SOLIDAGO SPATHULATA DC. var. NEOMEXICANA (A. Gray) Cronquist. Mesic slopes and ridges, burned areas. *634.*

STEVIA SERRATA Cav. Dry slopes and ridges. *1100.*

SYMPHYOTRICHUM FOLIACEUM (Lindl. ex DC.) G. L. Nesom var. CANBYI (A. Gray) G. L. Nesom [*Aster foliaceus* Lindl. ex DC. var. *canbyi* A. Gray]. Mesic slopes and ridges, burned areas. *1094.*

TARAXACUM CERATOPHORUM (Ledeb.) DC. Mesic slopes and ridges. *1076.*

*TARAXACUM OFFICINALE Weber ex F. H. Wigg. Riparian and aquatic zones, open valley bottoms. *778.*

TOWNSENDIA FORMOSA Greene. Mesic slopes and ridges, narrow canyons. *556.*

*TRAGOPOGON PRATENSIS L. Mesic slopes and ridges, open valley bottoms, burned areas. *689.*

VIGUIERA CORDIFOLIA A. Gray. Dry slopes and ridges. *1045.*

BERBERIDACEAE

MAHONIA REPENS (Lindl.) G. Don [*Berberis r.* Lindl.]. Mesic slopes and ridges, narrow canyons. *917.*

BETULACEAE

ALNUS INCANA (L.) Moench ssp. TENUIFOLIA (Nutt.) Breitung [*A. t.* Nutt.]. Riparian and aquatic zones. *Roalson & Allred 540.*

BORAGINACEAE

HACKELIA FLORIBUNDA (Lehm.) I. M. Johnst. Dry slopes and ridges, mesic slopes and ridges, narrow canyons. *563.*

LITHOSPERMUM MULTIFLORUM Torr. ex A. Gray. Mesic slopes and ridges. *624.*

MERTENSIA FRANCISCANA A. Heller. Riparian and aquatic zones, mesic slopes and ridges, narrow canyons. *844.*

ONOSMODIUM MOLLE Michx. ssp. OCCIDENTALE (Mack.) Cochrane. Dry slopes and ridges, mesic slopes and ridges, narrow canyons. *708.*

BRASSICACEAE (CRUCIFERAE)

ARABIS PERENNANS S. Watson. Dry slopes and ridges. *802.*

*BRASSICA NAPUS L. Open valley bottoms. *873.*

DESCURAINIA INCISA (Engelm. ex A. Gray) Britton ssp. VISCOSA (Rydb.) Rollins. Mesic slopes and ridges, burned areas. *955.*

*DESCURAINIA SOPHIA (L.) Prantl. Open valley bottoms. *806.*

DRABA HELLERIANA Greene var. PATENS (A. Heller) O. E. Schulz. Mesic slopes and ridges, narrow canyons. *Roalson & Allred 1180.*

†DRABA MOGOLLONICA Greene. Rock outcrops. *776.*

ERYSIMUM CAPITATUM (Douglas) Greene. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *581.*

LEPIDIUM RAMOSISSIMUM A. Nelson. Open valley bottoms. *652.*

PENNELLIA LONGIFOLIA (Benth.) Rollins. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *748.*

*RORIPPA NASTURTIUM-AQUATICUM (L.) Hayek. Riparian and aquatic zones. *719.*

SCHOENOCRAMBE LINEARIFOLIA (A. Gray) Rollins [*Sisymbrium linearifolium* (A. Gray) Payson, *Thelypodiopsis linearifolia* (A. Gray) Al-Shehbaz]. Dry slopes and ridges, rock outcrops. *614.*

THELYPODIUM WRIGHTII A. Gray. Rock outcrops. *1159.*

*THLASPI ARVENSE L. Open valley bottoms. *937.*

THLASPI MONTANUM L. var. FENDLERI (A. Gray) P. K. Holmgren. Riparian and aquatic zones, mesic slopes and ridges, narrow canyons. *752.*

CACTACEAE

ECHINOCEREUS COCCINEUS Engelm. var. COCCINEUS [*E. triglochidatus* Engelm. var. *melanacanthus* (Engelm.) L. D. Benson]. Dry slopes and ridges, rock outcrops. *801.*

OPUNTIA MACRORHIZA Engelm. var. MACRORHIZA. Dry slopes and ridges, rock outcrops. *816.*

CAMPANULACEAE

CAMPANULA ROTUNDIFOLIA L. Mesic slopes and ridges. *585.*

CANNABACEAE

HUMULUS LUPULUS L. var. NEOMEXICANUS Nelson & Cockerell [*H. americanus* of NM authors]. Mesic slopes and ridges. *Roalson & Allred 1194.*

CAPRIFOLIACEAE

LONICERA ARIZONICA Rehder. Mesic slopes and ridges, narrow canyons. *881.*

SAMBUCUS CAERULEA Raf. var. NEOMEXICANA (Wooton) Rehder [*S. n.* Wooton]. Riparian and aquatic zones, dry slopes and ridges, mesic slopes and ridges, burned areas. *Roalson & Allred 548.*

SYMPHORICARPOS ALBUS (L.) S. F. Blake var. ALBUS. Mesic slopes and ridges, burned areas. *882.*

SYMPHORICARPOS OREOPHILUS A. Gray. Mesic slopes and ridges, burned areas. *977.*

CARYOPHYLLACEAE

CERASTIUM ARVENSE L. Mesic slopes and ridges. *786.*

CERASTIUM NUTANS Raf. var. NUTANS. Mesic slopes and ridges. *564.*

CERASTIUM NUTANS Raf. var. OBTECTUM Kearney & Peebles. Mesic slopes and ridges, burned areas. *953.*

DRYMARIA GLANDULOSA C. Presl. Open valley bottoms. *1070.*

DRYMARIA LEPTOPHYLLA (Cham. & Schltdl.) Fenzl ex Rohrb. Open valley bottoms, high elevation meadows. *1062.*

SILENE LACINIATA Cav. Dry slopes and ridges, mesic slopes and ridges, burned areas. *630.*

SILENE SCOULERI Hook. ssp. PRINGLEI (S. Watson) C. L. Hitchc. & Maguire. Mesic slopes and ridges. *605.*

STELLARIA LONGIFOLIA Muhl. ex Willd. Mesic slopes and ridges. *830.*

CELASTRACEAE

PAXISTIMA MYRSINITES (Pursh) Raf. Rock outcrops. *1171.*

CHENOPODIACEAE

CHENOPODIUM HIANS Standl. Dry slopes and ridges, open valley bottoms, burned areas. *744.*

*CHENOPODIUM RUBRUM L. Dry slopes and ridges, burned areas. *910.*

TELOXYS GRAVEOLENS (Willd.) W. A. Weber [*Chenopodium g.* Willd.]. Dry slopes and ridges, open valley bottoms, high elevation meadows. *725.*

CLUSIACEAE (GUTTIFERAE)

HYPERICUM SCOULERI Hook. ssp. SCOULERI [*H. formosum* Kunth ssp. *s.* (Hook.) C.L. Hitchc.]. Riparian and aquatic zones. *970.*

CONVOLVULACEAE

IPOMOEA CAPILLACEA (Kunth) G. Don. High elevation meadows, rock outcrops. *609.*

IPOMOEA CRISTULATA H.M. Hall. Rock outcrops. *1133.*

CORNACEAE

CORNUS SERICEA L. ssp. SERICEA [*Cornus stolonifera* Michx.]. Riparian and aquatic zones. *762.*

CRASSULACEAE

SEDUM STELLIFORME S. Watson. Rock outcrops. *650.*

CUCURBITACEAE

ECHINOPEPON WRIGHTII (A. Gray) S. Watson. Rock outcrops. *Roalson & Allred 1189.*

ERICACEAE

ARCTOSTAPHYLOS UVA-URSI (L.) Spreng. Mesic slopes and ridges. *878.*

CHIMAPHILA UMBELLATA (L.) Nutt. Mesic slopes and ridges. *923.*

VACCINIUM SCOPARIUM Leiberg. Mesic slopes and ridges, burned areas. *980.*

EUPHORBIACEAE

ACALYPHA NEOMEXICANA Müll. Arg. High elevation meadows. *1165.*

CHAMAESYCE PARRYI (Engelm.) Rydb. [*Euphorbia p.* Engelm.]. Open valley bottoms, high elevation meadows. *1007.*

CHAMAESYCE SERPYLLIFOLIA (Pers.) Small [*Euphorbia neomexicana* Greene, *Euphorbia s.* Pers.]. Open valley bottoms. *662.*

EUPHORBIA ROBUSTA (Engelm.) Small. Dry slopes and ridges, rock outcrops. *788.*

TRAGIA RAMOSA Torr. Dry slopes and ridges. *818.*

FABACEAE (LEGUMINOSAE)

ASTRAGALUS EGGLESTONII (Rydb.) Kearney & Peebles. Mesic slopes and ridges, open valley bottoms. *646.*

ASTRAGALUS GILENSIS Greene. Dry slopes and ridges, mesic slopes and ridges, rock outcrops. *684.*

ASTRAGALUS HUMISTRATUS A. Gray var. HUMISTRATUS. Mesic slopes and ridges, open valley bottoms. *653.*

CALLIANDRA HUMILIS Benth. Dry slopes and ridges. *1106.*

DALEA FILIFORMIS A. Gray. High elevation meadows. *1124.*

DALEA LEPORINA (Aiton) Bullock. Open valley bottoms. *987.*

DALEA POLYGONOIDES var. POLYGONOIDES A. Gray. Open valley bottoms. *734.*

DESMODIUM ROSEI B. G. Schub. Dry slopes and ridges. *1167.*

GALACTIA WRIGHTII A. Gray. Rock outcrops. *608.*

LATHYRUS GRAMINIFOLIUS (S. Watson) T. G. White. Dry slopes and ridges, mesic slopes and ridges. *760.*

LATHYRUS LANSZWERTII Kellogg var. ARIZONICUS (Britton) S. L. Welsh. Mesic slopes and ridges, rock outcrops. *743.*

LOTUS WRIGHTII (A. Gray) Greene. Dry slopes and ridges, rock outcrops. *610.*

LUPINUS NEOMEXICANUS Greene. Dry slopes and ridges, mesic slopes and ridges, rock outcrops. *774.*

*MEDICAGO LUPULINA L. Open valley bottoms. *932.*

OXYTROPIS LAMBERTII Pursh. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *622.*

PHASEOLUS ACUTIFOLIUS A. Gray var. TENUIFOLIUS A. Gray. Dry slopes and ridges. *1111.*

PHASEOLUS GRAYANUS Wooton & Standl. Dry slopes and ridges, mesic slopes and ridges. *1029.*

PHASEOLUS MACULATUS Scheele. Dry slopes and ridges. *1043.*

ROBINIA NEOMEXICANA A. Gray var. NEOMEXICANA. Dry slopes and ridges, mesic slopes and ridges, burned areas. *893.*

THERMOPSIS MONTANA Nutt. Riparian and aquatic zones, Dry slopes and ridges, mesic slopes and ridges. *781.*

*TRIFOLIUM PRATENSE L. Open valley bottoms. *871.*

VICIA AMERICANA Muhl. ex Willd. ssp. AMERICANA. Mesic slopes and ridges. *1128.*

VICIA AMERICANA Muhl. ex Willd. ssp. MINOR (Hook.) C.R. Gunn. Mesic slopes and ridges. *837.*

VICIA PULCHELLA Kunth. Mesic slopes and ridges. *621.*

FAGACEAE

QUERCUS GAMBELII Nutt. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms, rock outcrops, burned areas. *812.*

QUERCUS GRISEA Liebm. Dry slopes and ridges. *813.*

QUERCUS X UNDULATA Torr. Dry slopes and ridges. *814.*

GENTIANACEAE

FRASERA SPECIOSA Douglas ex Griseb. [*Swertia radiata* (Kellogg) Kuntze]. Mesic slopes and ridges, narrow canyons. *1176.*

GENTIANA AFFINIS Griseb. Open valley bottoms. *699.*

GENTIANELLA AMARELLA (L.) Börner ssp. ACUTA (Michx.) J. M. Gillett. Riparian and aquatic zones, mesic slopes and ridges. *696.*

HALENIA RECURVA (Sm.) Allen. Mesic slopes and ridges. *1098.*

GERANIACEAE

GERANIUM CAESPITOSUM E. James var. CAESPITOSUM. Mesic slopes and ridges, open valley bottoms. *657.*

GERANIUM CAESPITOSUM E. James var. FREMONTII (Torr. ex A. Gray) Dorn [*G. fremontii* Torr. ex A. Gray]. Mesic slopes and ridges. *568.*

GROSSULARIACEAE

RIBES PINETORUM Greene. Riparian and aquatic zones, dry slopes and ridges, mesic slopes and ridges, narrow canyons, burned areas. *773.*

HYDRANGEACEAE

FENDLERA RUPICOLA A. Gray. Dry slopes and ridges. *809.*

JAMESIA AMERICANA Torr. & A. Gray. Riparian and aquatic zones. *754.*

HYDROPHYLLACEAE

NAMA DICHOTOMUM (Ruiz & Pav.) Choisy. Open valley bottoms, high elevation meadows. *997.*

PHACELIA HETEROPHYLLA Pursh. Mesic slopes and ridges, burned areas. *950.*

LAMIACEAE (LABIATAE)

AGASTACHE PALLIDIFLORA (A. Heller) Rydb. var. PALLIDIFLORA. Mesic slopes and ridges, narrow canyons, burned areas. *620.*

MONARDA AUSTROMONTANA Epling. Open valley bottoms. *1058.*

MONARDA MENTHAEFOLIA Graham. Mesic slopes and ridges. *580.*

MONARDELLA ODORATISSIMA Benth. Mesic slopes and ridges. *971.*

PRUNELLA VULGARIS L. Riparian and aquatic zones. *929.*

SALVIA SUBINCISA Benth. Dry slopes and ridges, open valley bottoms. *655.*

LINACEAE

LINUM LEWISII Pursh var. LEWISII. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms, burned areas. *625.*

LINUM PUBERULUM (Engelm.) A. Heller. Mesic slopes and ridges. *733.*

MALVACEAE

SPHAERALCEA FENDLERI A. Gray var. FENDLERI. Dry slopes and ridges, rock outcrops. *615.*

NYCTAGINACEAE

MIRABILIS LONGIFLORA L. Dry slopes and ridges. *1072.*

MIRABILIS OBLONGIFOLIA (A. Gray) Heimerl. Dry slopes and ridges, mesic slopes and ridges, burned areas. *613.*

MIRABILIS OXYBAPHOIDES (A. Gray) A. Gray. Rock outcrops. *1154.*

ONAGRACEAE

EPILOBIUM ANGUSTIFOLIUM L. ssp. CIRCUMVAGUM Mosquin. Riparian and aquatic zones. *967.*

EPILOBIUM CILIATUM Raf. ssp. CILIATUM. Riparian and aquatic zones. *956.*

EPILOBIUM SAXIMONTANUM Hausskn. Riparian and aquatic zones. *573.*

GAURA HEXANDRA Ortega ssp. GRACILIS (Wooton & Standl.) P. H. Raven & D. P. Greg. Dry slopes and ridges. *639.*

OENOTHERA ELATA Kunth ssp. HIRSUTISSIMA (A. Gray ex S. Watson) W. Dietr. Mesic slopes and ridges *576.*

OENOTHERA PALLIDA Lindl. ssp. RUNCINATA (Engelm.) Munz & W. M. Klein. Mesic slopes and ridges, burned areas. *691.*

OROBANCHACEAE

CONOPHOLIS ALPINA Liebm. var. MEXICANA (A. Gray ex S. Watson) R. R. Haynes. Dry slopes and ridges, mesic slopes and ridges. *867.*

OXALIDACEAE

OXALIS ALPINA (Rose) Rose ex R. Knuth [*O. metcalfei* (Small) R. Knuth, *O. monticola* Small]. Mesic slopes and ridges, rock outcrops. *569.*

OXALIS DECAPHYLLA Kunth [*O. grayi* (Rose) R. Knuth]. Riparian and aquatic zones, mesic slopes and ridges. *742.*

PAPAVERACEAE

CORYDALIS AUREA Willd. ssp. OCCIDENTALIS (Engelm.) G. B. Ownbey. Riparian and aquatic zones, mesic slopes and ridges. *766.*

PLANTAGINACEAE

PLANTAGO ARGYRAEA Morris. Open valley bottoms. *664.*

*PLANTAGO MAJOR L. Riparian and aquatic zones. *665.*

POLEMONIACEAE

IPOMOPSIS AGGREGATA (Pursh) V. E. Grant. Mesic slopes and ridges, high elevation meadows. *629.*

POLEMONIUM FOLIOSISSIMUM A. Gray var. MOLLE (Greene) Anway. Mesic slopes and ridges. *1081.*

POLYGALACEAE

MONNINA WRIGHTII A. Gray. Mesic slopes and ridges. *1137.*

POLYGONACEAE

ERIOGONUM JAMESII Benth. var. JAMESII. Dry slopes and ridges, rock outcrops. *612.*

ERIOGONUM PHARNACEOIDES Torr. Dry slopes and ridges, open valley bottoms, rock outcrops. *647.*

*POLYGONUM AVICULARE L. Riparian and aquatic zones. *998.*

*POLYGONUM CONVOLVULUS L. Riparian and aquatic zones. *1147.*

POLYGONUM DOUGLASII Greene. Riparian and aquatic zones. *992.*

*POLYGONUM LAPATHIFOLIUM L. Riparian and aquatic zones. *659.*

RUMEX CRISPUS L. Riparian and aquatic zones. *750.*

PORTULACACEAE

TALINUM CONFERTIFLORUM Greene. Rock outcrops. *728.*

PRIMULACEAE

ANDROSACE SEPTENTRIONALIS L. ssp. PUBERULENTA (Rydb.) G. T. Robbins. Mesic slopes and ridges, open valley bottoms. *771.*

PRIMULA RUSBYI Greene. Mesic slopes and ridges, rock outcrops. *894.*

RANUNCULACEAE

AQUILEGIA CHRYSANTHA A. Gray. Mesic slopes and ridges. *715.*

AQUILEGIA TRITERNATA Payson. Mesic slopes and ridges, narrow canyons. *826.*

CLEMATIS COLUMBIANA (Nutt.) Torr. & A. Gray var. COLUMBIANA. Mesic slopes and ridges. *805.*

DELPHINIUM SCOPULORUM A. Gray. Mesic slopes and ridges. *745.*

DELPHINIUM TENUISECTUM Greene ssp. AMPLIBRACTEATUM (Wooton) Ewan. Open valley bottoms. *645.*

RANUNCULUS HYDROCHAROIDES A. Gray. Riparian and aquatic zones. *588.*

THALICTRUM FENDLERI Engelm. ex A. Gray. Mesic slopes and ridges. *674.*

RHAMNACEAE

CEANOTHUS FENDLERI A. Gray. Dry slopes and ridges, mesic slopes and ridges. *1086.*

FRANGULA BETULAEFOLIA (Greene) Grubov ssp. BETULAEFOLIA [*Rhamnus b.* Greene]. Dry slopes and ridges. *1161.*

ROSACEAE

AGRIMONIA GRYPSOSEPALA Wallr. Riparian and aquatic zones, mesic slopes and ridges. *603.*

AMELANCHIER UTAHENSIS Koehne. Mesic slopes and ridges. *850.*

CERCOCARPUS MONTANUS Raf. var. MONTANUS. Dry slopes and ridges, high elevation meadows, rock outcrops. *800.*

FALLUGIA PARADOXA (D. Don) Endl. ex Torr. Dry slopes and ridges. *648.*

FRAGARIA VESCA L. ssp. AMERICANA (Porter) Staudt [*F. a.* (Porter) Britton]. Riparian and aquatic zones, Mesic slopes and ridges. *703.*

GEUM ALEPPICUM Jacq. Riparian and aquatic zones. *880.*

GEUM TRIFLORUM Pursh var. CILIATUM (Pursh) Fassett. Mesic slopes and ridges, open valley bottoms. *795.*

HOLODISCUS DUMOSUS (Nutt. ex Hook.) A. Heller. Dry slopes and ridges, mesic slopes and ridges, narrow canyons. *928.*

PENTAPHYLLOIDES FLORIBUNDA (Pursh) Á. Löve [*Potentilla fruticosa* auct. non L.]. Riparian and aquatic zones, mesic slopes and ridges. *638.*

PHYSOCARPUS MONOGYNUS (Torr.) J. M. Coult. Dry slopes and ridges. *912.*

POTENTILLA HIPPIANA Lehm. var. HIPPIANA. Riparian and aquatic zones, mesic slopes and ridges. *572.*

*POTENTILLA NORVEGICA L. Mesic slopes and ridges, open valley bottoms. *642.*

POTENTILLA RIVALIS Nutt. var. MILLEGRANA (Engelm. ex Lehm.) S. Watson. Riparian and aquatic zones, burned areas. *Roalson & Allred 1198.*

POTENTILLA THURBERI A. Gray var. ATRORUBENS (Rydb.) Kearney & Peebles. Mesic slopes and ridges. *558.*

PRUNUS EMARGINATA (Douglas ex Hook.) Walp. var. EMARGINATA. Mesic slopes and ridges, narrow canyons. *888.*

PRUNUS VIRGINIANA L. var. MELANOCARPA (A. Nelson) Sarg. Dry slopes and ridges, mesic slopes and ridges, narrow canyons. *545.*

ROSA WOODSII Lindl. var. WOODSII. Dry slopes and ridges, mesic slopes and ridges. *840.*

RUBUS IDAEUS L. ssp. STRIGOSUS (Michx.) Focke [*R. strigosus* Michx. var. *arizonicus* (Greene) Kearney & Peebles]. Riparian and aquatic zones, dry slopes and ridges, mesic slopes and ridges, burned areas. *561.*

RUBUS PARVIFLORUS Nutt. Riparian and aquatic zones, mesic slopes and ridges, narrow canyons, burned areas. *746.*

RUBIACEAE

GALIUM FENDLERI A. Gray. Dry slopes and ridges. *633.*

GALIUM TRIFLORUM Michx. Riparian and aquatic zones, mesic slopes and ridges. *751.*

HOUSTONIA WRIGHTII A. Gray [*Hedyotis w.* (A. Gray) Fosberg]. Rock outcrops. *611.*

SALICACEAE

POPULUS ANGUSTIFOLIA E. James. Riparian and aquatic zones. *855.*

POPULUS TREMULOIDES Michx. Dry slopes and ridges, mesic slopes and ridges, narrow canyons, burned areas. *Roalson & Allred 535.*

SALIX LUCIDA Muhl. ssp. LASIANDRA (Benth.) E. Murray [*S. lasiandra* Benth.]. Riparian and aquatic zones. *Roalson & Allred 542.*

SAXIFRAGACEAE

HEUCHERA NOVOMEXICANA Wheelock. Dry slopes and ridges. *841.*

SCROPHULARIACEAE

CASTILLEJA INTEGRA A. Gray. Dry slopes and ridges, high elevation meadows. *1127.*

CASTILLEJA MINIATA Douglas ex Hook. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms. *554.*

CASTILLEJA RHEXIFLORA Rydb. Mesic slopes and ridges, burned areas. *966.*

MIMULUS GLABRATUS Kunth var. JAMESII (Torr. & A. Gray ex Benth.) A. Gray. Riparian and aquatic zones. *598.*

PENSTEMON BARBATUS (Cav.) Roth ssp. TORREYI (Benth.) D. D. Keck. Mesic slopes and ridges. *557.*

PENSTEMON PINIFOLIUS Greene. Dry slopes and ridges. *886.*

PENSTEMON VIRGATUS A. Gray. Mesic slopes and ridges, open valley bottoms. *567.*

*VERBASCUM THAPSUS L. Open valley bottoms. *600.*

VERONICA PEREGRINA L. ssp. XALAPENSIS (Kunth) Pennell. Riparian and aquatic zones. *936.*

SOLANACEAE

PHYSALIS SUBULATA Rydb. var. NEOMEXICANA (Rydb.) Waterf. ex Kartesz & Gandhi. Open valley bottoms. *1156.*

SOLANUM TRIFLORUM Nutt. Mesic slopes and ridges, open valley bottoms, rock outcrops. *996.*

VALERIANACEAE

VALERIANA ARIZONICA A. Gray. Mesic slopes and ridges, narrow canyons. *775.*

VALERIANA EDULIS Nutt. ex Torr. & A. Gray. Mesic slopes and ridges, open valley bottoms. *565.*

VERBENACEAE

GLANDULARIA BIPINNATIFIDA (Nutt.) Nutt. [*Verbena b.* Nutt.]. Dry slopes and ridges. *628.*

VERBENA MACDOUGALII A. Heller. Dry slopes and ridges. *1071.*

VIOLACEAE

VIOLA CANADENSIS L. var. CANADENSIS. Mesic slopes and ridges. *617.*

VIOLA CANADENSIS L. var. SCOPULORUM A. Gray. Riparian and aquatic zones, mesic slopes and ridges. *829.*

VIOLA NEPHROPHYLLA Greene. Riparian and aquatic zones. *784.*

VISCACEAE

ARCEUTHOBIUM APACHECUM Hawksw. & Wiens. Dry slopes and ridges, mesic slopes and ridges. Parasitic on *Pinus strobiformis. 982.*

ARCEUTHOBIUM VAGINATUM (Willd.) J. Presl subsp. CRYPTOPODIUM (Engelm.) Hawksw. & Wiens. Dry slopes and ridges, mesic slopes and ridges, open valley bottoms, narrow canyons. Parasitic on *Pinus ponderosa* var. *scopulorum. 874.*

VITACEAE

PARTHENOCISSUS QUINQUEFOLIA (L.) Planch. var. QUINQUEFOLIA. Dry slopes and ridges, rock outcrops. *1142.*

VITIS ARIZONICA Engelm. Dry slopes and ridges, rock outcrops. *1065.*

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APPENDIX I

The following list includes vascular taxa collected by the E. H. Roalson in the vicinity of the study area, but outside of it. The taxa are arranged as they are in the checklist. Introduced species are designated by an asterisk (*). All vouchers were collected by E. H. Roalson and deposited in NMCR, unless otherwise noted.

ANGIOSPERMAE—MONOCOTYLEDONES

CYPERACEAE

CAREX HYSTRICINA Muhl. ex Willd. Riparian and aquatic zones. *640.*

ELEOCHARIS OVATA (Roth) Roem. & Schult. Riparian and aquatic zones. *594.*

SCHOENOPLECTUS ACUTUS (Muhl. ex Bigelow) Á. & D. Löve var. OCCIDENTALIS (S. Watson) Smith [*Scirpus a.* of NM authors]. Riparian and aquatic zones. *644.*

JUNCACEAE

JUNCUS BALTICUS Willd. Riparian and aquatic zones. *590.*

POACEAE (GRAMINEAE)

ANDROPOGON GERARDII Vitman. Dry slopes and ridges. *697.*

ARISTIDA ARIZONICA Vasey. Open valley bottoms. *723.*

ARISTIDA HAVARDII Vasey. Open valley bottoms. *724.*

MUHLENBERGIA REPENS (J. Presl) Hitchc. Open valley bottoms. *721.*

POTAMOGETONACEAE

POTAMOGETON FOLIOSUS Raf. var. FOLIOSUS. Riparian and aquatic zones. *593.*

POTAMOGETON NODOSUS Poir. Riparian and aquatic zones. *591.*

ANGIOSPERMAE—DICOTYLEDONES

ASTERACEAE (COMPOSITAE)

AMBROSIA ARTEMISIIFOLIA L. Open valley bottoms. *661.*

ARTEMISIA FRIGIDA Willd. Open valley bottoms. *726.*

RATIBIDA COLUMNIFERA (Nutt.) Wooton & Standl. Open valley bottoms. *678.*

SANVITALIA ABERTII A. Gray. Open valley bottoms. *732.*

SYMPHYOTRICHUM FALCATUM (Lindl.) G. L. Nesom var. FALCATUM [*Aster falcatus* Lindl. var. *falcatus*]. Open valley bottoms. *716.*

TOWNSENDIA EXSCAPA (Richardson) Porter. Dry slopes and ridges, open valley bottoms. *1212.*

BORAGINACEAE

LITHOSPERMUM COBRENSE Greene. Dry slopes and ridges. *679.*

CALLITRICHACEAE

CALLITRICHE HETEROPHYLLA Pursh. Riparian and aquatic zones. *592.*

CAMPANULACEAE

LOBELIA ANATINA Wimm. Riparian and aquatic zones. *595.*

CAPPARACEAE

CLEOME SERRULATA Pursh. Open valley bottoms. *654.*

CARYOPHYLLACEAE

ARENARIA LANUGINOSA (Michx.) Rohrb. ssp. SAXOSA (A. Gray) Maguire. Open valley bottoms. *692.*

CHENOPODIACEAE

CHENOPODIUM LEPTOPHYLLUM Nutt. ex S. Watson. Open valley bottoms. *658.*

ERICACEAE

PTEROSPORA ANDROMEDEA Nutt. Mesic slopes and ridges. *690.*

FABACEAE (LEGUMINOSAE)

LUPINUS KINGII S. Watson var. KINGII. Open valley bottoms. *641.*

TRIFOLIUM MUCRONATUM Willd. ex Spreng. ssp. LACERUM (Greene) J. M. Gillett. Riparian and aquatic zones. *586.*

FAGACEAE

QUERCUS TURBINELLA Greene. Dry slopes and ridges. *676.*

HYDROPHYLLACEAE

PHACELIA ALBA Rydb. Open valley bottoms. *656.*

LAMIACEAE (LABIATAE)

HEDEOMA DRUMMONDII Benth. Open valley bottoms. *730.*

OXALIDACEAE

*OXALIS CORNICULATA L. var. WRIGHTII (A. Gray) B. L. Turner. Riparian and aquatic zones, open valley bottoms. *660.*

POLEMONIACEAE

IPOMOPSIS MULTIFLORA (Nutt.) V. E. Grant. Open valley bottoms. *667.*

LINANTHUS NUTTALLII (A. Gray) Greene ex Milliken [*Linanthastrum n.* (A. Gray) Ewan]. Dry slopes and ridges. *681.*

POLYGONACEAE

ERIOGONUM ALATUM Torr. Open valley bottoms. *672.*

ERIOGONUM POLYCLADON Benth. Open valley bottoms. *731.*

RUMEX SALICIFOLIUS Weinm. var. MEXICANUS (Meisn.) C. L. Hitchc. Riparian and aquatic zones. *718.*

ROSACEAE

POTENTILLA CRINATA A. Gray. Open valley bottoms. *722.*

SCROPHULARIACEAE

ORTHOCARPUS LUTEUS Nutt. Open valley bottoms. *680.*

ORTHOCARPUS PURPUREOALBUS A. Gray ex S. Watson. Dry slopes and ridges. *596.*