Colorado's rare flora

Steve L. O'Kane Jr.

Colorado Natural Areas Program, Denver, Colorado

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COLORADO'S RARE FLORA

Steve L. O'Kane, Jr.1

ABSTRACT.—Distribution, status, habitat, elevational range, original literature citations, synonymy, and specimens deposited at Brigham Young University (BRY), University of Colorado (COLO), Colorado State University (CS), Denver Botanical Garden (KHD), Kansas State University (KSC), University of Kansas (KANU), Missouri Botanical Garden (MO), and the Rocky Mountain Herbarium (RM) are given for 79 species of rare Colorado plants. Species federally listed by the U.S. Fish and Wildlife Service under the Endangered Species Act, candidates for listing, and species that qualify as federal candidates because of limited range, small populations, or known threats are included. Suggested changes in status are offered where appropriate. Maps and tables indicating the Colorado range of these species are provided.

Colorado, because of its geologic history and elevational extremes, its diversity of geologic formations, soil types, topography, local climatic regimes, and floristic affinities (Kruckeberg 1986, Mason 1946a, 1946b, Stebbins and Major 1965, 1980, Welsh 1978a), is host to a number of rare endemic species. Some of these species are directly threatened by human activities that modify or eliminate habitat essential to the species. These threats include overgrazing by domestic livestock, road construction, off-road-vehicle (ORV) use, construction of irrigation ditches and canals, agricultural conversion, residential and summer home construction, chaining, spraying, seeding rangeland to introduced species, competition from exotic weeds, dam construction for hydroelectricity and water storage, and exploration for and extraction of oil, gas, minerals, and oil shale. Furthermore, rare species, by virtue of their narrow endemism or small populations, are more susceptible to stochastic or systematic human-caused extinction (Diamond 1984, Jablonski et al. 1985, Menges 1986, Terborg and Winter 1980, Wilcox 1980); a single catastrophic event could significantly impact or even extirpate them. Some rare species are the objects of intentional harm. Colorado's rare cacti, for example, are actively sought by collectors in this country and abroad.

The Endangered Species Act of 1973 provides protection for species that are threatened with extinction throughout all or a significant portion of their range (endangered) or that are likely to become endangered in the foreseeable future (threatened). Seven species in Colorado are listed as either endangered or threatened, and numerous taxa are under review for listing as endangered or threatened. The most recent list of Colorado's candidate species is contained in the U.S. Fish and Wildlife Service's (1985) list of candidate plant taxa. Endangered and threatened species are listed in the publication Endangered and Threatened Wildlife and Plants (USFWS 1987). The Colorado Natural Areas Program (CNAP) cooperates with the USFWS, through an Endangered Species Act, Section 6 agreement, in protecting rare plant species. CNAP maintains a data base for listed and candidate taxa, as well as for those species that are more common elsewhere but are rare in Colorado. CNAP's list of Colorado rare plants (CNAP 1988) is revised as new data are received. CNAP and USFWS files on rare species in Colorado, data from literature sources, and specimen label data from herbaria with important collections of Colorado specimens have been used to compile this report.

This paper addresses those species that (1) are listed as endangered or threatened, (2) are candidates or are qualified to be candidates for listing, and (3) are no longer candidates but are rare enough to be either reinstated or require constant surveillance to assure that they do not again become rare or threatened in the foreseeable future. Botanists, government agency personnel, ecologists,

1Colorado Natural Areas Program, 1313 Sherman Street, Room 718, Denver, Colorado 80203. Present address: Missouri Botanical Garden, Box 299, St. Louis, Missouri 63106 and Department of Biology, Box 1137, Washington University, St. Louis, Missouri 63130.
environmental consultants, and land developers can use this information to plan for projects that modify natural habitats, to assess the status of rare species contained in project areas, to prepare environmental impact statements, and to plan for fieldwork involving rare species.

The only publications specifically concerning Colorado’s rare plants are Peterson’s (1982) pamphlet on the plants listed as threatened or endangered and Ecology Consultant’s (1979) compendium for the U.S. Forest Service of the rare species of Forest Service Region 6. These publications, now out of date, do not contain information on the availability of specimens for study. However, they have been extensively consulted in the preparation of this paper, as have reports on intensive inventories of individual species and of important botanical areas by CNAP, government agencies, environmental consultants, interested amateurs, university personnel, and The Nature Conservancy (e.g., Galatowitsch et al. 1988, Peterson and Baker 1982, O’Kane 1986, 1987a, 1987b, 1987c, 1987d, Harner and Associates 1984, Knight et al. 1986).

Specimens from eight herbaria were thoroughly examined and are reported herein: Brigham Young University (BYR), University of Colorado (COLO), Colorado State University (CS), Denver Botanical Garden (KHD), Kansas State University (KSC), University of Kansas (KANU), Missouri Botanical Garden (MO), and Rocky Mountain Herbarium (RM). A few specimens from herbaria not thoroughly searched are reported when known. Papers, reports, and books dealing with the rare flora of adjacent states are helpful sources of data for species crossing state borders. For Utah, Welsh et al. (1975), Welsh (1978b), Welsh and Chatterly (1985), and Welsh and Thorne (1979) are freely consulted. Dorn and Dorn (1980) and Ecology Consultants (1979) are used for Wyoming. New Mexico Native Plant Protection Advisory Committee (1984) is employed for data on New Mexico’s rare plants. Mohlenbrock’s book on the threatened and endangered plants of the United States (1983) provides useful information for several of Colorado’s rare plants. Floras and monographs giving data on species distributions include: Harrington (1964) and Weber (1976, 1987) for Colorado; Kearney and Peebles (1960) for Arizona; Martin and Hutchins (1980) for New Mexico; Cronquist et al. (1977, 1984) and Welsh et al. (1987) for Utah; Dorn (1988) for Wyoming; Great Plains Flora Association (1986) for the Great Plains; Goodrich and Neese (1956) for the Uinta Basin; and Barneby (1964) for the genus Astragalus.

Inasmuch as this paper is a companion to Welsh and Chatterly’s (1985) recent report on Utah’s rare plants, the format used in their paper has been followed closely. Habitat, distribution, threats, elevational range, and federal status, as well as distributional maps, useful anecdotal information, and specimen citations are given for each species. The township and range of collection sites are from specimen labels if given, but are otherwise extrapolated from locality descriptions provided on the labels. Dates of collections are provided—month/day/year—to help in planning field surveys. Original literature citations for each species are included to facilitate location of technical descriptions. Although synonyms are provided, an exhaustive literature search has not been conducted to provide a definitive synonymy for each species.

The federal status of each taxon, as defined in the Endangered Species Act and as reported in U.S. Fish and Wildlife Service (1985), is as follows. Species listed as endangered or threatened are protected by specific laws. For Category 1 species the USWS has enough information available to support the appropriateness of being listed as endangered or threatened. Category 2 species are possibly appropriate to list as endangered or threatened, but more data are needed to support preparation of a listing package. Category 2* species meet the criteria of Category 2 but are presumed extinct. Category 3C species are no longer considered candidates for listing. Category 3B species are taxa that do not meet the act’s definition of “species”; this usually means that the entity is either not a “good” taxon or that it is synonymous with a more abundant one. Recommendations are made, where appropriate, that species be considered for listing as threatened or endangered, that taxa currently not candidates be made Category 1 or 2 candidates, or that current candidates be down-graded to Category 3C or 3B.

Binomials and trinomials used here are not necessarily those recommended by authorities familiar with the taxa but are, rather,

Figure 1 shows the townships in Colorado containing federally threatened or endangered taxa. Figure 2 shows townships containing candidate and recommended candidate taxa. Table 1 lists by species the county distribution of the rare species in Colorado. A species list arranged by county is found in Table 2. Maps showing the geographical range of each taxon are found in the Appendix.

COLORADO'S RARE FLORA


**Map 1**

**Family.**—Apiaceae (Umbelliferae).

**Federal Status.**—Category 2.

The Larimer alletes occurs in nearly vertical habitats of Precambrian granite cliffs and isolated tors in the ponderosa pine and Douglas-fir zones of the lower foothills in the drainages of the Poudre River, Larimer County, where it is frequently found growing with *Heuchera* and *Pseudocymopterus*. Localities range in elevation from 2,100 to 2,380 m. Populations are in relatively inaccessible habitats that are little threatened by existing land management. Planned reservoir projects in the area, however, could threaten known populations and potential habitat. Several populations northwest of Fort Collins in Phantom Canyon are protected by The Nature Conservancy. The species has recently been reported from Albany County, Wyoming (Dorn 1988).

**Larimer County:** T9N R71W: Wilken, Popp & Steingraber 13973, 6/8/83 (CS); Hartman 11678, 6/13/80 (RM); T11N R71W: Popp s.n., 6/29/83 (CS); T11N R72W: Neely 3542, 1986 (CS); Popp s.n., 6/29/83 (CS); Johnston & Lucas 1664–5, 6/8/78 (BRY, COLO, RM); Lucas s.n., 6/9/78 (COLO, RM); T12N R71W: Jones 41797, 6/9/65 (CS, RM); Popp s.n., 6/29/83 (CS, RM); Osterhout 4678, 5/24/12 (BRY, COLO, RM); Osterhout 2002, 7/19/99 (BRY, COLO, RM); Johnston & Lucas 1662, 6/7/78 (BRY, COLO); Weber & Jones 12392, 6/9/65 (COLO); Hartman 3077, 5/16/71 (RM); T12N R obscure: Goodding 8850, 4/02 (RM).

*Ambrosia linearis* (Rydb.) Payne, N. Amer. Fl. 33: 27. 1922.

**Map 2**

**Family.**—Asteraceae (Compositae).

**Synonyms.**—*Gaertneria linearis* Rydb., *Franseria linearis* Rydb.

**Federal Status.**—Category 2.

The streaked ragweed is a rarely collected endemic of the eastern plains of Colorado. It is known to occur in sandy, seasonally moist soils. Few searches have been conducted for the species, and records are spotty, coming mostly from disturbed sites of railroad embankments and road borrow ditches. The taxon may be more common, as indicated by the county distribution of the few available records. Inventories are needed to ascertain its status.

**Location Obscure:** Christ 948, 7/10/37 (CS). Elbert County: T9S R64W: Austin 939, 8/7/35 (CS). El Paso County: Location obscure, Ward 3371, 3/19/36 (CS). Kiowa County: T18S R51W: Penland 4686, 8/31/72 (COLO); T18S R52W: Stephens 62753, 9/28/72 (COLO, KANU); Stephens 54547, 6/10/72 (KANU). Lincoln County: T17S R56W: Stephens 62695, 9/28/72 (KANU); Stephens 90540, 7/15/81 (KANU); Stephens 54616, 6/10/72 (KANU); T16S R55W: Ownbey 1325, 7/5/37 (COLO).


**Map 3**

**Family.**—Ranunculaceae (Hellaboraceae).

**Synonym.**—*Aquilegia micrantha* Eastw. f. *mancosana* (Eastw.) W. A. Weber.

**Federal Status.**—Category 2*.

The Mancos columbine is known from two historical collections taken in or near Johnson Canyon, a side canyon of the Mancos River below Mesa Verde National Park. Recent searches of the canyon failed to locate populations of the taxon. The original collections were from damp, alkaline alcoves of cliff overhangs. Collections and sightings of spurless forms of *A. micrantha* have, however, been made elsewhere in the state. This variety needs to be examined taxonomically, as it probably represents only a spurless form of *A. micrantha*, in which case it should be downgraded to Category 3B.
Fig. 1. Distribution of Colorado's federally endangered and threatened species by township. Locations based on specimen labels are shaded. Dots indicate locations based solely on CNAP data.

Montezuma County: T33N R14W: Wetherill s.n., 6/1891 (CAS); Eastwood s.n., 9/1892 (Holotype: CAS).


Map 4

Family.—Asteraceae (Compositae).
Synonym.—Seriphidium canum (Pursh) W. A. Weber ssp. viscidulum (Osterh.) W. A. Weber sensu Weber.

Federal Status.—Category 2.
Coaltown sagebrush grows in a small area in North Park, Jackson County. The taxonomic validity of this taxon is questioned (Leila Shultz, personal communication, Wittmann et al. 1988). This species may be a hybrid between A. cana ssp. viscidula and A. longiloba, both of which occur in North Park, albeit not growing with A. argilosa (Beetle 1959). According to Shultz, other specimens of the taxon may be found filed under A. cana ssp. viscidula. If the taxon should be found to be an unstabilized hybrid or proven to be synonymous with A. cana ssp. viscidula (Seriphidium canum ssp. viscidulum), its status should be downgraded to Category 3B. The species tends to grow on disturbed sites of alkaline mine tailings within flat expanses of sagebrush, Atriplex, and greasewood at ca 2,500 m in elevation.

Jackson County: T6N R50W: Asplund 68–12, 8/24/68 (RM); Beetle & Palmer 12316, 11/12/56 (KANU, RM); Beetle 12872, 7/31/57 (Holotype: RM); Mahaffey s.n., 9/19/65 (CS); Mahaffey s.n., 9/19/65 (CS); Mahaffey & Harrington s.n., 9/19/45 (RM); Wiley-Eberle 454, 7/30/79 (CS); Wiley-Eberle et al. 824, 7/16/81 (CS).

Fig. 2. Distribution of Colorado's current and recommended candidate rare plants by township. Locations based on specimen labels are shaded. Dots indicate locations based solely on CNAP data.

Map 5

**Family.**—Aspleniaceae.

**Synonym.**—*A. adiantum-nigrum* L. of Colorado literature.

**Federal Status.**—Category 2.

The black spleenwort is known from four widely disjunct populations: White Rocks in Boulder County, Colorado; Zion National Park, Utah; near Flagstaff in Coconino County, Arizona; and in Chihuahua, Mexico (McVaugh 1957). The White Rocks population grows in cracks of a light-colored rock outcrop. Development for gravel pits and housing developments may pose a threat to the species (Ecology Consultants 1979). Our material may be conspecific with *A. adiantum-nigrum* L. of Eurasia and Africa (Maxon 1912; Lellinger 1985), in which case it should be downgraded to Category 3B. This is one of the rarest species in the United States.

**Boulder County:** T1N R69W: Andrews s.n., 8/05 (CS); Bethel & Andrews s.n., 8/05 (CS); Betts & Robbins 8340, 12/15/10 (COLO); Andrews s.n., 7/15/17 (COLO); Schramus s.n., 8/1/14 (MO).


Map 6

**Family.**—Fabaceae (Leguminosae).

**Federal Status.**—Category 2.

Cronquist milkvetch is known from Ute Mountain Ute tribal lands in the southwestern corner of Montezuma County, from adjacent Utah, and from Comb Wash in San Juan County, Utah. It occurs in shadscale communities in fine-textured soils derived from Mancos shale and the Morrison Formation. In Colorado it ranges in elevation from 1,475 to 1,750 m. Populations are currently threatened by road construction and gas exploration and by an impending system of canals. The species was recently discovered in Colorado.
Table 1. County distribution of Colorado’s rare plants. A single asterisk indicates species endemic to Colorado. Locations are based on herbarium specimens except where double asterisks indicate county records based solely on CNAP data.

<table>
<thead>
<tr>
<th>Species</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aletes humilis*</td>
<td>Larimer</td>
</tr>
<tr>
<td>Ambrosia linearis*</td>
<td>Elbert, El Paso, Kiowa, Lincoln</td>
</tr>
<tr>
<td>Aquilegia micrantha var. mancosana*</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Arabis vivariensis</td>
<td>Moffat</td>
</tr>
<tr>
<td>Artemisia argilosa*</td>
<td>Jackson</td>
</tr>
<tr>
<td>Asplenium andrewsii</td>
<td>Boulder</td>
</tr>
<tr>
<td>Astragalus cronquistii</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Astragalus debowquaeus*</td>
<td>Mesa</td>
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<tr>
<td>Astragalus deterior*</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Astragalus hamiltonii</td>
<td>Moffat</td>
</tr>
<tr>
<td>Astragalus humilinum</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Astragalus linfolius*</td>
<td>Delta, Mesa, Montrose</td>
</tr>
<tr>
<td>Astragalus microcymbus*</td>
<td>Gunnison</td>
</tr>
<tr>
<td>Astragalus osterhoutii*</td>
<td>Grand</td>
</tr>
<tr>
<td>Astragalus ripeyi</td>
<td>Conejos</td>
</tr>
<tr>
<td>Astragalus schmolliae*</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Astragalus wetherillii</td>
<td>Garfield, Mesa, Moffat, Montrose, San Miguel*</td>
</tr>
<tr>
<td>Atriplex pleiantha</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Braya humilis ssp. centosa*</td>
<td>Chaffee, Gunnison, Park</td>
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<tr>
<td>Cirsium ounebegi</td>
<td>Moffat</td>
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<tr>
<td>Cleome multicaulis</td>
<td>Saguache, Costilla</td>
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<tr>
<td>Cryptantha aperta*</td>
<td>Rio Grande, Alamosa</td>
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<tr>
<td>Echinocereus triglochidiatus var. inermis</td>
<td>Mesa</td>
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<tr>
<td>Erigeron kachinensis</td>
<td>Montrose</td>
</tr>
<tr>
<td>Eriogonum brandegei*</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Eriogonum clavellatum</td>
<td>Chaffee, El Paso, Fremont, Park</td>
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<tr>
<td>Eriogonum pelinophilum*</td>
<td>Montezuma</td>
</tr>
<tr>
<td>Eutrema penlandii*</td>
<td>Delta, Montrose</td>
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<tr>
<td>Festuca dasyclada</td>
<td>Park, Summit</td>
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<tr>
<td>Fructuca hallii</td>
<td>Garfield, Rio Blanco</td>
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<td>Frasera coloradensis*</td>
<td>Huerfano, Larimer</td>
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<tr>
<td>Gaura neomexicana ssp. coloradensis</td>
<td>Baca, Bent, Prowers, Las Animas</td>
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<tr>
<td>Gilia penstemonoideis*</td>
<td>Boulder, Larimer, Weld, Adams?</td>
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<tr>
<td>Hackelia gracilenta*</td>
<td>Gunnison, Hinsdale</td>
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<td>Haplopappus fremontii ssp. monochephalus*</td>
<td>Montrose, Ouray</td>
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<tr>
<td>Hyemenoxys helenioides</td>
<td>Montezuma</td>
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<tr>
<td>Ipomopsis globularis*</td>
<td>Fremont, Huerfano**, Otero**, Las Animas</td>
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<tr>
<td>Ipomopsis polyantha var. polyantha*</td>
<td>Lake, Park, Summit</td>
</tr>
<tr>
<td>Neoparrya lithophila*</td>
<td>Chaffee, Gunnison, Park</td>
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<tr>
<td>Oenothera acutissima*</td>
<td>Moffat</td>
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<tr>
<td>Oenothera kleinii*</td>
<td>Mesa</td>
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<tr>
<td>Parthenium alpinum</td>
<td>Montezuma</td>
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<td>Parthenium tetraneuris*</td>
<td>Falcon, Mesa, Moffat, Montrose, San Miguel**</td>
</tr>
<tr>
<td>Pedioactus knoultontii</td>
<td>Montezuma</td>
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<td>Penstemum albiflavis*</td>
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<td>Penstemum debilis*</td>
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<tr>
<td>Penstemun degeneri*</td>
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<td>Penstemun gibbensii</td>
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<tr>
<td>Penstemun harrisoni*</td>
<td>Eagle, Grand, Routt, Summit</td>
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<tr>
<td>Penstemun parviflorus*</td>
<td>Montezuma</td>
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<td>Phacelia formosula*</td>
<td>Jackson</td>
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<td>Phacelia submatica*</td>
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<td>Phlox caryophylla</td>
<td>Archuleta, La Plata</td>
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<td>Potentilla effusa var. rupincola*</td>
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<td>Sclerocactus glaucus</td>
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<td>Senecio rupincola*</td>
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<td>Sprinchnum pallidum</td>
<td>Boulder, Jefferson, Weld?, Morgan?, El Paso?</td>
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<td>Spiranthus diluvialis</td>
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<td>Thalictrum heliotropium*</td>
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Montezuma County: T32N R20W: O’Kane, Anderson & Flemming 2027A, 5/8/85 (CS); Barneby 17803, 5/19/82 (BRY, COLO); Higgins & Welsh 13330, 5/25/83 (BRY); T331/4S R18W: O’Kane & Anderson 2343, 5/15/86 (COLO, CS); T33N R20W: O’Kane et al. 2028A, 5/8/85 (CS); Goodrich & Atwood 18175, 5/17/83 (BRY).
Table 2. Colorado’s rare plants listed by county. Locations are based on herbarium specimens except where an asterisk indicates records based solely on CNAP data.

<table>
<thead>
<tr>
<th>County</th>
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<td>Adams</td>
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**Map 7**

**Family.**—Fabaceae (Leguminosae).

**Federal Status.**—Category 2.

The DeBeque milkvetch, recently described from Mesa County, grows among rocks in sandy soils of the Wasatch Formation and in clay soils derived from the Atwell Gulch Member of the Wasatch Formation. It is found in areas surrounded by pinyon-juniper woodlands at elevations ranging from 1,570 to 1,950 m. Known localities are just west of DeBeque in the Chimney Rock area and south of the Colorado River in the shallow canyons at the base of Horsethief Mountain. The species is similar to the pink-purple-flowered *A. eastwoodiae*, which is nearly sympatric and with which it may be conspecific.

**Mesa County:** T8S R97W: O’Kane 2369,

Map 8

**Family.**—Fabaceae (Leguminosae).

**Federal status.**—Category 3C.

The Cliff Palace milkvetch is endemic to a small area in Mesa Verde National Park near Anasazi cliff dwellings, where it grows in sandy soils of ledges and in cracks of slickrock. The species occurs between 2,040 and 2,135 m in elevation with pinyon and juniper. Superficially, this inconspicuous species resembles A. naturitensis, A. cottamii, and A. monumentalis. Its ochreolous flowers are smaller than those of these species. Astragalus naturitensis has bicolored rather than ochreolous flowers, and both A. monumentalis and A. cottamii have narrower pod septa and pink-purple petals. No threats are known; however, park use within its habitat should be monitored.

**Montezuma County:** T34N R15W: Ratzloff & Colyer s.n., 5/31/78 (COLO); Isely, Erdman & Isely 8789, 5/21/64 (BRY); Welsh 1746, 5/31/62 (BRY); Welsh, Erdman & Moore 2132, 6/9/63 (BRY); Peabody & Sears 1464, 6/17/77 (BRY); Friedlander s.n., 6/15/80 (CS).

**Astragalus hamiltonii** C. L. Porter, Rhodora 54: 159. 1952.

Map 9

**Family.**—Fabaceae (Leguminosae).

**Synonym.**—A. lonchocarpus Torr. var. hamiltonii (C. L. Porter) Isely.

**Federal status.**—Category 2.

The Hamilton milkvetch is known in Colorado from a single population, discovered in 1987, of perhaps a score of individuals near Deerlodge Park in Dinosaur National Monument. The few other populations of the species occur in northwestern Uintah County and near the Utah-Colorado border about 16 km north of Bonanza, Utah, where it grows on soil derived from the Duchesne River Formation from 1,580 to 1,935 m in elevation. The Colorado population occurs at 1,756 m in sand of the interstices of a small, nearly barren outcrop of the Morrison Formation in a juniper—Cercocarpus intricatus woodland. The National Park Service protects this species in Colorado.

**Moffat County:** T6N R99W: O’Kane 2768, 5/17/87 (COLO, CS, Dinosaur Nat'l. Mon.).


Map 10

**Family.**—Fabaceae (Leguminosae).

**Synonym.**—Tragacantha humillima (Gray) O. Kze., Phaca humillima (Gray) Rydb.

**Federal status.**—Endangered.

The Mancos milkvetch is known from a few populations in San Juan County, New Mexico, and from the rims of mesas above the Mancos River canyon in Montezuma County, Colorado. The type locality in Montezuma County, discovered in 1875 by T. S. Brandegee, was not relocated until field searches were conducted in 1986 and 1987. The species inhabits pockets of sandy soil on exfoliating slickrock of the Point Lookout Member of the Mesa Verde Formation amidst pinyon-juniper woodlands at 1,700 to 1,770 m elevation. Populations in Colorado are small and, although not currently threatened, could be impacted by seismic exploration for deposits of oil and gas. This species may be exhibiting competitive exclusion with A. cottamii Welsh. These species are never found growing together in the same pocket of soil but may be found in immediately adjacent but slightly different habitat.

**Montezuma County:** T33N R obscure: Brandegee 1087, 7/1861 (Type: GH, MO); T33N R17W: O’Kane 2342, 5/14/86 (COLO); Neely 3897, 4/4/87 (CS); Neely 3889, 4/3/87 (CS).


Map 11

**Family.**—Fabaceae (Leguminosae).
SYNONYMS.—*Ctenophyllum limifolium* Osterh., I.c., nom. nud. in syn., *A. rafaelensis* Jones sensu Rydb.

FEDERAL STATUS.—Category 2.

The Grand Junction milkvetch is known from a few populations in Delta, Mesa, and Montrose counties at elevations of 1,510 to 1,880 m on steep slopes of the Chinle and Morrison formations with pinyon, juniper, and sagebrush on the east side of the Uncompahgre Plateau. Until the late 1970s the species was known only from Osterhout's type locality near Grand Junction. No threats are known, but the impact of grazing on the species is not understood. The species is similar to *A. rafaelensis*, which occurs on the west side of the Uncompahgre Plateau. *Astragalus rafaelensis*, primarily found in and around the San Rafael Swell in Utah, differs by having pendant pods and shorter calyx teeth. *A. limifolius* may represent a variety of this species (Barneby 1964).

**Delta County:** T51N R13W: Weber 15307, 5/15/78 (BRY, COLO, RM). **Mesa County:** T1S R1W: Osterhout 6557, 6/18/26 (Holotype: RM, Isotypes: COLO, RM); T12S R100W: Atwood & Thompson 8742, 5/18/82 (BRY); Anderson s.n., 5/10/82 (COLO); T49N R18W: Wilken & Kelley 13955, 6/2/83 (BRY, CS); T51N R13W: Wilken, Ratzloff & Ellis 13533, 5/27/79 (CS). **Montrose County:** T48N R17W: Peterson & Kennedy 83–50, 6/2/83 (BRY, CS, RM); T51N R12W: John- ston, Ratzloff & Lucas 1559, 5/25/78 (COLO, RM); T51N R13W: Johnston, Ratzloff & Lucas 1587, 5/25/78 (BRY, COLO); Neese & Abbott 13553, 6/14/83 (BRY, CS, RM).


**Family.—**Fabaceae (Leguminosae).

**SYNONYM.—***Lonchophaca osterhoutii* (Jones) Rydb.

**FEDERAL STATUS.—**Category 2.

Osterhout milkvetch occurs in a few populations near Kremmling, Grand County, on clayey, seleniferous soils derived from shales of the Niobrara, Pierre, and Troublesome formations on barren knolls and in sagebrush communities. Elevations range from 2,225 to 2,315 m. The species is an obligate selenophyte and is able to withstand harsh site conditions. Barneby (1964) reports Osterhout's type locality as "Hot Sulphur Springs." Osterhout's specimen label, however, merely states "Sulphur Springs." The taxon has not been located near Hot Sulphur Springs but has been collected near Sulphur Springs, a spring northeast of Kremmling and west of Hot Sulphur Springs. A proposed reservoir north of Kremmling could extirpate many of the known localities. Recent intensive inventories for the species have not significantly increased its known range. This species should be listed as endangered, and a listing package to that effect is pending approval (J. Anderson, personal communication).

**Grand County:** T1N R81W: Weber 4914, 7/2/49 (COLO, KANU); T2N R81W: Beath & Eppson s.n., 6/21/40 (RM); Eppson s.n., 7/10/47 (MO, RM); Weber 4915, 7/2/49 (COLO, KANU, RM); Neese & Grah 17181, 6/9/85 (RM); Neese & Grah 17145, 7/10/85

ORV activity. *Astragalus microcynbus* grows in sagebrush communities in fine to moderately coarse soils usually derived from Cambrian granite on hillsides from 2,315 to 2,485 m in elevation. Due to its extreme rarity, this species should be listed as threatened.

**Gunnison County:** T49N R1W: O’Kane & Anderson 3270, 13/7/87 (RM); Weber 9144, 7/9/55 (BRY, CS, RM); Ripley & Barney 7179, 7/20/45 (Holotype: CAS; Isotypes: COLO, GH, RSA); Johnston, Ratzloff & Luc- cas 1795, 7/11/78 (COLO, RM); Ratzloff s.n., 6/30/78 (COLO); Neese 15845, 7/15/84 (BRY, CS, RM); Neese 15855, 7/13/84 (BRY, CS); Neese 15857, 7/13/84 (BRY, CS); Neese 15892, 7/15/84 (BRY, CS); Neese 15845, 7/13/84 (BRY, CS, RM).

*Astragalus osterhoutii* M. E. Jones, Rev. Astrag. 251. 1923.

Map 14

Family.—Fabaceae (Leguminosae).

Federal status.—None.

The Ripley milkvetch is a tall, striking, yellow-flowered milkvetch of the Rio Grande Valley in Taos County, New Mexico, and from the lower drainages of the Conejos River, Conejos County, Colorado. In Colorado this milkvetch grows in grassy ponderosa pine savannas, pinyon-juniper woodlands, and sagebrush and rabbitbrush flats adjacent to streams and rivers at elevations of 2,500 to 2,700 m. Most localities have been severely impacted by heavy grazing. Plants avoid herbivory by growing within tall shrubs. Plants growing in the open, which are selectively eaten by livestock, wildlife, or both, are rarely seen. This species needs protection from grazing. Category 2 status is recommended.

Conejos County: T32N R7E: O’Kane & Anderson 2531, 7/13/86 (COLO, CS); T33N R6E: O’Kane & Anderson 2536, 7/13/86 (NY, RM); T33N R7E: Ramaley & Johnson 14747, 6/22/35 (COLO); Weber 7788, 7/18/52 (COLO, KANU, RM); T34N R7E: Anderson 87–165, 9/11/87 (COLO); Bye & Linares 12923, 7/10/84 (COLO); T35N R7E: O’Kane & Anderson 2619, 8/19/86 (COLO, CS, RM); T36N R6E: Weber & Salamun 12914, 7/14/65 (COLO); O’Kane & Anderson 2540, 7/13/86 (COLO, CS, RM); O’Kane & Anderson 2601, 8/18/86 (BRY, CS, RM).

Astragalus schmollii C. L. Porter, Madroño 8: 100. Pl. 9, Figs. 4–7. 1945.

Map 15

Family.—Fabaceae (Leguminosae).

Synonym.—A. platycarpus var. montezumae Barneby.

Federal status.—Category 2.

The Schmoll milkvetch grows in sandy loam on mesas, slopes, and in drainage bottoms in pinyon-juniper woodlands at 1,830 to 2,135 m in elevation. It is limited to a small area in Mesa Verde National Park. Although populations are few, they often have numerous individuals. Populations within the park should be monitored for impacts from park use. Potential habitat outside the park may be threatened by grazing and by road construction associated with Ute Mountain Ute Tribal Park development. The species is similar to Astragalus lonchocarpus, although it is foliose with all leaves regularly odd-pinnate with petiolate leaflets, whereas A. lonchocarpus has leaves mostly reduced to rachises. Alice Eastwood first collected fragmentary material of the species in 1890, but it was not described until 1945.

Montezuma County: T33N R15W: Neely 4487, 7/10/87 (CS); T33 1/2N R15W: Weber 4823, 6/13/49 (COLO, KHD); Sears 1462, 6/16/77 (BRY); Welsh 3026, 6/12/64 (BRY); Welsh 3024, 6/12/64 (BRY); Bader 26, 5/12/29 (BRY, COLO); Isely, Erdman & Isely s.n., 5/21/64 (BRY); Friedlander s.n., 6/15/80 (CS); Erdman 458, 5/28/64 (COLO); Friedlander 458, 6/5/65 (COLO); Eastwood s.n., 6/1890 (COLO); Welsh & Welsh 1550, 6/6/61 (BRY); Schmoll & Nusbaum 1555, 5/26/52 (Holotype: RM, Isotype: BRY); Nelson 10420, 5/12/25 (MO, RM).

Astragalus wetherillii M. E. Jones, Zoe 4: 34. 1893.

Map 16

Family.—Fabaceae (Leguminosae).

Synonym.—Phacawetherillii (Jones) Rydb.

Federal status.—Category 3C.

The Wetherill milkvetch is known from scattered localities in western Colorado. It grows in sagebrush, sagebrush-greasewood, oakbrush, and juniper communities on steep slopes, canyon benches, and talus under cliffs in sandy-clay to gravelly soils, usually of the Mancos and Wasatch formations, at elevations of 1,430 to 2,015 m. Jones (1923) reports an Eastwood observation from the canyon of the Colorado east of Moab, Grand County, Utah. This population, despite recent searches, has not been re-collected and may represent a waif carried downstream (Barneby, in correspondence to J. Anderson). Although relatively widespread, populations are infrequent and invariably consist of few individuals. Various populations are threatened by oil and gas development, overgrazing, road construction, and other habitat modifications. This taxon, because of small population sizes and known threats, should be considered a Category 2 species.
**Garfield County:** T5S R93W: Neese 11278, 5/2/82 (BRY, CS); O’Kane 2446; 6/26/86 (CS, RM); Weber 3326, 5/17/47 (CS, KANU, RM); Welsh & Higgins 6228, 6/13/67 (BRY); Welsh & Higgins 6235, 6/16/67 (BRY).

**Mesa County:** Location obscure: Eastwood s.n., 5/1892 (Type: MO, RM); T5S R97W: Kass, Welsh & Welsh 1653, 5/16/84 (BRY, RM); Welsh, Welsh & Kass 22816, 5/16/84 (BRY, RM); T10S R97W: Kass, Welsh & Welsh 2023, 5/11/85 (BRY, RM); Welsh, Welsh & Kass 23377, 5/11/85 (BRY, RM).

**Moffat County:** T6N R91W: Harrington 7202, 6/12/53 (CS). **Montrose County:** T49N R9W: Payson 682, 6/15/15 (RM); Payson 82, 5/11/13 (RM). **San Miguel County:** Location obscure: Brewster s.n., n.d. (CS).


**Map 17**

**Family.**—Chenopodiaceae.

**Federal Status.**—Category 2.

*The Four Corners orach* is a rare Navajo Basin endemic of Montezuma County and immediately adjacent New Mexico and Utah. It grows in salt desert scrub communities with *Atriplex* on nearly barren clay knolls derived from Mancos shale. In Colorado the taxon occurs from 1,490 to 1,650 m in elevation. This annual species experiences vast fluctuations in population density depending on annual precipitation. Populations are threatened by oil and gas exploration, ORV use, and, in New Mexico, coal mining. Threatened or endangered status is recommended.

**Montezuma County:** T32N R19W: Weber 4788, 6/12/48 (Holotype: COLO, Isotypes: CS, MO, RM); O’Kane, Anderson & Fleming 2022, 5/8/85 (CS); Weber 7651, 6/7/49 (COLO, KANU, MO); Anderson 85–35, 6/5/85 (BRY).


**Map 18**

**Family.**—Brassicaceae (Cruciferae).

**Federal Status.**—Category 2.

*Alpine braya* occurs on tundra underlain with Leadville limestone or Manitou dolomite. Elevations range from 3,475 to 3,900 m. The species prefers slopes without late-lying snowbanks and is found in small, open microsites from which solifluction lobes capped with *Dryas octopetala* have slipped. This pioneer habitat provides a place where seeds can germinate and individuals can escape competition. Individuals are occasionally found on old roads associated with hardrock mining in its highly mineralized habitat. Despite the widespread occurrence of suitable habitat, the species is infrequent and consists of small populations (Neely and Carpenter 1986). Mining and ORV activity associated with old mining roads are the most significant threats to the species. This taxon may be synonymous with *B. humilis* var. *humilis* (Harris 1985), in which case, although a biologically interesting disjunct, it should be downgraded to Category 3B.

**Chaffee County:** T14S R81W: Neely 3170, 7/19/85 (CS, UTC); T15S R81W: Peterson, Johnston & Anderson 82–56, 8/17/82 (CS). **Gunnison County:** T13S R84W: Neely 3183, 7/24/85 (CS, UTC); T51N R3E: Neely 3174, 7/19/85 (CS, UTC); Neely 3174, 7/19/85 (CS, UTC); Neely & Carpenter 3311, 8/18/85 (CS, UTC); Neely & Carpenter 3310, 8/18/85 (COLO, UTC); T51N R4E: Neely 3220a, 7/26/85 (CS, UTC); Neely 3211, 7/25/85 (CS, UTC); Weber & Dixon 16332, 7/27/82 (COLO); Dixon 712, 7/21/81 (COLO); Johnston, Peterson & Anderson 2614, 8/18/82 (COLO).

**Park County:** T8S R78W: Neely et al. 3141, 7/18/85 (CS, UTC); Yeatts 2069, 7/14/85 (KHD); Weber & Roloff 16328, 7/26/82 (BRY, COLO, CS, RM); Walter 28, 7/7/59 (CS); Weber & Rollins 6491, 7/7/51 (CS); O’Kane et al. 2171, 7/19/85 (CS); O’Kane 2144, 7/16/85 (CS); Rollins & Weber 51288, 8/7/51 (Isotypes: COLO, RM); Weber & Livingston 5153, 7/7/51 (COLO, RM); Weber 8753, 7/4/54 (COLO); T9S R78W: O’Kane 2152, 7/17/85 (CS); T10S R78W: Neely 3125a, 7/16/85 (CS, UTC).


**Map 19**

**Family.**—Asteraceae (Compositae).

**Federal Status.**—Category 2.

*The Ownbey thistle* is endemic to the eastern Uinta Mountains in Utah and Cross Mountain and Dinosaur National Monument in Moffat County, Colorado. In Colorado it occurs in sandy soils of riparian areas in otherwise dry canyons and, more typically, in
alcoves with seeps and under shaded cliffs. In alcoves it is usually associated with *Aquilegia micrantha*. The species, in Colorado, is known only from drainages of the Yampa and Green rivers on outcrops of the Morgan and Weber formations, and, less frequently, on Madison Limestone. Elevations range from 1,700 to 1,800 m. Inventories in 1987 and 1988 (S. O'Kane, personal communication, T. Naumann, personal communication) showed that the canyons of the Yampa River in Dinosaur National Monument, the center of the range of this species, contain many populations. Although populations are small, most are not threatened due to their inaccessibility to livestock and human activities.

**Moffat County**: T6N R95W: Northcutt & Bunin s.n., 9/19/78 (COLO); Nessie & Smith 12051, 7/25/82 (BRY, RM); T6N R101W: O'Kane 2820, 5/19/87 (COLO, CS, Dinosaur Nat'l. Mon.); T6N R102W: O'Kane & Roszczewski 3168, 6/26/87 (COLO, CS, Dinosaur Nat'l. Mon.).

**Cleome multicaulis** Moñino & Sessé ex DC., Prod. 1: 240. 1824.

**Map 20**

**Family**.—Capparidaceae.

**Synonym**.—*C. sonorae* A. Gray.

**Federal Status**.—Category 2.

Slender spiderflower is a wetland species occurring around the margins of lakes, ponds, artesian wells, and sloughs in the San Luis Valley. *Cleome multicaulis* grows with *Carex, Juncus*, and *Triglochin* a few meters back from the water in the moderately moist zone between a ring of *Scirpus* standing in water below and alkaline *Sarcobatus* flats above. *Cleome* also occurred in southeastern Arizona, western Texas, New Mexico (a single collection), and south to Mexico City (the type locality). No modern collections outside the San Luis Valley, other than a recent one from Wyoming, are known. The Natrona County, Wyoming, collection (Dorn 1988) is from the margins of a man-made stock pond (R. Hartman, personal communication) where it was probably brought in by migrating waterfowl. Modification of wetland habitats is the greatest threat to the species.

**Alamosa County**: Location obscure: Bethel s.n., 7/1897 (CS, RM); Hapeman s.n., 7/30/18 (RM); T38N R10E: Dixon 2103, 7/5/72 (CS); T38N R11E: O'Kane, Anderson & Dixon 2450, 7/7/86 (CS, RM, WIS); O'Kane, Anderson & Dixon 2456, 7/7/86 (COLO, RM, WIS); T40N R11E: O'Kane & Anderson 2484, 7/8/86 (COLO, CS); O'Kane & Anderson 2487, 7/8/86 (CS, RM); Brandegee 1150, 8/1875 (COLO); Ramaley 15926, 8/3/36 (COLO); Ramaley 12216, 7/21/29 (COLO, RM); T40N R12E: Spellenberg & Zucker 7850, 8/4/84 (ASU, CS, ID, MO, NMC, NY, RSA, UNM); O'Kane & Anderson 2482, 7/8/86 (CS, NY, RM, WIS); O'Kane & Anderson 2469, 7/7/86 (COLO, CS, WIS). **Costilla County**: T30S R73W: O'Kane & Anderson 2493, 7/9/86 (COLO, RM, WIS); Ramaley 15745, 7/29/36 (COLO). **Rio Grande County**: T37N RSE: Johnson 76, 8/9/74 (CS); Robinson C-1, 8/23/68 (CS); T39N RSE: Ramaley 15645, 7/23/36 (COLO). **Saguache County**: T42N RSE: Ramaley 13039, 8/14/31 (COLO); T43N RSE: O'Kane, Anderson & Dixon 2449, 7/14/86 (COLO, CS, WIS); Weber 11067, 7/12/60 (BRY, COLO).


**Map 21**

**Family**.—Boraginaceae.

**Synonym**.—*Orocarya aperta* Eastw.

**Federal Status**.—Category 2a.

The Grand Junction cat’s-eye, known only from the type locality collected in 1892 by Alice Eastwood, has not been rediscovered and may be extinct. Habitat in and around Grand Junction has been significantly altered or eliminated for agriculture and urban development. However, the herbarium label probably indicates the general locality, and the Grand Junction cat’s-eye may still occur in the foothills surrounding the Grand Valley. Most *Cryptantha* species do not inhabit lowlands in this part of Colorado.

**Mesa County**: Location obscure: Eastwood s.n., 6/27/1892 (Holotype: CAS, Isotype fragment: RM); Eastwood s.n. 5/17/92 (CALIF.).


**Map 22**

**Family**.—Cactaceae.

FEDERAL STATUS.—Endangered.

The spineless hedgehog cactus, like the typical variety, has a stunning scarlet red flower. The spineless form has been subject to commercial exploitation. Other threats include chaining of rangeland, trampling by cattle, and habitat destruction for energy development. In Colorado the spineless variety occurs in Mesa, Delta, Montrose, and San Miguel counties and grows in pinyon-juniper woodlands, often in the duff and partial shade under pinyon and juniper trees at elevations of 1,800 to 2,500 m. Soils are coarse and shallow and are usually derived from sandstone, often the Dakota sandstone. Welsh et al. (1987) place this taxon in var. melanacanthus (Engelm.) L. Benson because there appears to be a cline from eastern Utah to western Colorado of plants with dense spines to those with no spines at all. In Colorado spineless plants have been observed growing with the spined form. The taxon might better be treated as a forma rather than as a variety (Wittmann et al. 1988, Welsh et al. 1987), in which case it should be downgraded to Category 3B.


Map 23

FAMILY.—Polygonaceae.

FEDERAL STATUS.—Category 2.

The kachina daisy is a Colorado Plateau endemic growing in hanging gardens, seeps, and shaded alcoves of otherwise dry slickrock canyons in San Juan County, Utah, and Montrose County, Colorado. It is often found with Mimulus eastwoodiae at about 1,575 m in elevation. The species is apparently very rare in Colorado, but new populations are infrequently found in both Colorado and Utah. The inaccessibility of much of its habitat provides the species some protection but also makes new populations difficult to locate.

MONTROSE COUNTY: T45N R18W: Ratzloff 107, 4/29/78 (COLO, CS); Ratzloff s.n., 8/17/78 (BRY); T46N R19W: Ratzloff & Crowe 218, 8/30/77 (COLO); Ratzloff s.n., 8/17/78 (BRY); Ratzloff s.n., 4/29/78 (BRY).


Map 24

FAMILY.—Polygonaceae.

SYNONYM.—Eriogonum spathulatum Gray var. brandegei (Rydb.) Stokes.

FEDERAL STATUS.—Category 2.

The Brandegee buckwheat was once known only from a small population collected by T. S. Brandegee near the Garden Park Dinosaur Quarry near Canyon City, Fremont County. Reveal and Davidse located a small population near Salida, Chaffee County, in 1967. Since then several large populations have been located around Salida, growing on barren slopes of lucustrine alluvium of the Dry Union Formation at elevations of 2,200 to 2,560 m. Searches at the Garden Park locality have yielded only one new population; here plants grow on the Morrison Formation at 1,760 to 1,975 m in elevation. The Arkansas River canyon, cut through igneous rocks, divides the two areas of occurrence by 50 miles. Reveal (1969) should be consulted for a description employing more important characters than those given in the original description. Bentonite mining threatens one of the two Garden Park populations, but the extensive populations near Salida have no current threats, except that increased development for mountain homes around Salida could pose a significant threat to the species in the future. A specimen taken from “South Park,” Park County (Kelly 507), probably has an incorrect location. Repeated searches in South Park have located neither the species nor suitable habitat. Kelly, passing through South Park on his way to Cortez, probably collected the species near Salida. Letterman s.n., a particularly woolly pubescent collection taken in 1884, gives “Colorado Springs” as the collection locality.

CHAFFEE COUNTY: T50N R8E: O’Kane 2208, 7/31/85 (COLO, CS); O’Kane & Anderson 2219, 8/2/85 (CS); O’Kane & Anderson 2216, 8/1/85 (COLO, CS); O’Kane & Anderson 2215, 8/1/85 (COLO, CS); O’Kane & Anderson 2212, 8/1/85 (COLO, CS); T51N R8E: Johnston & Lucas 1888, 8/11/78 (RM); Johnston, Hendzel & Fager 2775, 10/12/83 (RM);

Family.—Polygonaceae.

Federal Status.—Category 3C.

The Comb Wash buckwheat is a Colorado Plateau endemic growing on sites in Colorado identical to those supporting Astragalus conquisition, with which it is occasionally found. The species occurs in shadlike communities on fine soils derived from the Mancos shale at about 1,750 m in elevation. Known occurrences in Colorado are threatened by road construction, by exploration for oil and gas, and by a proposed system of irrigation canals on the Ute Mountain Ute Reservation in the southwest corner of Montezuma County. The species is also known from adjacent San Juan County as far west as Comb Wash. This species, because of its limited range, few populations, and known threats, should be considered a Category 2 candidate for federal listing. Additional fieldwork for the species is needed.

Montezuma County: T33½N R18W: O’Kane & Anderson 2344, 5/15/86 (COLO, CS); T33N R19W: Harrington 10103, 6/19/68 (CS).


Family.—Polygonaceae.

Federal Status.—Endangered.

The clay-loving buckwheat is limited to an area from Montrose to Delta and Hotchkiss where it grows on barren adobe hills derived from Mancos shale in Artemisia nova and Atriplex corrugata communities at elevations of 1,600 to 1,910 m. The species prefers shallow swales surrounded by shadlike where black sage is the dominant species. Penstemon retrorsus, a Category 1 species, is a common associate. Prior to 1984, E. pelinophilum was known only from the type locality near Hotchkiss, adjacent to a heavily grazed horse pasture. Intensive searches have since located several large populations. The species is threatened by livestock grazing, habitat modification for agriculture and housing developments, oil and gas exploration, the construction of irrigation ditches, and ORV activity.

Delta County: T14S R94W: Gentry 2253, 7/23/55 (COLO); Neese 13236, 5/10/83 (CS); Ratzloff s.n., 6/21/78 (COLO); Reveal & Reveal 2780, 7/16/72 (Isotypes: BRY, COLO, MO, RM); T15S R94W: Neese 15792, 6/20/84 (CS); T51N R10W: Neely 2950, 6/20/85 (CS, UTC); T48N R9W: Neely 2962, 6/20/85 (CS, UTC); Neely 2969, 6/20/85 (CS, UTC); T49N R5W: Neely 2983, 6/27/85 (CS, UTC); Neese 15968, 7/19/84 (CS); Neese 15800, 7/12/84 (CS); T49N R9W: Neese 15796, 6/22/84 (CS); Neese 15967, 7/19/84 (CS); T49N R10W: Neese 15795, 6/21/84 (CS); T51N R9W: Neely 2892, 6/16/85 (COLO, CS, UTC); Neely & O’Kane 2943, 6/19/85 (CS, UTC); O’Kane & Neely 2087, 6/19/85 (COLO, CS); O’Kane & Neely 2088, 6/19/85 (COLO, CS).


Family.—Brassicaceae (Cruciferae).

Synonym.—Eutrema edwardsii R. Brown

ssp. penlandii (Rollins) W. A. Weber.

Federal Status.—Category 3C.

Penland’s eutrema, an alpine species of moist bogs perched on outcrops of Leadville limestone or Manitou dolomite, grows in the Mosquito Range and on Hoosier Ridge. Elevations range from 3,660 to 4,260 m. The species is known from few populations, most of which are threatened because of their proximity to active mines or mining claims. Mining activities that alter hydrologic regimes can destroy the fragile alpine wetlands required by the species; e.g., habitat of a known population on Pennsylvania Mountain was recently ditched to supply water to a nearby mine. Populations generally consist of few individuals. Careful searches in 1986 of six known localities revealed that only two of these sites
still contained individuals of the species, albeit small size and the possibility that individuals may not appear in a given year may have prevented plants from being located. Because of rarity, small populations, fragile habitat, and current and potential threats, the species’ status should be raised to Category 2.

PARK COUNTY: TSS R77W: Hulten & Weber 11041, 7/10/59 (COLO); Johnston & Lucas 1351, 7/21/77 (RM); Lucas & Johnston s.n., 7/21/77 (CS); Penland 3909, 7/26/49 (GH); Penland 1305, 7/27/35 (COLO, GH); Weber & Rollins 51291, 8/8/51 (COLO, RM); T9S R78W: O’Kane 2157, 7/18/85 (CS); Weber 13343, 7/14/67 (COLO); T9S R79W: O’Kane & Anderson 2572, 8/6/86 (CS); T10S R78W: Weber 13315, 7/12/67 (COLO). SUMMIT COUNTY: TSS R77W: Johnston, Lucas & Benjamin 1878, 7/27/78 (COLO).

**Festuca dasyclada** Hackel ex Beal, Grasses N. Amer. 2: 602. 1896.

**Map 28**

**Family.**—Poaceae (Gramineae).

**Synonym.**—Argillochloa dasyclada (Hackel ex Beal) W. A. Weber.

**Federal Status.**—Category 2.

The Utah fescue grows on outcrops of Green River shale on barren scree slopes or in sparsely vegetated communities dominated by *Pseudotsuga menziesii* at elevations of 1,890 to 2,745 m. The species is apparently rare in Utah. Colorado hosts many populations, but they are restricted to the Piceance Basin and to the Roan Plateau. The major threat to the species is the mining of oil shale, although ORVs, domestic livestock grazing, and road construction also impact the species. Unless oil shale extraction drastically increases in the future, the species is not threatened with significant habitat loss. An oil shale company has used the species for revegetation of disturbed sites. This species should be downgraded to Category 3C.

GARFIELD COUNTY: T4S R96W: Popp & Riefler 82–372, 7/13/82 (CS); T5S R95W: Harner s.n., 7/16/83 (COLO); Keammerer & Keammerer s.n., 7/28/78 (COLO); T5S R96W: Clark s.n., 8/8/82 (COLO); Keammerer & Keammerer s.n., 7/26/78 (COLO, RM); T6S R94W: Irvine & Chichester 193, 7/15/76 (BRY, COLO); Mase 1241, 7/16/81 (CS); T6S R95W: Nichols 158, 7/17/81 (CS); Woods s.n., 7/7/81 (COLO); T7S R96W: Irvine 171, 7/5/76 (COLO, UTC); O’Kane & Anderson 2425, 6/11/86 (RM); Painter, Emrich & Bender 54, 7/17/78 (COLO, CS); TTS R97W: Irvine & Gregory 34, 7/7/78 (COLO); Painter, Emrich & Pease 25, 7/14/78 (COLO, CS, RM).

**RIO BLANCO COUNTY:** T3S R95W: Baker & Sigstedt 82–264, 7/2/82 (CS); Kelley, Baker & Sigstedt 82–19A, 6/30/82 (CS); Neese et al. 11979, 7/10/82 (BRY); Smith et al. 1814, 7/10/82 (BRY, COLO, RM, UTC); T4S R94W: Kelley & Sigstedt 82–71, 7/8/82 (CS); Neese et al. 11982, 7/10/82 (BRY); Weber 17810, 7/8/86 (COLO); Weber 15977, 6/21/81 (COLO); Wiley & England 429, 7/24/79 (BRY); Wilken 13567, 9/22/79 (CS); T4S R95W: Baker & Naumann 82–269, 7/6/82 (BRY, COLO, CS); Kelley & Sigstedt 82–61, 7/7/82 (CS); T5S R98W: Ellis & Hackney s.n., 7/13/80 (CS).

**Festuca hallii** (Vasey) Piper, Bot. Gaz. 6: 296. 1881.

**Map 29**

**Family.**—Poaceae (Gramineae).


**Federal Status.**—Category 2.

In Colorado, Halls fescue grows in alpine tundra with *Kobresia* and in subalpine grasslands. The highest stations for the species are found in Colorado. The species, once thought to be limited to Colorado, occurs across the northern Great Plains of North Dakota and Canada, extends down the Rocky Mountain Cordillera through Montana, Wyoming, and Colorado, and is apparently disjunct near Thunder Bay, Ontario (Dorn 1988, Harms 1985, Pavlick and Looman 1984). In Colorado the species is apparently rare and may be disjunct (Weber 1961, 1987). This taxon, because it is widespread and is apparently not threatened in a significant portion of its range, should be downgraded to Category 3C.


**Fraseria coloradensis** (C. M. Rodgers) D. M. Post, Madroño 10: 108. 1949.

**Map 30**

**Family.**—Gentianaceae.

**Synonym.**—Swertia coloradensis Rogers.
**Federal status.** — Category 2.

The Colorado gentian is endemic to south-eastern Colorado where it grows on sparsely vegetated slopes and disturbed sites covered with gravel derived from Greenhorn limestone. It is associated with typical grassland species and, occasionally, with *Juniperus*. Elevations range from 1,220 to 1,650 m. The species is apparently negatively impacted by domestic livestock grazing. A recent survey in Colorado located several new populations; however, outcrops of Greenhorn limestone in adjacent New Mexico, where the species is expected, were not searched.

**Baca County:** T28S R46W: Kuhn 494, 6/23/87 (COLO); Kuhn 619, 9/2/87 (CS); Kuhn 541, 6/29/87 (CS); T28S R48W: Kuhn 527, 6/25/87 (CS); T28S R49W: Kuhn 522, 6/25/87 (COLO); T29S R50W: Kuhn 510, 6/24/87 (COLO); T30S R50W: Kuhn 556, 7/2/87 (CS); T31S R49W: Kuhn 554, 7/2/87 (CS); T33S R50W: Kuhn 553, 7/2/87 (CS); Johnston 2441, 6/16/81 (COLO); Johnston 2446, 6/16/81 (COLO); Locklear 7, 6/5/86 (COLO, KANU, NEB); Rogers 6423, 9/8/48 (COLO, MICH).

**Bent County:** T26S R48W: Kuhn 548, 7/1/87 (CS); T26W R49W: Kuhn 524, 6/24/87 (CS); T27S R49W: Kuhn 523, 6/24/87 (COLO). Las Animas County: T29S R51W: Kuhn 511, 6/24/87 (COLO); T30S R53W: Kuhn 550, 7/1/87 (CS); T31S R51W: Kuhn 552, 7/1/87 (CS); Johnston 2450, 6/16/81 (COLO); Locklear 10, 9/9/86 (COLO, KANU, NEB); T31S R52W: Johnston 2449, 6/16/81 (COLO); Rogers 4951, 7/20/47 (COLO, MICH); T33S R51W: Rogers 6110, 6/29/48 (COLO, MICH). Prowers County: T25S R46W: Harrington 3481, 7/13/47 (CS); Porter 4300, 7/13/47 (COLO, MO, RM); T26S R46N: Johnston 2424, 6/15/81 (COLO); Harrington 9864, 6/9/65 (CS); Locklear 9, 9/9/86 (KANU, NEB); Weber 5082, 8/28/49 (COLO); T26S R47W: Kuhn 549, 7/1/87 (CS); T27S R45W: McGregor 34856, 9/7/83 (KANU).


**Family.** — Onagraceae.

**Synonym.** — *Gaura coloradensis* Rydb.

**Federal status.** — Category 1.

The Colorado butterflyweed was previously known only from a small area near the Colorado-Wyoming border in Larimer and Weld counties and Sedalia in Adams County (J. Anderson, personal communication). Populations near the foothills in Larimer County have not been seen since 1944. Recent surveys, however, located several populations in Laramie County, Wyoming, the southwestern corner of Nebraska, and near the Colorado-Wyoming border in Weld County, Colorado. Two "populations" are known from Boulder County: just north of Boulder on a disturbed roadside and further east on the plains. The first consisted of a single individual and the latter was transplanted there in the late 1970s. The species is probably impacted by domestic livestock grazing, and several populations in Wyoming may be impacted by development at military installations. The species occupies moist meadows and gentle mid-slopes just above drainages and below the drier uplands at elevations from about 1,790 to 1,890 m. It is frequently associated with species of *Scirpus* and *Carex*.

**Boulder County:** T1N R71W: Weber & Phipps 17471, 9/22/84 (COLO, CS, RM).

**Larimer County:** Location obscure: Cowan 1632, 7/1/95 (COCO, CS, US); Harrington 543, 8/4/44 (COLO, CS); T7N R68W: Cowan s.n., 7/8/1895 (Holotype: NY; Isotype: GH); Cowan & Crandall 1308, n.d. (ISC, NY).

**Weld County:** T11N R67W: Neece 16023, 8/4/84 (BRY, CS); Neece, Peterson & Andrews 15969, 8/1/84 (CS); T12N R67W: Neece & Andrews 16057, 8/14/84 (CS); Porter 9690, 8/6/44 (DS, MSC, RM, RSA).

**Hackelia gracilenta** (Eastw.) I. M. Johnston, Contr. Gray Herb. 68: 46. 1923.

**Map 32**

**Family.** — Boraginaceae.

**Synonym.** — *Lappula gracilenta* Eastw.

**Federal status.** — None.

*Hackelia gracilenta* is endemic to a small area in Mesa Verde National Park where it grows in loamy or sandy soils of mesas, slopes, and drainage bottoms. It prefers the accumulated litter beneath stands of *Quercus gambelii* or pinyon and juniper. Elevations range from 1,830 to 2,010 m. No threats are known, but potential habitat outside the park in the Ute Mountain Ute Tribal Park may be threatened by grazing and by road construction for.
park development. This species, like other Mesa Verde endemics of extremely limited distribution, should be considered a Category 2 species. Inventories of national park and adjacent tribal lands are needed.

**Montezuma County:** T33.5N R15W: Friedlander s.n., 6/15/80 (CS); Friedlander s.n., 6/22/80 (CS); Mesa Verde Explorers’ Camp 146, 7/6/44 (CS); Nelson 10414, 5/12/25 (MO, RM); Schmoll & Nusbaum 1660, 6/1/25 (RM); T34N R15W: Erdman 46, 6/16/59 (COLO); Buder 89, 6/8/29 (COLO); Eastwood s.n., 6/1890 (COLO); Reveal, Gentry & Davidse 843, 6/9/67 (COLO, KANU, NY, RM); Weber 8711, 6/9/54 (COLO).

**Haplopappus fremontii** A. Gray ssp. monocephalus (A. Nels.) H. M. Hall, Gen. Haplopappus 87. 1928.

**Map 33**

**Family.**—Asteraceae (Compositae).

**Synonyms.**—Oonopsis monocephala A. Nels.

**Federal status.**—Category 2.

**Haplopappus fremontii** ssp. monocephalus has a relatively large range. Furthermore, it is probably not a good subspecies (G. Brown, personal communication, W. A. Weber, personal communication). Populations are known to contain both single- and multi-headed individuals. I have seen mixed specimens as well as specimens of the typical variety and var. monocephalus from the same locality collected by the same person on the same day. Status should be changed to Category 3B. The taxon grows in clayey soils, often derived from the Morrison Formation, in the juniper zone in south central and southeastern Colorado.

**Fremont County:** T17S R70W: Neese 15948, 7/17/84 (CS); T18S R68W: Weber 8569, 5/21/49 (COLO); T18S R70W: Neese 15961, 7/18/84 (RM); T19S R69W: Weber & Hogan 17537, 8/24/85 (COLO, RM). **Las Animas County:** T31S R61W: Archibald s.n., 1902 (COLO); Archibald A257, 1900 (Isotypes: COLO, RM); T33S R60W: Brooks 14334, 7/11/79 (MO).

**Hymenoxys helenioides** (Ryd.) Cockerell, Bull. Torrey Bot. Club 31: 481. 1904

**Map 34**

**Family.**—Asteraceae (Compositae).

**Synonyms.**—Picradenia helenioides Rydb., Dugaldia helenioides (Ryd.) A. Nels.

**Federal status.**—Category 2.

In Colorado the Intermountain bitterweed is found at elevations from 2,600 to 2,725 m where it grows on grassy floodplain terraces above creeks and below forested hillsides. This species resembles Helenium (Dugaldia) hoopesii Gray—hence the specific epithet—but differs from that taxon by its shorter stature, smaller capitula, and divided leaves. The species in Colorado is known from La Veta Pass, in Costilla County, and from near Slumgullion Pass, Hinsdale County. In 1987 John Anderson relocated these populations, which have not been seen since 1900 and 1940, respectively. Sangre de Cristo Creek near La Veta Pass is the type locality. Several populations are known from the Wasatch and Aquarius plateaus in central Utah, one from the Chuska Mountains of San Juan County, New Mexico (Anderson & Heil 87–174 ASU), and three from the Lukachukai Mountains of Apache County, Arizona (Anderson & Heil 87–126, 87–141 & 87–142 ASU). Arizona and New Mexico populations occur in openings in ponderosa pine–oak–aspen forests; in Utah the species grows on dry sagebrush-covered mounds within dry sedge meadows. Populations of the species invariably consist of few individuals, often fewer than a dozen. The habitat of the species, because of its high forage value, is usually grazed by domestic livestock. Because populations invariably consist of few individuals, are infrequently found across a large geographical area containing much potential habitat, have inviable pollen, and are found with both Hymenoxys richardsonii and Helenium hoopesii, Hymenoxys helenioides may be of sporadic hybrid origin (J. Anderson, unpublished data, personal communication).

**Costilla County:** T28S R70W: Anderson 87–105, 7/22/87 (COLO), T29S R71W: Rydeberg & Vreeland 5495, 7/2/1900 (Holotype: NY, Isotype: RM); Anderson 87–116, 7/23/87 (CS). **Hinsdale County:** T44N R3W: Pendland 1548, 7/7/40 (COCO).

**Ipomopsis globularis** (Brand) W. A. Weber, Pflanzenreich, 4, Fam. 250: 120. 1907.

**Map 35**

**Family.**— Polemoniaceae.

**Synonyms.**—Gilia spicata Nutt. var. capitata A. Gray, G. cephaloidea Rydb. of manuals, G. globularis Brand.

**Federal status.**—Category 3C.
Globe gilia is a showy endemic of the Mosquito Range, adjacent Hoosier Ridge, and Boreas Pass where it grows on barer spots in gravelly tundra and loose talus at elevations of 3,475 to 3,965 m. It is often interspersed with caespitose Salix species and Dryas octopetala. The habitat of this species is usually underlain with heavily mineralized Leadville limestone or Manitou dolomite. Mining and four-wheel-drive recreation present the major threats to the species. Although not in danger of immediate large-scale habitat loss, this species should be monitored for decreases in population size and for habitat destruction.

**Location Obscure:** Brandegee s.n., 1871 (COLO); Lake: T10S R79W: Lewis 1741, 8/3/80 (US). Park County: T7S R77W: Lewis 1665, 7/31/50 (US); T8S R77W: Crandall s.n., 7/31/95 (CS); Johnston & Kurling 136, 7/31/75 (COLO); Johnston & Lucas 7, 7/21/77 (CS); Lewis 1578, 7/29/80 (US); Lewis 1872, 7/29/80 (US); Wojciechowski 1032, 7/23/80 (US); T8S R78W: Hall & Harbour 461, n.d. (Isotypes: GH, US); Huestis s.n., 8/14/05 (COLO, CS); Johnston 2369, 7/18/80 (COLO); Lewis 1505, 7/25/80 (US); Lewis 1767, 8/23/80 (US); O’Kane 2141, 7/16/85 (US); O’Kane 2120, 7/15/85 (CS); O’Kane 2174, 7/19/85 (CS); Yeatts 2067, 7/14/85 (KHD); T9S R78W: O’Kane 2153, 7/17/85 (CS); T10S R78W: Neely 3068, 7/9/85 (CS); Neely & Johnston 3098, 7/16/85 (CS); T10S R79W: Fillmore s.n., 8/13/55 (CS). Summit County: T7S R77W: Cowan 1810, 8/2/95 (CS); Cowan & Crandall s.n., 8/2/95 (CS); Nelson 1052, 8/1/72 (CS); Wojciechowski 1137, 7/31/80 (US); T8S R77W: Weber & Thornburg 4450, 8/31/48 (COLO, CS); T8S R78W: Komarkova s.n., 8/17/73 (COLO).


**Map 36**

**Family.—Brassicaceae (Cruciferae).**

**Federal Status.—Category 2.**

The recently described Dudley Bluffs bladderpod is an extremely rare endemic of the Picacho Basin where it grows on barren outcrops of the Thirteenth Mile Creek Tongue of the Green River shale where it abuts the Uinta Formation on ridgetops, benches, and snouts of ridges. The taxon inhabits harsh sites which, because of sparse vegetation, exposed topographic positions, and light-colored substrate, have a high-incident solar radiation. Sites are characterized by a pavement of small shale fragments. *Astragalus lutosus, Machaeranthera grindelioides*, and *Artemisia* are always present. Elevations range from 1,870 to 2,025 m. Habitat destruction associated with oil shale extraction is the greatest potential threat to the species. Recent surveys provide enough information to list the species as threatened or endangered.
RIO BLANCO COUNTY: Location obscure: Weber 10985, 5/16/59 (COLO); T1N R98W: O’Kane 2418, 6/5/86 (COLO, GH); T1S R97W: O’Kane 2402, 6/2/86 (COLO, CS); O’Kane & Sigstedt 82–125, 5/19/82 (CS, RM); T1S R98W: O’Kane 2417, 6/5/86 (COLO, GH); Walker & Sigstedt 82–31, 5/31/82 (CS); Walker, Waters & Riefler 82–108, 6/2/82 (COLO, CS); T2S R97W: Baker & Naumann 82–191, 6/11/82 (CS); Rollins & Rollins 8394, 6/30/83 (Isotypes: COLO, CS, MO, RM).


Map 38

Family.—Brassicaceae (Cruciferae).

Federal Status.—Category 2.

The Piceance bladderpod is endemic to outcrops of Green River shale in the Piceance Basin and escarpments of the Roan Plateau and Battlement Mesa. It grows on barren ridgetops above steep, shifting talus slopes and on unstable, oakbrush-covered side slopes. Elevations range from 1,905 to 2,625 m. Several populations growing adjacent to roads may be impacted by road maintenance and by ORVs leaving established rights-of-way. Oil shale extraction could severely affect several other populations. The type locality was recently patented by a shale-oil producer. The species, like Lesquerella congesta, Penstemon debilis, Physaria obcordata, and Thalictrum heliophillum, was discovered during botanical inventories of areas containing high-quality oil shale. A recent survey indicates that the species is more abundant and widespread on the Roan Plateau than previously thought (Mountain West Environmental Services 1987).

Garfield County: T5S R100W: Kelley 83–134, 8/3/83 (CS). Rio Blanco County: T1N R99W: O’Kane 2436, 6/15/86 (COLO); O’Kane 2433, 6/15/86 (COLO, BRY); O’Kane 2427, 6/14/86 (COLO, GH); T1S R96W: Baker & Naumann 82–231, 6/25/82 (CS, GH); T1S R100W: Kelley & Naumann 82–155, 7/22/82 (CS, GH); T2S R95W: O’Kane 2405, 6/3/86 (COLO, CS, RM); O’Kane 2403, 6/3/86 (COLO, NY); O’Kane 2407, 6/3/86 (COLO, BRY); T2S R96W: Walker & Naumann 82–213, 6/16/82 (CS); T2S R100W: O’Kane 2447, 6/25/86 (COLO, GH); T3S R99W: O’Kane & O’Kane 2095, 6/27/85 (CS); Rollins & Rollins 8395, 6/20/83 (BRY, CS, GH, RM); Wiley-Eberle 1021, 7/27/83 (CS, RM); T3S R100W: Baker & Sigstedt 82–308, 7/21/82 (Holotype: GH; Isotype: CS); Painter, Emmich & Pease 132, 7/24/78 (CS); Peterson & Naumann 82–4, 7/16/82 (COLO, CS, RM); Peterson et al. 1141, 7/5/78 (CS); Wilken 13866, 7/14/82 (COLO, CS, GH, RM). Mesa County: T8S R95W: Anderson 87–87, 7/15/87 (COLO, CS).

Lesquerella pruinosa Greene, Pitt. 4: 307–308. 1901.

Map 39

Family.—Brassicaceae (Cruciferae).

Federal Status.—Category 2.

The Pagosa bladderpod is endemic to the area around Pagosa Springs where it grows in fine-textured soils derived from Mancos shale at elevations of 2,095 to 2,290 m. This area is being increasingly impacted by residential and commercial development associated with airport expansion, out-of-state vacationer homes, and land speculation related to two proposed ski areas near Wolf Creek Pass. The species is found on open shale slopes in oakbrush communities and, less frequently, open stands of ponderosa. Known threats and limited distribution qualify the species as a threatened species, although more fieldwork is needed before a final determination can be made.

Archuleta County: T34N R1W: Johnston & Lucas 1724, 6/21/78 (COLO, RM); O’Kane 2080, 6/5/85 (COLO, CS); O’Kane & Anderson 2072b, 6/4/85 (CS); T34N R2W: O’Kane 2068, 6/4/85 (COLO, CS); T34N R3W: O’Kane 2648, 4/5/87 (RM); O’Kane & Johnston 2078, 6/5/85 (CS); T35N R1W: Bethel s.n., 7/4/17 (CS, MO, RM); Bethel s.n., 6/30/21 (CS); Bethel, Willey & Clokey 4132, 6/29/21 (RM); Johnston & Lucas 1719, 6/20/78 (RM); O’Kane 2063, 6/4/85 (CS); Penland, Brown & Hartwell 2119, 6/15/48 (KHD); 035N R2W: Schmoll 1077, 6/16/24 (COLO, RM).


Map 40

Family.—Apiaceae (Umbelliferae).

Synonym.—Cogswellia concinna Osterh.

Federal Status.—Category 2.

The Colorado desert-parsley is endemic to
the barren adobes and pinyon-juniper covered hills of Mancos shale from south of Montrose to Delta and Hotchkiss. The species grows in mat saltbush communities at elevations of 1,635 to 1,920 m and up to 2,120 m in pinyon and juniper. It is known to occur with *Peastemon retrorsus*, a Category 1 species, and *Eriogonum pelinophilum*, an endangered species. The species is threatened with habitat modification and destruction resulting from residential and agricultural development, canal systems, oil and gas exploration, and ORV use. Searches for this species are required to determine its status as few specimens exist, most of these being at least 75 years old.

**Delta County:** Location obscure: Purpus 51, 5/1892 (F); Purpus 587, 5/1893 (F); T14S R91W: Neese 13245, 5/11/83 (BRY, CS); Osterhout 4515, 5/21/11 (Isotype: COLO); T14S R92W: Neese 13257, 5/11/83 (BRY, CS); T14S R93W: Ellis s.n., 5/27/78 (CS); T14S R94W: Neese 13267, 5/12/83 (BRY, CS, RM); T15S R93W: Neese 13262, 5/11/83 (BRY, CS). **Gunnison County:** Location obscure: Baker 22, 6/6/01 (MO, RM). **Montrose County:** T49N R8W: Weber 7483, 5/30/52 (COLO). **Ouray County:** T R: Anderson and Fergeson 87–55, 6/1/87 (COLO, CS).


**Map 41**

**Family.—**Apiaceae (Umbelliferae).

**Synonyms.—**Cynomarathrum latilobum Rydb., Aletes latiloba (RydB.) W. A. Weber.

**Federal Status.—**Category 2.

The Canyonlands lomatium is a Navajo Basin endemic limited to the Entrada and Wingate sandstones at elevations of 1,530 to 1,582 m. The species is found from a few populations in Mesa County, Colorado, and Grand and San Juan counties, Utah, where it grows in sand and sandy silt on rimrock ledges in the pinyon-juniper zone. Occasionally plants are found as waifs in the canyons below as seeds are washed down. Because of its inaccessible habitat and the protection most populations receive in Colorado National Monument and Arches National Park, the species is not currently threatened with extinction. Because the species is known from very few populations, however, it should remain a candidate for listing until field surveys are completed and threats, if any, to other populations are identified.

**Mesa County:** T15 T1W: Neese 13274, 5/13/83 (BRY, CS, RM); Siplivinsky 3298, 5/19/82 (COLO); T15 T2W: Rector 6, 7/12/80 (COLO); Riplay & Barneby 5443, 5/23/43 (RM); Weber 15804, 5/24/80 (COLO); T2S R2W: Anderson 372, 5/15/82 (BRY); T11S R102W: Anderson s.n., 7/19/84 (BRY); Rector s.n., 5/30/80 (COLO, CS, RM); Weber & Rector 16641, 5/26/83 (COLO, CS, RM); T12S T101W: Siplivinsky 5033, 8/29/82 (COLO).


**Map 42**

**Family.—**Fabaceae (Leguminosae).

**Federal Status.—**Category 2.

The Paradox lupine is known only from western Montrose County where it grows at elevations of 1,530 to 1,582 m. The species is usually found growing beneath junipers on fairly open ground but may also be found in stands of mixed pinyon and juniper. Soils are usually sandy and are derived from the Chinle formation. Plants are, however, occasionally seen on loamy or clayey soils and even on adobe hills. This is a distinct taxon recognized by its succulent herbage and prostrate habit. Threats to the species include overgrazing, landfills, road construction, and oil and gas exploration and extraction.

**Montrose County:** T46N R15W: Beck & Siplivinsky 3606, 6/4/82 (COLO, CS); Payson 239, 4/21/14 (Holotype: RM). Isotypes: COLO, MO, RM); Payson 985, 6/1/17 (MO, RM); Peterson & Baker 83–49, 5/16/83 (BRY, COLO, CS); T47N R18W: Peterson & Kennedy 83–60, 5/15/83 (BRY, COLO, CS, RM); Peterson & Kennedy 83–58, 5/18/83 (BRY, COLO, CS); Peterson & Kennedy 83–57, 5/18/83 (BRY, COLO, CS, RM); T47N R19W: Weber & Wittman 16073, 5/29/82 (COLO); T48N R19W: Atwood & Thompson 8801, 5/20/82 (BRY); Conrad, Morris & Dunn 6627, 5/19/73 (BRY, COLO); Cox, Dunn & Fleak 1986, 6/10/70 (MO); Peterson & Kennedy 83–55, 5/18/83 (BRY, COLO, CS, RM); Ratzloff s.n., 5/13/78 (COLO); Ratzloff s.n., 5/13/78 (COLO); Walker 152, 6/21/12 (RM).

Map 43

Family.—Asteraceae (Compositae).

Federal Status.—Category 2.

The Dolores skeletonplant is a narrow endemic of the Dolores River canyon near the Colorado-Utah border at Gateway in Mesa County. It grows in reddish purple, sandy alluvium and colluvium of the Cutler formation between the canyon walls and the river in juniper, shadscale, and sagebrush communities at elevations of 1,400 to 1,435 m. A small population in adjacent Utah is reported (J. Anderson, personal communication). Populations of this species are severely impacted by domestic livestock grazing along narrow canyon reaches and in blackbrush flats of wider places in the canyon bottom. Individuals are limited to the protection of shrubs and clumps of Opuntia, and herbage projecting beyond this protection is immediately browsed. Few individuals are seen between shrubs, and then only on small sites inaccessible to livestock. Unless the little additional inventory needed indicates otherwise, this species should be listed as endangered.

Mesa County: T15S R104W: O’Kane & Anderson 2092, 6/20/85 (CS); T50N R19W: Harrington 4426, 6/11/49 (CS); O’Kane & Anderson 2091, 6/20/85 (CS); Ratzloff 1655, 6/21/79 (COLO); T51N R19W: Anderson 85–82, 6/20/85 (BRY); Beck & Siplivinski 3669, 6/5/82 (COLO, CS, RM); Freeman & Wetter 1823, 5/18/83 (KANU); Harrington 3069, 5/27/47 (CS); O’Kane & Anderson 2090, 6/20/85 (CS).

Mentzelia densa Greene, Pitt. 3: 99. 1896.

Map 45

Family.—Loasaceae.

Synonyms.—Mentzelia multiflora (Nutt.) A. Gray var. densa (Greene) A. Nels., Nuttallia densa (Greene) Greene, Touteria densa (Greene) Rydb.

Federal Status.—Category 2.

The Royal Gorge stickleaf is limited to the drainages and main canyon of the Arkansas River between Canon City and Cotopaxi, a distance of 25 miles, where it grows on steep, igneous canyon walls in mountain shrub communities at elevations of ca 1,900 to 1,990 m. Darlington enigmatically reports the species from “southern Colorado” by citing specimens from “Mesa County.” Darlington does not place the species in the Arkansas canyon although Greene described the taxon from there. Specimens examined by Darlington are probably best ascribed to M. multiflora (O’Kane et al. 1988). Known localities are immediately adjacent to highways, but other threats are not known. Livestock probably have little impact on the species because of its inaccessible habitat. Inventories are needed to document the status of this species.

Chaffee County: T49N R9E: Baker, Earle & Tracy 141/2, 6/19/1898 (MO). Fremont County: Location obscure: Engelmann s.n., 9/1874 (MO); Redfield 466, 7/22/1872 (MO); T18S R70W: Osterhout 3334, 8/15/06 (RM); Osterhout 2094, 6/20/00 (NY); Shear 3782, 8/8/92 (NY); T18S R71W: Osterhout 6599, 6/22/26 (RM); T18S R72W: Harrington 7636, 7/8/54 (CS); Jones s.n., 6/29/13 (RM); T19S R73W: Brandegee s.n., 1872 (COLO); T48N R12E: O’Kane & Anderson 2204, 7/31/85 (CS).

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Map 46

Family.—Scrophulariaceae.

Federal Status.—Category 2.

This monkeyflower, unusual for the genus in that it does not reproduce sexually, is known from two areas of endemism, one near Tarryall Reservoir in Jefferson County and another consisting of a few populations in Rocky Mountain National Park. Interestingly, it has been located on the outwash from the recent Lawn Lake flood (B. Jennings, personal communication). The species reproduces by forming "gemmae" of swollen petiole bases containing a reduced plant axis. These gemmae fall free from the plant when leaves dehisce in the autumn. Flowers are rarely formed, and these are functionally sterile. This precise mode of reproduction is not known in any other plant species (J. Karron, personal communication). The species provides an opportunity to study the evolution of obligate asexual reproduction in an otherwise sexually reproducing genus. 


Map 47

Family.—Nyctaginaceae.

Synonyms.—Allionia rotundifolia Greene, A. polytricha Standl., Oxybaphus rotundifolius (Greene) Standl.

Federal Status.—Category 2.

Mirabilis rotundifolia is endemic to an area along the Arkansas River between Canôon City and Pueblo where it grows on fine-textured, white hills eroded from the Timpas Forma-

tion, a Niobrara equivalent. It occurs at 1,550 to 2,200 m and is often found associated with Frankenia, Juniperus, Pinus edulis, and Atriplex. The species is threatened by mining for cement products and by residential expansion. The effects of grazing are not known, and surveys for the taxon are incomplete.


Map 48

Family.—Apiaceae (Umbelliferae).

Synonym.—Aletes lithophila (Mathias) W. A. Weber.

Federal Status.—Category 2.

Neoparrya lithophila was long sought in the "Henfano Mts." of northern New Mexico until it was rediscovered by W. A. Weber in 1957 on a volcanic dike near Silver Mountain in the vicinity of the Spanish Peaks, Huerfano County, Colorado. The species was found in Saguache County on the eastern edges of the San Juan volcanic area by C. E. Taylor in 1922. His specimens were filed under Pseu-
docymopteris anisatus at the U.S. Forest Service Herbarium until discovered by R. Hartman when the herbarium was moved to the Rocky Mountain Herbarium. Several populations have subsequently been located from northwest of Saguache to south of Alamosa. These populations occur on lava flows and outcrops of igneous rocks with Artemisia, Ribes, Symphoricarpos, and Pinus. An unusual population, growing on barren, nearly white silt-loam of the Dry Union Formation, was discovered near Salida in 1986 (O’Kane et al. 1988). The total elevational range of the species is 2,130 to 3,048 m. The species is not impacted by grazing because it grows on inac-
cessible rock outcrops with little forage value. No other threats, other than some habitat degradation of the Elephant Rocks population near Del Norte from recreational activities,
are known, and the species might best be downgraded to Category 3C.

CHAFFEE COUNTY: T49N R9E: O’Kane & Anderson 2218, 8/2/85 (COLO, CS). CONEJOS COUNTY: T34N R11E: O’Kane, Anderson & Dixon 2500, 7/10/86 (COLO, CS). HUERFANO COUNTY: T27S R69W: Hartman 3101, 5/25/71 (RM); Johnston 1406, 8/1/77 (COLO); Parry 83, 9/18/67 (Holotype: GH, Isotypes: MICH, MO); Weber & Gaudreau 10571, 6/29/57 (BRY). RIO GRANDE COUNTY: T40N R6E: Anderson s.n., 7/25/84 (COLO); Johnston 3038, 7/24/85 (RM); Johnston 3051, 7/24/85 (RM); Johnston 3041, 7/24/85 (RM); O’Kane & Anderson 2243, 8/8/85 (COLO, CS). SAGUACHE COUNTY: T41N R6E: O’Kane & Anderson 2241, 8/8/85 (COLO, CS); T43N R7E: O’Kane 2245, 8/9/85 (COLO, CS); T45N R5E: Hartman 17360, 9/18/83 (COLO, RM); Hartman 17350, 9/18/83 (COLO, RM, CS); Hartman 17360, 9/18/83 (CS, RM); Johnston 3058, 7/25/85 (RM); Johnston et al. 2776, 10/12/83 (RM); O’Kane & Anderson 2222, 8/7/85 (COLO, CS); O’Kane & Anderson 2221, 8/7/85 (CS); Taylor 475, 7/10/22 (RM); Taylor 476, 7/6/22 (RM); T45N R6E: Johnston 3062, 7/25/85 (RM); Johnston 3063, 7/25/85 (RM).


Map 49

FAMILY.—Onagraceae.

SYNONYM.—O. flava (A. Nels.) Garrett var. acutissima (W. L. Wagner) Welsh.

FEDERAL STATUS.—Category 2.

This evening-primrose is known in Colorado only from Moffat County where it grows in sandy, moist soils. It is found in seeps, adjacent to springs, along ephemeral watercourses, and in cracks of outcrops of the Uinta Mountain Group sandstones where microsites are more mesic. Surrounding vegetation may be ponderosa pine savanna, sagebrush, grass-forb, or mountain brush. Elevations range from 2,195 to 2,550 m. Known populations, because of nearby water and relatively lush forage, are impacted by domestic livestock grazing. The effects of this grazing are not known. Because the species is low-growing, light grazing could, in some situations, be beneficial, as it reduces the cover of taller species. Heavy grazing, with accompanying trampling, is probably detrimental to the species, especially around grassy springs. The species is also known from a few populations in adjacent Uintah and Daggett counties, Utah.

MOFFAT COUNTY: T6N R104W: Harrington 9924, 6/7/66 (CS); Neese 11806, 6/20/82 (BRY); T7N R101W: Brown s.n., 1938 (BRY); MacLeod & MacLeod s.n., 6/7/70 (COLO); MacLeod & MacLeod s.n., 7/2/70 (COLO); TTN, 102W: O’Kane & Neely 3052, 13/6/87 (COLO, MO, RM); TSN R102W: MacLeod 790, 8/8/69 (COLO); Wiley-Eberle 822, 5/14/81 (CS); Wiley-Eberle et al. 822, 6/3/81 (CS); T11N R103W: Peterson & Kennedy 83–360, 6/30/83 (BRY, CS).


Map 50

FAMILY.—Onagraceae.

FEDERAL STATUS.—Category 2*.

The Wolf Creek evening-primrose is known only from the type collection from the Wolf Creek Valley overlook on the south side of Wolf Creek Pass. This subalpine area is dominated by subalpine fir and Engelmann spruce. Immediately following its discovery the population was destroyed by earthmoving equipment widening Highway 160. Inventories in the area have not located additional populations, and the species is presumed extinct, at least at the type locality. The taxon has affinities to other species of Oenothera in the Mojave Desert (W. L. Wagner, personal communication, W. A. Weber 1987) and may have been introduced in a highway seed mix, as several species from much lower altitudes are present on the site.


Map 51

FAMILY.—Asteraceae (Compositae).

SYNONYM.—Bolophyta alpina Nuttall.

FEDERAL STATUS.—Category 3C.

The alpine feverfew is endemic to the plains of northern Weld County, Colorado, and to the southeastern quadrant of Wyoming. It forms small mats in clayey soils derived from mudstone. Cobbles eroded from conglomerate of overlying strata are often found on the soil surface. The species occurs at elevations
of 1,675 to 1,770 m in sparsely vegetated areas of blue grama grasslands. The effects of heavy grazing on the species are not known. Because of apparent rarity and lack of biological information, the taxon should be considered a Category 2 species until inventories indicate otherwise. This species (and the following species) illustrates the potential beneficial uses of rare plant genomes. *Parthenium alpinum*, *P. tetraneuris*, and *P. ligulatum* (a relatively rare species of the Uinta Basin) have been crossed with guayule (*P. argentatum*) as part of a study designed to transfer desirable traits, particularly cold tolerance, into this potentially valuable rubber-producing species (Hashemi et al. 1986, 1987).

**WELD COUNTY**: T11N R65W: Harmon 8919, 6/4/77 (CS); Harmon 8810, 6/4/77 (CS); Johnston & Lucas 1602, 5/30/78 (COLO, RM); Johnston & Lucas 1626, 5/31/78 (COLO, CS, RM); T11N R66W: Hartman 17370, 6/29/84 (RM); Hartman 17369, 6/9/84 (RM).


Map 52

**FAMILY.**—Asteraceae (Compositae).


**FEDERAL STATUS.**—Category 2.

The Arkansas River feverfew occurs on the rolling and dissected hills between Cañon City and Pueblo in Fremont and Pueblo counties. It grows at elevations of 1,500 to 1,710 m on limestone and shale derived from the Niobrara Formation in communities composed of various mixtures of pinyon, juniper, mountain mahogany, sagebrush, and *Frankenia*. A disjunct population near Salida, Chaffee County, grows on alluvium of the Dry Union Formation with *Eriogonum brandegei*, pinyon, and juniper at 2,225 m. Many populations are threatened by residential expansion, mining of limestone for cement production, and ORVs. The effects of grazing are not known. Inventories for the species are relatively complete, but the full extent of current and potential impacts needs to be determined.

**CHAFFEE COUNTY**: T50N RSE: Anderson 85–109, 8/1/85 (CS). *FREMONT COUNTY*: T14S R69W: Johnston & Wittman 2034, 6/10/79 (COLO); T18S R67W: Baker & Deardorff 83–123, 7/14/83 (CS); T18S R68W: Baker & Deardorff 83–124, 7/14/83 (CS); Baker & Deardorff 83–121, 7/14/83 (CS); Baker & Deardorff 83–120, 7/14/83 (CS); Baker & Deardorff 83–122, 7/14/83 (CS); Herrmann 23600, 6/1/71 (CS, RM); Johnston & Lucas 1628, 6/1/78 (RM); Weber 4680, 5/21/44 (COLO, CS, KANU, RM); T19S R68W: Baker & Deardorff 83–119, 7/13/83 (COLO, CS); Baker & Deardorff 83–111, 7/11/83 (BRY, CS); Harrington 9856, 5/17/65 (CS, KSC); Johnston & Lucas 1630, 6/1/78 (COLO); Peterson & Kennedy 83–434, 7/12/83 (BRY, CS); Peterson & Kennedy 83–439, 7/13/83 (CS, RM); Peterson & Kennedy 83–433, 7/12/83 (CS); Ripley & Barneby 7662, 6/1/46 (RM); Wittmann & Wittmann 1575, 5/4/81 (COLO); T19S R69W: Peterson & Kennedy 83–416, 7/11/83 (CS, RM); Weber s.n., 5/60 (COLO). *PUEBLO COUNTY*: T19S R66W: Baker & Deardorff 83–125, 7/20/83 (CS); T19S R67W: Peterson & Kennedy 83–119, 7/13/83 (COLO, CS); Peterson & Kennedy 83–436, 7/12/83 (CS, RM); T20S R65W: Peterson & Kennedy 83–438, 7/12/83 (CS); Ripley & Barneby 8303, 5/23/47 (RM); T20S R66W: Baker & Kennedy 83–126, 7/21/83 (CS, RM); Peterson & Deardorff 83–447, 7/21/83 (BRY); Peterson & Kennedy 83–448, 7/21/83 (CS); Peterson & Kennedy 83–449, 7/21/83 (BRY); T20S R67W: Ripley & Barneby 7666, 6/1/46 (RM).


Map 53

**FAMILY.**—Cactaceae.

**SYNONYM.**—*Pediocactus bradyi* L. Benson var. *knowltonii* (L. Benson) Backbg.

**FEDERAL STATUS.**—Endangered.

The Knowlton cactus is known from one naturally occurring population on the New Mexico–Colorado border in La Plata County, Colorado, and San Juan County, New Mexico. A small population in New Mexico near the type locality, consisting of eight individuals and presumably introduced by cactophiles fearful of the effects of Navajo Reservoir on the native population, has recently been reduced to three individuals by road construction (P. Knight, personal communication). Another "population" has recently been created in New Mexico from cuttings to study the
biology and to ensure the survival of the species. This species is among the rarest in North America as well as one of the most endangered. Cactus collectors as far away as Germany and Japan have poached the species for their cactus collections. The type locality, now owned by The Nature Conservancy, is fenced to exclude domestic livestock. The one hill that this species occupies is unusual in that it contains a mixture of Juniperus osteosperma and J. scopulorum. Juniperus scopulorum is not found elsewhere within miles of the population. Additionally, although at a relatively low elevation of 1,950 m, other montane species are found at the site. Soils are cobbly riverine alluvium. This species poses interesting questions concerning speciation and dispersal in the Cactaceae.

La Plata County: T32N R7W: Heil s.n., 5/18/75 (UNM); Peterson & Knight 83–7, 5/2/83 (CS).


Map 54

FAMILY.—Scrophulariaceae.

SYNONYM.—Penstemon scariosus Pennell var. albifluis (England) N. Holmgren.

FEDERAL STATUS.—Category 1.

The White River penstemon is known in Colorado only from several small populations on barren outcrops of Green River shale on Raven Ridge, Rio Blanco County. No herbarium specimens were located from the locality, but the record is certain as the Colorado Natural Areas Program and the Bureau of Land Management are currently conducting a population biology study of the species at this locality. The species, in Colorado, grows in pinyon-juniper communities. Welsh (1985) questions whether this taxon should be considered a candidate for listing, although he gives no justification for this view. A limited range and potential threats from oil shale production indicate that the species should remain a candidate until inventories show otherwise. The effects of grazing on the unstable substrate occupied by the species are not known.


Map 55

FAMILY.—Scrophulariaceae.

FEDERAL STATUS.—None.

The Parachute penstemon is known only from Mt. Callahan, above the town of Parachute, where it occupies the steep southern escarpment of the ridge crest, and from a small population on the Anvil Points near Rifle. It grows on unstable, nearly barren white talus of decomposing Green River shale with Eriogonum lonchophyllum, Cymopterus hendersonii, and Galium coloradense. Mount Callahan also hosts Thalictrum heliophilum, Festuca dasyclada, Mentzelia argillosa, and Astragalus lutosus, other oil shale endemics. One of the two subpopulations on Mt. Callahan, ca 90 ha total, is protected as a Colorado Natural Area. This taxon is likely limited to its currently known range as inventories of oil shale lands are relatively thorough. Because of extreme rarity, P. debilis should be listed as an endangered species. Penstemon debilis and Pediocactus knowltonii are among the rarest plants in North America.

Garfield County: T7S R96W: O’Kane & Anderson 2424, 6/11/86 (Holotype: COLO; Isotypes: ASU, BRY, CS, NY, RM, UTC); O’Kane 2443, 6/25/86 (KANU); Anderson 86–79, 6/25/86 (CS, SJNM); Anderson 86–118, 7/23/86 (COLO, RM).


Map 56

FAMILY.—Scrophulariaceae.

FEDERAL STATUS.—Category 2.

The Degener beardtongue is apparently endemic to the canyon of the Arkansas River from near Texas Creek to Cañon City and to Wet Mountain Valley, but few specimens are known. It grows in the duff of pinyon at elevations of 1,830 to 2,895 m. Until inventories are conducted, the species should be considered rare.

Fremont County: T18S R71W: Peterson & Kennedy 83–446, 7/14/83 (CS); Weber & Nelson 13360, 7/23/67 (COLO); T49N R12E: Harrington 7517, 7/5/54 (CS).


Map 57

FAMILY.—Scrophulariaceae.

FEDERAL STATUS.—Category 2.

The Gibbens beardtongue occurs in Sweetwater and Carbon counties, Wyoming, and, in
Colorado, from Browns Park in Moffat County and the Piceance Basin of Rio Blanco County. The species belongs to a polymorphic and difficult group of species that includes *P. penlandii* and *P. fremontii*. In Browns Park the species grows in sandy soils derived from the Browns Park Formation. Populations in the Piceance Basin grow on partially decomposed shale of the Green River Formation. *Penstemon gibbeusii* is typically found with *Artemisia tridentata*, but it is also found in communities dominated by mountain mahogany and Utah juniper. Populations in Browns Park are threatened by heavy grazing. Piceance Basin populations may be threatened in the future by oil shale extraction; some populations have been impacted by road construction.

**Moffat County:** T10N R102W: Peterson et al. 1261, 7/20/78 (CS); T10N R103W: Wiley-Eberle s.n., 6/15/84 (CS); Neely 3668, 7/23/86 COLO, CS); Neely 3687, 7/23/86 (COLO, CS). **Rio Blanco County:** T1N R97W: O’Kane 2409, 6/4/86 (BRY, NY); T1N R98W: O’Kane 2445, 6/26/86 (COLO); T1N R99W: O’Kane 2434, 6/15/86 (BRY, COLO, CH, NY, RM); T1S R97W: Peterson & Rollins 83–215, 6/20/83 (CS); O’Kane 2414, 6/4/86 (COLO, RM); T2N R98W: Baker & Naumann 82–184, 6/10/82 (CS); O’Kane 2441, 6/15/86 (COLO, NY, RM); O’Kane, Sigstedt & Peterson 82–322, 6/11/82 (CS); T2S R95W: O’Kane 2407, 6/3/86 (BRY, COLO, NY, RM); T2S R97W: Baker & Naumann 82–197, 6/11/82 (CS); T3S R95W: Kelley & Riefler 82–37, 7/2/82 (CS); T3S R98W: Peterson et al. 1178b, 7/6/78 (CS); T4S R95W: Kelley & Sigstedt 82–88A, 7/8/82 (CS).


**Family.** Scrophulariaceae.

**Federal Status.** Category 1.

The Graham beardtongue, in Colorado, grows only west of Rangeley on Raven Ridge, a floristically important outcrop of Green River shale that contains a number of endemic species. It is found with *Juniperus osteosperma*, *Cercocarpus intricatus*, and *C. montanus* at 1,780 m. The population, consisting of a few small subpopulations, is monitored by the Colorado Natural Areas Program and the Bureau of Land Management. The Colorado population is included in a Colorado Natural Area/BLM Area of Critical Environmental Concern. Elsewhere, the species is known from a few populations in Carbon and Uintah counties, Utah. The species is potentially threatened by oil shale mining because it grows on rich deposits of the Green River shale. The effects of grazing on the unstable habitat of this species are not known.


**Family.** Scrophulariaceae.

**Federal Status.** Category 2.

Harrington beardtongue occurs in a semi-circular area adjacent to the Eagle, Colorado, and Blue rivers from near Vail to Dotsero, State Bridge, Kremmling, and to Green Mountain Reservoir. It grows in sands and fine sands in sagebrush communities at elevations of 2,165 to 2,475 m. Because it increases in open stands and decreases in closed stands of sagebrush, it appears to be an early successional species. The species is similar to *P. osterhoutii*, with which it is sympatric. *Penstemon osterhoutii* tends to occur just above the slightly more mesic sagebrush habitat of *P. harringtonii*. Inventories of habitat from Green Mountain Reservoir to Kremmling are relatively complete, but surveys elsewhere in the range are sketchy. Several populations, especially along the Blue River, are threatened by grazing and increased vacation-home and ski-resort construction. If expanses of habitat are found not to be threatened, the species should be lowered to Category 3C.

**Eagle County:** T2S R82W: Harrington 8053, 6/28/55 (CS); Western Resource Development, Co. s.n., 6/22/82 (COLO); T4S R82W: Harrington 4935, 6/7/35 (CS); T4S R83W: Western Resource Development, Co. s.n., 6/22/82 (COLO); T5S R82W: Bumin 2, 6/17/85 (COLO); T5S R83W: Western Resource Development, Co. s.n., 6/24/82 (COLO). **Grand County:** T1N R80W: Naumann 11, 6/29/84 (CS, RM); T1S R80W: Naumann 10, 6/28/84 (CS); Penland 4296, 6/19/52 (Isotypes: COLO, RM); T1S R81W: Harrington 8056, 6/28/55 (CS); Naumann 12, 6/29/84 (CS); Western Resource Development, Co.


**Map 60**

**Family.**—Scrophulariaceae.

**Federal Status.**—Category 2*.

This species is known only from the type locality, "S. W. Colo., Mancos," collected by Alice Eastwood in 1890. No further clues to the type location are available because Eastwood’s field books were destroyed in the 1906 San Francisco earthquake and fire. To my knowledge, no in-depth searches have been conducted for the species, although collectors have frequented the general area. The species is currently presumed extinct.

**Montezuma County:** T36N R13W: Eastwood s.n., 6/1890 (Isotypes: COLO, US, Phil. Acad. Sci.).


**Map 61**

**Family.**—Scrophulariaceae.

**Federal Status.**—None.

The Penland beardtongue is known only from a small area along a country road just northeast of Kremmling growing on seleniferous clay hills of the Troublesome Creek Formation at 2,300 m in elevation. It is sympatric with a small population of *Astragalus osterhoutii*. The effects of grazing on the species are not known. Also, the effects of increased recreational use of the area, should a nearby proposed reservoir be built, are not known.

**Grand County:** T2N R79W: Weber & Dahnke 17830, 7/30/86 (Holotype: COLO, Isotypes: MO, RM); Anderson 85–84, 7/1/86 (COLO).


**Map 62**

**Family.**—Scrophulariaceae.

**Federal Status.**—Category 1.

The adobe beardtongue occurs on barren grey adobe hills of the Mancos shale from near Montrose north to Delta and Paonia. It grows in sparsely vegetated communities dominated by *Artemisia nova*, *Atriplex confertifolia*, *A. corrugata*, and *Tetradymia spinescens* at elevations of 1,530 to 1,830 m on strongly gypsiferous clay soils. The species is sometimes found with *Eriogonum pelinophilum* and *Lotus concinnum*, two other local Mancos shale endemics. Threats to the species include livestock grazing, habitat modifications due to agricultural and residential development, oil and gas exploration, construction of irrigation ditches, and ORV activity. Although the species is fairly abundant within its limited range, the presence of these threats indicates that it should remain a candidate for listing. If listed, it should be considered threatened.

**Delta County:** T14S R92W: Neese 13252, 5/11/83 (BRY, CS); Neese 15782, 6/19/84 (CS); Ratzloff s.n., 5/17/75 (COLO); T15S R92W: Ellis s.n., 5/28/78 (CS); T15S R98W: Neely 2981, 6/27/85 (CS, UTC). **Montrose County:** Location obscure: Dawson s.n., n. d. (COLO); T49N R5W: Rollins 2125, 5/24/38 (RM); Weber 7451, 5/28/78 (COLO, CS, MO, RM); Weber & Murray 12379, 5/18/65 (COLO); T49N R9W: Johnston, Ratzloff & Lucas 1553, 5/15/78 (COLO); Payson 673, 6/15/15 (RM); T50N R9W: Ellis 7215, 4/27/72 (COLO); T51N R9W: Neely 2894, 6/16/85 (CS, UTC).


**Map 63**

**Family.**—Hydrophyllaceae.

**Federal Status.**—Endangered.

The North Park phacelia is found on barren sandy slopes near the North Platte and Canadian rivers in North Park, a high-altitude basin in Jackson County lying between the Park Range on the west and the Medicine Bow Mountains on the east. The sandy soils of its habitat, derived from the Coalmont Formation, are easily shifted by prevailing winds and by the hooves of grazing animals. *Phacelia formosula* grows at ca 2,450 to 2,500 m in elevation and is associated with species of *Artemisia* and *Chrysothamnus*. In addition to being rare and local, the species may be threatened by domestic livestock grazing, by energy exploration, and by habitat modification for hay production. Studies currently being conducted by CNAP and the BLM are
designed to identify threats, if any, and the natural history of the species.

JACKSON COUNTY: TSN R80W: Peterson et al. 827, 6/4/81 (CS); T9N R79W: Atwood 1977, 7/16/69 (BRY); Atwood & Higgins 5830, 8/11/73 (BRY, RM); O’Kane 2096, 7/1/85 (CS); Osterhout 5794, 8/6/18 (Holotype: RM, Isotypes: COLO, NY, RM); Peterson & Baker, 4/27/82 (CS); Weber & Murray 12344, 5/15/65 (COLO, CS); Wingate & Weber 1365, 5/5/82 (KHD); T8 S R98W: Kelley 83–20, 5/24/83 (CS); Kelley 83–16, 5/24/83 (BRY, CS, RM); T9S R96W: O’Kane 2380, 5/23/86 (BRY, COLO); O’Kane 2381, 5/24/86 (CS); O’Kane & Anderson 2364, 5/21/86 (COLO, CS); T9S R97W: Kelley 83–5, 5/12/83 (BRY, CS RM); T9S R98W: O’Kane 2396, 5/26/86 (COLO, CS); Peterson, Kelley & Walker 82–50, 5/22/82 (BRY, CS, RM); Peterson, Kelley & Walker 82–52, 5/22/82 (CS).


Map 65

FAMILY.—Polemoniaceae.
FEDERAL STATUS.—Category 2.

Clove phlox is confined to an area from Pagosa Springs southeast and southwest to adjacent northern New Mexico where it grows in pinyon-juniper woodlands, sagebrush, and grassy meadows from 2,280 to 2,380 m in elevation. The species thrives in communities in mild disclimax, often along roads, but it is also found on pristine sites. Soils are clayey and are derived from the Mancos shale. Herbivores apparently do not utilize the species. Threats from increased residential and recreational use of the area associated with nearby proposed ski areas, an improved airport, and increased popularity of the area will probably not greatly impact the species because of its wide occurrence in its area of endemism and because the taxon can tolerate mild disturbance. Spraying of roadsides with herbicides, however, should be discontinued where the species occurs. This species should be downgraded to Category 3C.

ARCHELTA COUNTY: T34N R1W: Harrington 8076, 7/1/55 (CS); T34N R2W: Wilken 14425, 5/23/85 (CS); T35N R1W: Harrington 9797, 6/14/55 (CS); Johnston, Johnston & Johnston 2538, 5/16/82 (COLO); O’Kane 2062, 6/4/85 (CS); T35N R2W: Bethel 4967, 6/30/21 (CS); O’Kane 2055, 6/3/85 (CS); O’Kane 2056, 6/3/85 (CS); O’Kane 2067, 6/4/85 (COLO, CS); O’Kane & Anderson 2057, 6/3/85 (CS); Schmoll 1093, 6/15/24 (COLO, RM); T36N R1W: O’Kane 2054, 6/3/85 (CS);
T36N R2.5W: O’Kane et al. 2059, 6/3/85 (CS); T35N R8W: Porter 2031, 6/25/35 (RM).


*Map 66*

**Family.**—Brassicaceae (Cruciferae).

**Federal Status.**—Category 2.

Bell’s twinpod, endemic to the Niobrara Formation, grows on fine-textured soils derived from black shale high in calcium in the southern part of its range and from light-colored, limy shale in the north. The species is scattered along the foothills and hogbacks from Fourmile Canyon near Boulder to Box Elder Creek north of Owl Canyon. One old collection, however, exists from Cheyenne Mountain near Colorado Springs (Churchill s.n. MO), and a 1988 report (J. Borland, personal communication, specimen verified by W. A. Weber) places the species southwest of Denver in Jefferson County on a small outcrop of Niobrara shale at the mouth of Deer Creek Canyon. As Cheyenne Mountain is composed of Pikes Peak Granite, it is likely that the collection locality is in error unless a disjunct population occurred at the foot of the mountain on Pierre Shale. Bell’s twinpod is usually found in shrub communities dominated by *Rhus triloba* and *Cercocarpus montanus* at elevations of 1,580 to 1,750 m. *Oryzopsis* and species of *Stipa* are common associates. Although not threatened everywhere in its range, threats to individual populations can be significant. Some populations are threatened by road construction and maintenance. The populations near LaPorte could be impacted by mining for cement products. The effects of grazing are not known.

**Boulder County:** TIN R70W: Weber 3270, 4/10/47 (COLO, CS); T2N R70W: Naumann 2, 6/7/84 (CS); Neely 2514, 5/5/85 (CS, UTC); T2N R71W: Denham & Denham 1315, 4/16/67 (COLO); Gambill s.n., 5/7/84 (KHD); Mulligan & Crompton 2898, 8/24/64 (Isotype: COLO); Ramaley 1016, 5/30/05 (COLO); Rollins 7948, 5/24/79 (COLO, MO, RM); Weber 3372, 5/22/47 (COLO, CS); Wiegang & Upton 3320, 6/12/22 (MO); Wynn s.n., 5/10/83 (KHD); T3N R71W: Wilken 12857, 5/18/77 (CS). **El Paso County:** T15S R67W: Churchill s.n., 6/22/12 (MO). **Larimer County:** Location obscure: Osterhout 5616, 6/25/17 (COLO); T4N R70W: Popp s.n., 6/18/83 (CS); T4S R69W: Robinson s.n., 5/25/80 (COLO); T5N R69W: Naumann & Trout 4, 7/2/84 (CS); T6N R70W: Popp s.n., 6/29/83 (COLO); Schromberg s.n., 5/8/83 (COLO); T7N R69W: Naumann & Trout 3, 5/6/84 (CS); Popp s.n., 6/18/83 (CS); T5N R69W: Crandall 212, 5/14/1890 (CS); Crandall 425, 5/2/1896 (CS, MO); Crandall 427, 6/7/1898 (CS); Crandall 426, 5/7/1898 (CS); Wilken 14302, 5/6/85 (CS); T9N R69W: Lamham s.n., 6/8/80 (COLO); Neely 2734, 6/2/85 (CS, UTC); Popp s.n., 6/17/83 (CS); T10N R69W: Ramaley 2743, 6/14/07 (COLO).


*Map 67*

**Family.**—Brassicaceae (Cruciferae).

**Federal Status.**—Category 2.

The recently described Dudley Bluffs twinpod is limited to moderate or steep slopes in the Piceance Basin. The species is restricted to the Thirteen Mile Creek Tongue, which is embedded in the Uinta Formation, and to the more abundant Parachute Creek Member of the Green River shale. Soils are fine textured and usually have a large component of shale fragments. These soils, because of topographic position and sparse vegetation cover, are erosive. The species occurs in shrub communities containing various mixtures of *Ame- lancier, Chrysothamnus, Atriplex,* and *Artemisia* at elevations of 1,815 to 2,270 m. The surrounding vegetation is pinyon-juniper woodland. Road and pipeline construction and maintenance have impacted and could potentially impact several populations. Herbicides should not be applied along stretches of county road known to contain the species. The species can colonize recently exposed shale slopes, but the effects of continued disturbance are not known. Oil shale mining on a large scale could significantly impact the species. Livestock do not utilize the species, but the effects of trampling the unstable habitat of the taxon are not known. Rarity and known and potential threats indicate that *P. obcordata* should be listed as a threatened species.

**Rio Blanco County:** TIN R97W: O’Kane 2410, 6/4/86 (COLO, GH); TIN R98W: O’Kane 2419, 6/5/86 (COLO, GH); O’Kane & Anderson 2444, 6/26/86 (COLO, CS); TIN R100W: Walker & Riefler 82–361, 7/22/82
Great
1875
Vol.

herbarium
frequently
County:
(RM);
should
inventories
species
grows
(COLO);
(COLO);
(COLO);
6/17/82 (CS, GH); Baker & Naumann 82–209, 6/17/82 (CS, GH); Baker & Naumann 82–210, 6/17/82 (CS); Baker & Naumann 82–211, 6/22/82 (CS); Baker & Naumann 82–193, 1982 (CS, GH); Baker & Naumann 82–277, 7/8/82 (Holotype: GH, Isotypes: COLO, CS); Neese 11946, 7/9/82 (BRY); O’Kane 2412, 6/4/86 (BRY, COLO, RM); Rollins & Rollins 8390, 6/20/83 (COLO, CS, GH, RM); T3S R95W: Weber 17806, 7/8/86 (COLO).


Map 68

FAMILY.—Rosaceae.

SYNONYM.—Potentilla rupincola Osterh.

FEDERAL STATUS.—Category 2.

The Rocky Mountain cinquefoil, which grows among granitic rocks from ca 2,100 to ca 2,590 m in elevation, apparently occurs infrequently from Virginia Dale to Empire. Although no inventories have been conducted for the taxon, its range, as indicated by known herbarium specimens, is relatively large. Because it grows in inaccessible habitats, the species is probably not threatened. Unless inventories indicate otherwise, this taxon should be downgraded to Category 3C.

BOULDER COUNTY: T1S R73W: Payson 1558, 7/6/19 (COLO, RM). CLEAR CREEK COUNTY: T4S R74W: Shear 755, 8/19/1895 (RM); Tweedy 748, 7/15/03 (RM). LA County: T4N R74W: Ashton 172, 7/27/30 (RM); T5N R73W: Osterhout 1497, 7/28/1897 (RM); T9N R74W: Osterhout 1323, 8/1893 (RM); T11N R71W: Kunkel s.n., 6/23/73 (COLO); Osterhout 5132, 7/4/14 (COLO, RM); Osterhout 2274, 9/7/00 (COLO, RM); Osterhout 1780, 7/21/1898 (Holotype: RM); Osterhout s.n., 7/20/1898 (RM, NY); Osterhout s.n., 7/19/1899 (RM); Osterhout 5524, 8/14/16 (RM); Osterhout 5602, 8/14/16 (RM); Weber & Jones 12392, 6/9/65 (COLO); T12N R71W: Stephens & Brooks 43467, 8/10/70 (KANU).


FAMILY.—Poaceae (Gramineae).

SYNONYM.—Ptilagrostis mongolica Trucz. ex Trin. ssp. porteri (Ryd.) Barkworth.

FEDERAL STATUS.—Category 2.

The Porter needlegrass is endemic to the mountains flanking the north end of South Park where it grows in bogs with Deschampsia, Salix, and Pentaphylloides. The species is found on small microhabitats on the tops of hummocks formed from peat which elevate the species a few centimeters above the water table. Elevations range from 2,695 to 3,660 m. Ptilagrostis porteri is closely related to the Asiatic P. mongolica. Threats to the taxon include peat mining and the ditching of bogs for water diversion projects. The Geneva Park population has apparently been extirpated by peat mining. The effects of grazing are not known, but trampling by livestock probably disturbances the fragile microhabitat.

PARK COUNTY: T6S R75W: Giersch & Hickey 3102, 7/26/66 (COLO); Giersch s.n., 9/8/70 (COLO); Johnston 2511, 8/14/81 (COLO); T8S R74W: Johnston 2497, 8/13/81 (COLO); Johnston & Hendzel 2655A, 10/4/82 (COLO); Johnston & Hendzel 2655, 10/4/82 (COLO); TSS R77W: Marr s.n., 8/3/86 (COLO); T9S R72W: O’Kane 47, 8/28/84 (BRY, COLO, CS, RM); T9S R73W: Johnston & Hendzel 2655, 10/4/82 (COLO); O’Kane 53, 8/29/84 (COLO, CS, RM); Shubert 20–2, 7/20/54 (COLO, CS); Weber 12984, 9/25/66 (COLO); T9S R78W: Stevens 1, 9/3/59 (COLO, CS); SUMMIT COUNTY: TSS R78W: Price 403, 7/27/79 (COLO).


Map 70

FAMILY.—Brassicaceae (Cruciferae).

FEDERAL STATUS.—Category 2*

The Colorado watercress is known from a single collection, the type, collected by T. S. Brandegee in 1875. Stuckey (1972), by carefully reconstructing Brandegee’s 1875 itinerary, surmised the collection locality to be the vicinity of the lakes of the San Luis Valley in Alamosa County. Searches by myself, J. Anderson, and H. Dixon in 1986, and periodically by others, did not relocate the species. Wetlands in the San Luis Valley are continually modified by systems of canals, the digging of artesian wells, and conversion for agriculture. This species is presumed extinct.
LOCATION OBSCURE: Brandegee 1069, 1875 (PH).


**Map 71**

**Family.**—Asteraceae (Compositae).

**Synonym.**—*S. alpina* DC. sensu Harrington.

**Federal Status.**—Category 3C.

In Colorado this species is limited to the Mosquito Range and contiguous Hoosier Ridge where it grows on gravelly tundra slopes and amidst scree, often on solifluxion lobes, at elevations of ca. 3,200 to 4,355 m. It is most often found growing on exposed sites with poorly developed soils derived from Leadville limestone and Manitou dolomite. **Saussurea weberi** is also known from a few localities in west central Wyoming in Sublette and Fremont counties (Dorn 1988) and from west central Montana in Deer Lodge and Granite counties (Dorn 1984). Threats in Wyoming and Montana are not known, but in Colorado some populations are threatened by hard-rock mining in its mineral-rich area of endemism.

**Park County:** T8S R77W: Weber & Thornburg 4448, 8/31/48 (COLO); T8S R78W: Huestis s.n., 8/14/05 (Isotypes: COLO, RM); Penland 4254, 7/28/51 (BRY, COLO); T10S R78W: Neely 3070, 7/9/85 (CS); Weber 13304, 7/12/67 (COLO); T105 R79W: O’Kane & Anderson 2581, 8/6/86 (CS, NY, RM); Weber & Hogan 17508, 8/16/85 (COLO).

**Summit County:** T6S R76W: Johnston 1479, 8/15/77 (COLO, RM); T8S R77W: Weber 4313, 7/24/48 (COLO).


**Map 72**

**Family.**—Cactaceae.


**Federal Status.**—Threatened.

The Uinta Basin hookless cactus occurs in northeastern Utah as well as in Mesa, Garfield, Delta, and Montrose counties, Colorado. In Colorado the species grows on fine-textured soils that are often derived from the Mancos shale in shadrock, greasewood, and juniper communities at elevations generally near 1,550 m. Welsh (1987) considers this taxon to be a straight-spined form of *Sclerocactus whipplei* var. *roseus*, stating that "specimens with straight spines have long been known" and that "they differ in no other discernible way from the body of the species." Straight spines are "considered . . . to be taxonomically negligible." Plants with straight spines, as opposed to the usually hooked spines of *S. whipplei*, occur through much of the range of *S. whipplei*, although they are more common in eastern Utah and western Colorado. Whatever the taxonomic status of this controversial taxon, it is relatively widespread and abundant. Although threats to the taxon exist, e.g., poaching by cactus collectors and a proposed reservoir north of DeBeque, the species is threatened in only a fraction of its range and should, therefore, be reduced to Category 3C, or perhaps 3B, status.

**Delta County:** T14S R94W: Neese 13206, 5/9/83 (BRY); T15S R96W: Heil s.n., 10/76 (BRY). **Garfield County:** T7S R98W: Arp 1017, 6/20/70 (COLO); Kelley 83–6, 5/18/83 (CS); Weber 13978, 5/15/69 (COLO); T8S R97W: Arp 1006, 6/20/70 (COLO); Arp 1006, 6/20/70 (KHD). **Mesa County:** T15S R1E: Arp 1672, 10/76 (COLO); T15S R2E: Peterson 83–39, 5/11/83 (CS); T2S R2E: Baker 83–1, 5/11/83 (CS); Neese 13438, 5/27/83 (CS); Peterson & Kennedy 83–288, 5/10/83 (CS); T8S R97W: Kelley 83–14, 5/19/83 (CS); Weber 12353, 5/15/65 (COLO); T13S R97W: Neese & Abbott 13580, 6/15/83 (BRY). **Montrose County:** T51N R98W: Arp 1691, 9/4/71 (COLO).


**Map 73**

**Family.**—Cactaceae.


**Federal Status.**—Threatened.

The Mesa Verde cactus is limited, in Colorado, to Ute Mountain Ute tribal lands in the Four Corners area in Montezuma County where it grows on barren Mancos shale hills.
and flats with *Atriplex corrugata* and *A. confertifolia* at elevations of 1,605 to 1,690 m. The species is also known from a few scattered stations in San Juan County, New Mexico. This taxon experiences a substantial degree of poaching from cactus collectors and is occasionally trampled by domestic livestock. ORV use of its barren habitat also accounts for some mortality, and it is threatened by oil and gas exploration and development.

**Montezuma County:** T32N R17W: Peterson & Baker 83–16, 5/5/83 (CS); T33N R17W: Arp 1476, 9/6/70 (COLO); Peterson & Baker 83–10, 5/4/83 (CS); O’Kane & Jamieson 2631, 28/4/87 (RM); Weber s.n., 6/13/50 (COLO).


**Map 74**

**Family.**—Asteraceae (Compositae).

**Federal Status.**—Category 2.

The intermediate groundsel is known from three areas of endemism: the La Sal Mountains in Grand and San Juan counties, Utah; near the town of Mont Lewis in Sanpete County, Utah; and from the Uncompahgre Plateau in Mesa, Montrose, and Ouray counties, Colorado. The species, in Colorado, grows in wet meadows, often with *Pentaphylloides* and *Veratrum*, at elevations of 2,650 to 3,010 m. Surrounding vegetation is Engelmann spruce and aspen. The species is apparently infrequent and threats have not been identified. The effects of livestock grazing are not known. This taxon should remain a Category 2 species until thorough inventories are conducted.


**Map 75**

**Family.**—Iridaceae.

**Federal Status.**—None.

Pale blue-eyed-grass is known from a few localities in central and north central Colorado and southern Albany County, Wyoming. The species grows in wet meadows with rich organic soils. Sedges, grasses, and other wetland species such as *Triglochin maritima*, *Juncus balticus*, *Primula incana*, and *Dodecatheon pulchellum* are common associates. Elevations range from 2,415 to 2,900 m. Populations in South Park may be threatened by the ditching of wetlands for water diversion projects. The species is apparently rare, but inventories for the taxon have not been conducted. The species, because it inhabits fragile wetland habitats and because it appears to be rare, should be considered a Category 2 species until inventories better document its status.

**La Plata County:** T5N R74W: Cholewa 572, 7/12/80 (ID); T11N R76W: Wilken 14636, 7/9/86 (CS). **Park County:** T7S R75W: Beetle 2101, 8/4/37 (RM); T7S R76W: Ramaley & Gambill 16875, 7/13/39 (COLO); Weber 17380, 7/20/84 (COLO, CS); Weber & Randolph 17380, 7/20/84 (COLO, CS); TSS R75W: Cholewa 448, 7/13/79 (ID); Cholewa 150, 7/13/75 (ID); Cholewa 437, 7/12/79 (MO); TSS R76W: Harrington 9084, 7/4/59 (CS); T10S R76W: Cholewa 454, 7/13/79 (MO); T11S R76W: Cholewa 450, 7/13/79 (ID); Cholewa 157 (ID); T12S R76W: Cholewa 456, 7/13/79 (Holotype: 1D, Isotypes: CAN, CS; MO, NY, RM); Jennings s.n., 7/4/85 (CS).


**Map 76**

**Family.**—Orchidaceae.

**Synonym.**—*Spiranthes porrifolia* Lindl. sensu Goodrich, Neese, and Welsh.

**Federal Status.**—Category 2.

Diluvium lady’s tresses is known from several widely disjunct localities in Colorado (Boulder and Jefferson counties and the “South Fork of the Platte”), Nevada (Lincoln County), and Utah (Daggett, Garfield, Tooele, Utah, Wayne, Salt Lake, and Weber counties). The species occupies wet meadows in floodplains and, at least in Colorado and Utah, does not tolerate heavy grazing (B. Jennings, personal communication, Sheviak 1984). Localities in Salt Lake, Tooele, and Utah counties, Utah, have been extirpated; a Boulder County, Colorado, population has
been impacted by grazing. The disjunct pattern of distribution indicates that the taxon may be found in suitable habitat in intervening areas. Sheviak (1984) states that, because of the complexity of the group, "a significant number of specimens may be misdetermined and the stations consequently undetected." Inventories are needed to ascertain the status of this taxon. Rydberg (1906) notes a locality for *Spiranthes porrifolia* from "Camp Harding, near Pike’s Peak." The collection Rydberg consulted has not been located (B. Jennings, personal communication) but probably belongs to *S. diluwialis* as *S. porrifolia* is known only from west of Colorado (Cronquist et al. 1977).

LOCATION OBSCURE (Probably Weld or Morgan County): "South Fork of the Platte," H. Engelmann s.n., 9/1856 (MO). BOULDER COUNTY: T1S R70W: Jennings 86–9, 8/12/86 (COLO, CS, NYS, RM); Jennings 86–6, 7/30/86 (COLO, CS, NYS, RM); Jennings 86–7, 8/2/86 (COLO, CS, NYS, RM); Sharps s.n., 7/30/85 (COLO). JEFFERSON COUNTY: T3S R69W: B. Anderson 1827, 7/25/81 (KHD); Jennings s.n., 8/5/85 (CS); Root 85–55, 8/26/85 (KHD); T3S R70W: Bye 9769, 9/6/80 (COLO); Sheviak 224, bloomed in hort. (NYS), Sheviak 2313, 8/5/82 (NYS), Callas s.n., 8/17/84 (KHD); Gambill et al. s.n., 7/23/81 (COLO); Jennings s.n., 8/8/84 (CS); Sheviak, Jennings, Long & Wood 2257, 7/17/82 (Isotype: COLO); Smookler s.n., 8/18/80 (COLO).


Map 77

FAMILY.—Ranunculaceae.

FEDERAL STATUS.—Category 2.

The sun-loving meadow rue grows on steep talus slopes and ridges covered with broken, shifting plates of the Parachute Creek Member of the Green River shale. Associated vegetation is very sparse, typically with scattered plants of *Cynopteris hendersonii*, *Holodiscus dumosus*, *Astragalus lutosus*, and *Chrysothamnus nauseosus*. The species is limited to the Piceance Basin, the Roan Plateau, and to the ridge east of Horse Mountain and south of the Colorado River. *Thalictrum heliophilum* is occasionally found with another oil shale endemic, *Lesquerella parisiiflora*. The population on Mount Callahan is found with *Festuca dasyclada*, *Mentzelia argillosa*, and *Penstemon debilis*. This site has been designated a Colorado Natural Area. Elevations range from 1,920 to 2,682 m. The species is unusual because it occupies windswep, harsh sites where its congeners prefer mesic, usually shaded conditions in the mountains. Oil shale companies have used the species for revegetation following shale extraction with great success. Inventories for the species are complete, and the decision whether or not to list the species as endangered or threatened depends, in part, on the likelihood of extensive oil shale extraction in the near future.

GARFIELD COUNTY: T5S R100W: Kelley 138, 8/3/83 (CS); T6S R95W: Nicholas 83, 6/20/81 (CS); T6S R96W: Harner 1918, 7/16/83 (COLO); T6S R97W: Mustard 3365a, 7/22/81 (COLO); T6S R98W: Camp, Dresser & McKee, Co. 3666, 7/8/82 (COLO); Mustard 2760, 6/3/81 (COLO); T7S R96W: O’Kane & Anderson 2421, 6/11/86 (COLO, NY, RM).

RIO BLANCO COUNTY: T3S R99W: Allard & Walker 607, 8/26/81 (CS); Erdman s.n., 8/23/77 (COLO); Neese & Baker 11950, 7/10/82 (BRY); Popp & Waters 82–419, 8/2/82 (BRY, COLO, CS, RM); Waters s.n., 7/15/81 (CS); Wiley-Eberle 534, 7/17/80 (CS); T3S R100W: O’Kane 3226, 1/7/87 (COLO, MO, RM); Wilken 13864, 7/14/82 (Holotype: RM, Isotypes: BRY, COLO, CS, NY); T4S R100W: Baker & Naumann 82–256, 7/13/82 (BRY, CS, RM). Mesa County: T8S R95W; reported by Johnston in 1985 and J. Anderson in 1987.

OTHER RARE TAXA

The Colorado Natural Areas Program (1988) includes two additional taxa on its list of highest priority rare plants. At this time neither taxon is recommended for federal status as no threats are known that could significantly affect them. They are, however, biologically interesting endemics. These species are not included in Figures 1 and 2.


Map 78

FAMILY.—Brassicaceae (Cruciferae).


FEDERAL STATUS.—None.
The park rockcress is endemic to Uintah County, Utah, and Dinosaur National Monument in western Moffat County, Colorado. The species grows on sandy soils derived from the Weber Formation in Colorado. In Utah, besides sandstone, it is known to occur on limestone (Welsh et al. 1987). Its habitat is the shade and duff beneath pinyon-juniper woodlands, these frequently with cryptogamic soils and often on steep canyon slopes. Elevations range from 1,525 to 2,150 m. Little is known about the taxon because it has only recently been the focus of a botanical inventory (Galatowitsch et al. 1988). Preliminary data from an inventory conducted in the spring of 1988 (T. Naumann, personal communication) indicate that the park rockcress may be more abundant in the canyons of Dinosaur National Monument than was previously thought. No current threats to the species are known, and the species is not recommended for federal status. Dinosaur National Monument management plans will include consideration of this species. *Arabis vicariensis* is similar to *A. fernaldiana* from Nevada but differs in having smaller flowers and a shorter style (Welsh et al. 1987).

**Moffat County:** T6N R101W: Neely 4069, 5/19/87 (COLO, CS, DINO); Neely 4053, 5/19/87 (COLO, DINO, RM); T6N R102W: O’Kane 2829, 5/19/87 (COLO, CS, DINO); Neely 4117, 5/28/87 (COLO, DINO, RM); T6N R103W: Neely 4204, 6/1/87 (COLO, DINO, RM); T6N R104W: O’Kane 3007, 6/1/87 (COLO, DINO, RM); O’Kane 3002, 6/1/87 (COLO, DINO, RM); T7N R103W: Neely 4224, 6/3/87 (COLO, DINO, RM); Neely 4405, 6/16/87 (BRY, COLO, DINO).


Map 78

**Family:** Polemoniaceae.

**Federal Status:** Category 3C.

The Black Canyon gilia has its center of distribution in the Black Canyon of the Gunnison and on Blue Mesa where it grows on igneous and metamorphic rocks of vertical cliff faces. The nature of the habitat of the species and its occurrence in Black Canyon of the Gunnison National Monument provide it with protection from factors that threaten other rare Colorado endemics. While not abundant, the taxon has a relatively large area of endemism.

**Gunnison County:** Location obscure: Flowers 659, 6/12/61 (CS); Hall 553, 7/15/61 (CS); Hall 576, 7/18/61 (COLO); T47N R3W: Grey 41, 6/17/80 (COLO); Grey 158, 6/27/80 (COLO); Grey 196, 7/3/80 (COLO); Grey 520, 8/22/80 (COLO); Grey 212, 7/22/80 (COLO); Grey 157, 7/28/81 (CS); Grey 1426, 7/28/81 (CS); Johnston 1790, 7/10/78 (COLO); T48N R2E: Langenheim 4059, 8/12/55 (RM); T48N R4W: Grey 290, 7/9/80 (COLO); Grey 697, 8/19/80 (COLO); Grey 705, 8/19/80 (COLO); Grey 715, 8/21/80 (COLO); Grey 674, 8/19/80 (COLO); Grey 481, 7/21/80 (COLO); Weber 9356, 7/25/55 (COLO, CS, RM); T48N R5W: Grey 437, 7/18/80 (COLO); Grey 480, 7/21/80 (COLO); Grey 1188, 6/22/81 (CS); Grey 720, 8/21/80 (COLO); T49N R4W: Ripley & Barnaby 10208, n.d. (NY). **Hinsdale County:** T44N R2W: Grey 746, 8/22/80 (COLO); Grey 930, 8/29/80 (COLO); Grey 939, 8/29/80 (COLO); Ratzloff 142, 8/23/78 (COLO). **Montrose County:** T47N R6W: Rollins 1995, 8/37 (NY, RM); T49N R7W: Grey 465, 7/20/80 (COLO); T50N R8W: Grey 454, 7/19/80 (COLO); Grey 714, 8/20/80 (COLO); Grey 464, 7/19/80 (COLO). **Ouray County:** T44N R7W: Osterhout 8365, 7/25/15 (RM).

**Note Added in Proof**

J. G. Harris, monographer of *Braya* (1985), recently annotated the specimens at CS (D. Wilken, personal communication). Material previously assigned to *Braya humilis* ssp. *venosa* is now divided between *B. humilis* var. *glabella* and var. *humilis*. Although interesting long-distance disjuncts, neither taxon should be considered a candidate for U.S. Fish and Wildlife Service endangered or threatened status. Information on the status of specimens at other herbaria is not currently available; specimens at CS are as follows.

*Braya humilis* ssp. *humilis*: Neely 3211, 3125, 3174, 3220a, 3311, O’Kane 2144, 2152, 2171; Peterson et al. 52–56; Walter 28; Weber & Rollins 6491; Weber & Roloff 16328.

*Braya humilis* ssp. *glabella*: Neely 3170, 3174, 3183; Siems 1592, 7/31/87 “ca 15 mi WSW of Buena Vista” (CS) is a new collection.

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APPENDIX

The maps on the following pages show the geographical range of species treated in the text. Map symbols are as follows:

**Solid circles** Unambiguous locations taken from herbarium specimens. Circles cover ca five townships and, therefore, may represent more than one collection locality.

**Open circles** Locations based on field surveys for which no specimens exist. Data from the Colorado Natural Areas Program (CNAP) data base. Specimen-based localities always supercede CNAP reports. Circles cover ca four townships and, therefore, may represent more than one reported locality.

**Triangles** Approximate locations based on herbarium records. Localities cannot with confidence be assigned to a particular township.

**Star** Indicates a specimen-based record that can be placed only tentatively in a county.
Maps 73–78. Distribution of (73) Sclerocactus mesae-verdae, (74) Senecio dimorphophyllus var. intermedius, (75) Sisyrinchium pulchrum, (76) Spiranthes diluvalis, (77) Thalictrum helophyllum, and (78) Arabis vicariensis (upper left) and Gilia pennsylvanica.
LITERATURE CITED


