

**Rare Plant Survey of BLM Lands
Gateway, Colorado**



**Prepared for Bureau of Land Management
Grand Junction Resource Area
and Gateway Canyons Resort
By Peggy Lyon
Colorado Natural Heritage Program
2007**



**Colorado
State
University**
Knowledge to Go Places

Acknowledgements

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Rare Plant Survey of Gateway Area

Introduction: Increased development and recreational use of the Gateway area (Mesa County, Colorado) prompted the Grand Junction office of the Bureau of Land Management (BLM) and Gateway Canyons Resort to have CNHP survey the area for rare plants. Knowing the locations and condition of sensitive plant species is essential to management planning to reduce impacts on these species. Seven areas of concern were identified by BLM. Five of these were surveyed by the Colorado Natural Heritage Program in 2007 (Figure 1): Palisade (lower slopes); Lumsden Canyon; Sinbad Valley; and three sections along the Dolores River south of Gateway. Surveys of two more areas are planned for 2008: Lost Horse Basin and West Side Uncompahgre Plateau.



Figure 1. New development in Gateway has increased recreational use.

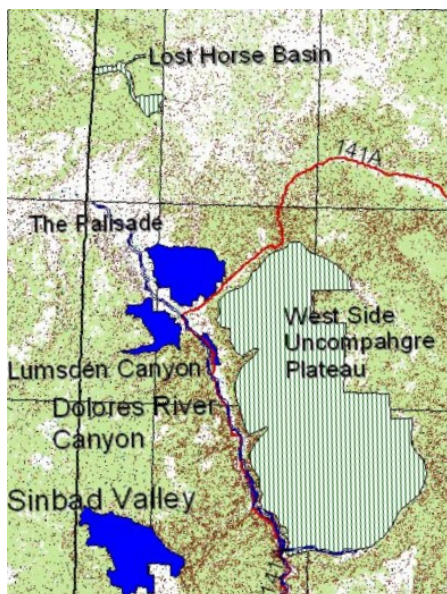


Figure 2. BLM rare plant survey areas. Blue are areas surveyed in 2007. Green are planned for 2008.

Methods: CNHP conducted preliminary research on rare plants and habitat requirements in the Gateway area. Species known or expected in the area at the beginning of the project were: *Lygodesmia doloresensis*, *Astragalus piscator*, *Astragalus equisolensis*, *Cryptantha gypsophila*, *Cryptantha osterhoutii*, *Eriogonum palmerianum*, *Astragalus rafaelsensis*, *Frasera paniculata*, *Penstemon utahensis*, *Epipactis gigantea*, *Pediomelum aromaticum*, *Adiantum capillis-veneris*. Surveys were conducted during the flowering time of targeted species, beginning in late April and continuing through June, with additional visits in September and October. Species lists were made in each area surveyed. Special attention was given to areas where new trails are planned, including the flagged route of a proposed trail in Lumsden Canyon.

Results: Fourteen element occurrence records were prepared and entered into the CNHP data system (Table 1). Of these, two (*Lygodesmia doloresensis* and *Astragalus piscator*) were updates of known occurrences. *Lygodesmia doloresensis* was mapped more precisely and individuals were counted. Newly mapped areas fell within the known range of the species. *Astragalus piscator* was counted at the known locations along Road 4.2, and a large new area on BLM land north of the community center was added. The remainder of the occurrences were new to the CNHP database. Maps of rare plant locations are given under each survey area.

Species lists for each of the four main areas surveyed were prepared. This report contains descriptions and species lists for each of the areas surveyed, and profiles of each of the rare plants found. Major discoveries were the first Colorado records in the CNHP database for *Astragalus equisolensis* and *Abronia nana*; a significant increase in occupied habitat for *Astragalus piscator*; and documentation of *Cryptantha gypsophila* in Sinbad Valley.

Potential Conservation Areas in the CNHP database for Gateway and Dolores Canyon North will be revised to reflect results of the 2007 survey.

Table 1. Rare plant occurrences documented in 2007

Scientific Name	Global rank*	State rank *	EO rank*	Location
<i>Abronia nana</i>	G4	S1	A	Sinbad Valley
<i>Astragalus equisolensis</i>	G5T1	S1	C	Palisade
<i>Astragalus piscator</i>	G2G3	S1	A	Palisade
<i>Cryptantha gypsophila</i> (2)	G1	S1	B	Sinbad Valley
<i>Cryptantha longiflora</i> (2)	G3	S3	B,C	Sinbad Valley
<i>Eriogonum palmerianum</i>	G4	S1	C	Palisade
<i>Gilia haydenii</i>	G3	S2	C	Lumsden Canyon
<i>Lygodesmia doloresensis</i>	G1	S1	B	Palisade
<i>Penstemon utahensis</i> (4)	G4	S2	C	Palisade and Lumsden

*See appendix I for information on CNHP ranking system

Six of the targeted species were not found within the sites surveyed. These were *Cryptantha osterhoutii*, *Astragalus rafaensis*, *Frasera paniculata*, *Epipactis gigantea*, *Pediomelum aromaticum* and *Adiantum capillis-veneris*. There are 14 element occurrence records in the CNHP database for these species within five miles of the surveyed areas, but none of them are within the designated areas for the 2007 survey (Figure 3). *Cryptantha osterhoutii* is known from the west side of the Dolores River across from the Palisade and north of Lumsden Canyon. *Astragalus rafaensis* is known from the west side of the Uncompahgre Plateau, which will be surveyed in 2008. *Frasera paniculata* has been found on the west side of the Dolores River north of the Palisade. *Pediomelum aromaticum* is known from the west side of the Dolores River about six miles south of Gateway. *Epipactis gigantea* is known from Unawep Seep and the spring on Hwy 141 at the Montrose/Mesa County line in the Uncompahgre Resource Area. *Adiantum capillis-veneris* is also known from the spring, as well as the west side of the Uncompahgre Plateau. We suggest that updating these records be added to the scope of work for 2008.

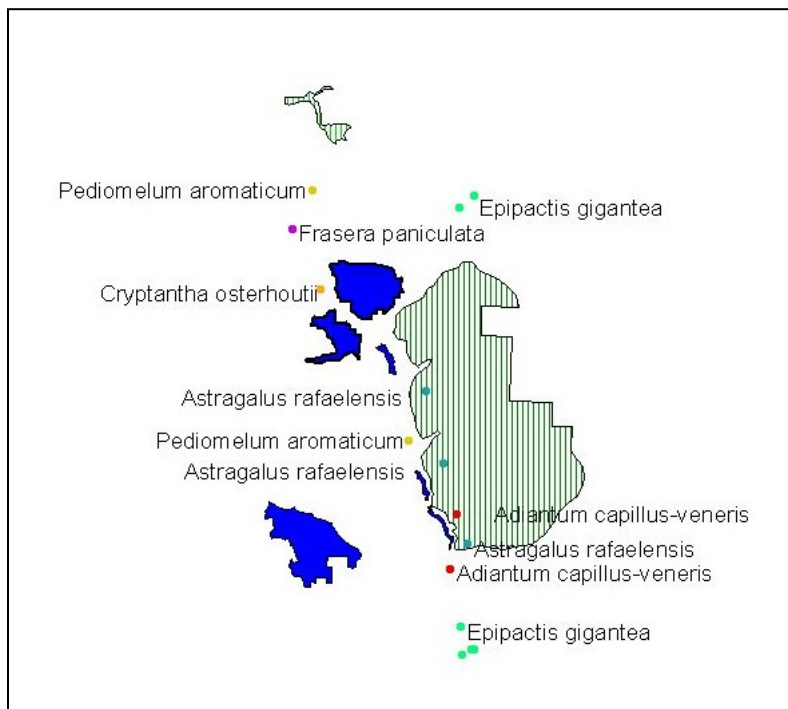


Figure 3. Locations of plants tracked by CNHP in Gateway area outside boundaries of 2007 survey.

Dolores River Canyon



Figure 4. Looking north from the northern section of BLM land along the Dolores River south of Gateway, with rabbitbrush, big sagebrush, tamarisk and coyote willow (*Chrysothamnus nauseosus*, *C. linifolius*, *Artemisia tridentata* ssp. *tridentata*, *Tamarix ramosissima* and *Salix exigua*).

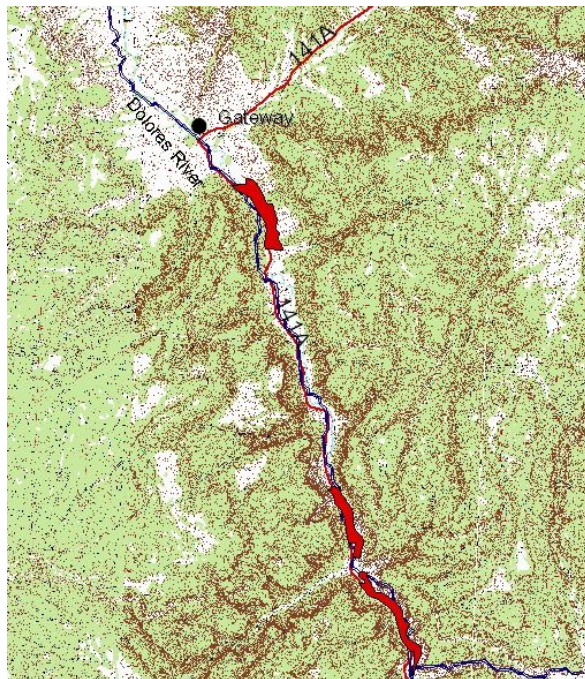


Figure 5. Three sections of BLM land surveyed along the Dolores River

Three stretches of BLM land were surveyed along the Dolores River south of Gateway. The three areas are separated by private land. They include the riparian zone along the river and a narrow strip of upland vegetation with Colorado pinyon, Utah juniper, rubber rabbitbrush and big sagebrush. From north to south, they are approximately 1.55, 1.45 and 2.36 miles in length. The three sections are similar, with riparian vegetation consisting of a mixture of tall shrubs that include skunkbrush (*Rhus trilobata*), wild privet (*Forestiera pubescens*), big sagebrush (*Artemisia tridentata* ssp. *tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), spearleaf rabbitbrush (*Chrysothamnus linifolius*), coyote willow (*Salix exigua*), greasewood (*Sarcobatus vermiculatus*) and tamarisk (*Tamarix ramosissima*). There is no clearly dominant species in the mix. Coyote willow forms a narrow band along the river's edge, except where it has been replaced by tamarisk. The drier areas away from the river are dominated by big sagebrush and rabbitbrush. Wild privet and skunkbrush form dense thickets throughout, in both the drier and wetter areas. There are a few scattered large trees, including plains cottonwood (*Populus deltoides* ssp. *wislizenii*), box elder (*Acer negundo*) and Chinese elm (*Ulmus pumila*). Although only the west side of the river was accessed, vegetation appears similar on the opposite bank.

All three sections have large stands of tamarisk. Alteration of the natural hydrology of the Dolores River by McPhee dam upstream has exacerbated the invasion of this exotic species.

The northern site has the least amount of tamarisk, but has been disturbed by grazing and garbage dumping. There are sizable patches of Russian knapweed (*Centaurea repens*). Other non-native species include cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola australis*), reed canary grass (*Phalaris arundinacea*) and horehound (*Marrubium vulgare*).

The middle section has the most tamarisk of the three. Thickets of wild privet, skunkbrush and tamarisk occur in the narrow strip of land between the river and the highway. Some individual tamarisk plants are the size of small trees, with a trunk diameter of over 18 inches.

The southern section contains a previously documented occurrence of wild privet, which is a CNHP tracked community (*Forestiera pubescens* Shrubland, ranked G1G2 S1, or critically imperiled globally and in Colorado). The occurrence was ranked fair (C) in 2001. Although wild privet is present in the two northern sections, it is not dominant. This section is the only one with road access from Highway 141, and has been impacted by camping. There are fire rings, piles of trash, and Russian knapweed.

A small population of Utah Penstemon (*Penstemon utahensis*) was found on the west side of Highway 141 in the northern section. It is ranked fair (C). There is a historic (1985) record of a small population of Dolores skeleton plant (*Lygodesmia doloresensis*) on the west side of the highway at the southern end of the northernmost section. This population has not been found since that time. It was noted in 1985 that few plants were flowering and setting seed, apparently due to grazing pressure.

All three areas fall within the Dolores Canyon South Potential Conservation Area designated by CNHP in 1996. The PCA is ranked B2, or Very High Biodiversity Significance.

Table 2. Natural Heritage plant and community element occurrences at Dolores River Canyon BLM lands south of Gateway

Scientific Name	Common Name	Global Rank	State Rank	EO* Rank and date documented
<i>Penstemon utahensis</i>	Utah Penstemon	G4	S2	C 2007
<i>Lygodesmia doloresensis</i>	Dolores skeleton plant	G1G2	S1	H 1985
<i>Forestiera pubescens</i> shrublands	Wild privet shrublands	G1G2	S1	C 2001, 2007

*Element occurrence rank



Figure 6. Native coyote willow lines river bank where it has not been replaced by tamarisk.

Figure 7. Drier sites on terraces of the flood plain have big sagebrush and rubber rabbitbrush dominant. Tamarisk is present, even in relatively dry areas.





Figure 8. Campfire rings in southern section. Other impacts of camping are piles of trash and invasion on Russian knapweed.



Figure 9. Dense thickets of tamarisk are nearly impenetrable.



Figure 10. Fall colors of wild privet contrast with the gray-green of big sagebrush.

Species lists, combined for three sections

(Rare plants are in bold type; non-native species are in italics)

Upland

Trees

Pinus edulis

Juniperus osteosperma

Shrubs

Artemisia tridentata spp. tridentata

Atriplex canescens

Opuntia phaeacantha

Opuntia polyacantha

Purshia stansburiana

Yucca harrimaniae

Grasses

Aristida purpurea

Achnatherum hymenoides

Bromus tectorum

Sporobolus aeroides

Sporobolus cryptandrus

Forbs

Astragalus sp.

Castilleja linariifolia

Centaurea repens (Acroptilon)

Gutierrezia sarothrae

Heterotheca villosa

Lepidium montanum

Machaeranthera bigelovii

Penstemon cyanocaulis

Penstemon utahensis

Salsola australis

Sphaeralcea parviflora

Stanleya pinnata

Tetrandeum ivesiana

Riparian

Trees

Acer negundo

Ulmus pumila

Populus deltoides ssp. *wislizenii*

Tamarix ramosissima

Shrubs

Artemisia tridentata ssp. *tridentata*

Chrysothamnus linifolius

Chrysothamnus nauseosus

Forestiera pubescens

Kochia sieversiana

Rhus trilobata

Salix exigua

Sarcobatus vermiculatus

Suaeda moquinii

Grasses

Agrostis scabra

Distichlis spicata

Phalaris arundinacea

Phragmites australis

Forbs

Clematis ligusticifolia

Glycyrrhiza lepidota

Marrubium vulgare

The Palisade



Figure 11. Slopes of the Palisade, with scattered juniper and mixed shrubs, habitat of horseshoe milkvetch (*Astragalus equisolensis*).

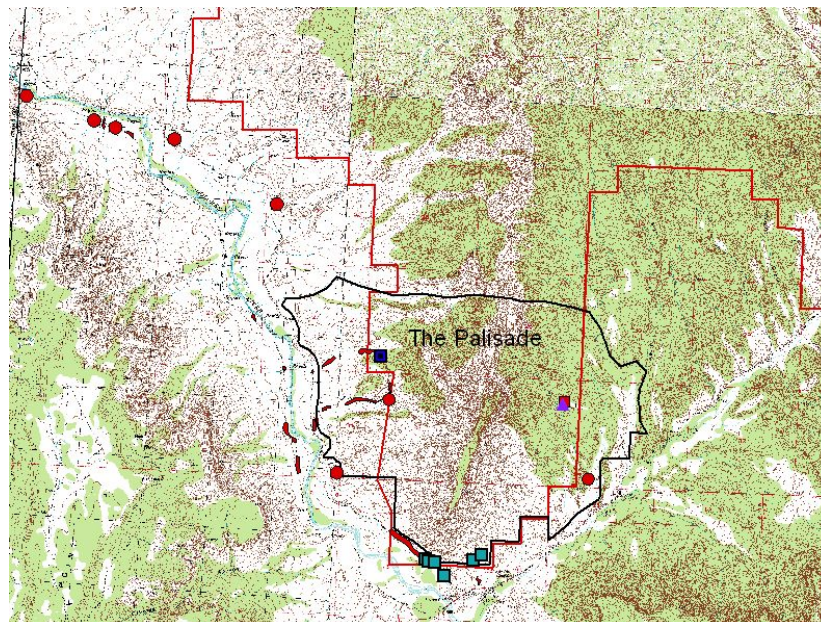


Figure 8. The Palisade: black outline is survey area, red outlined area is The Palisade ACEC. Red is *Lygodesmia doloresensis* locations, turquoise is *Astragalus piscator*, dark blue square is *Penstemon utahensis*, red square is *Astragalus equisolensis*, purple is *Eriogonum palmerianum*. Note that many of the rare plant locations are outside the ACEC boundaries.

The Palisade is a dramatic monolithic mountain with steep sandstone cliffs on all sides surrounding a flat top. Below the vertical cliffs are steep slopes, grading into more gently sloping terrain toward the bottom. Colorado pinyon pine and Utah juniper are dominant, becoming denser with increasing elevation. Lower slopes are more open, with widely scattered junipers and blackbrush (*Coleogyne ramosissima*). Sagebrush and rabbitbrush are common, along with cacti, Mormon tea (*Ephedra* sp.) and snakeweed (*Gutierrezia sarothrae*). Although the vegetation is sparse, it includes a high diversity of species, with 17 shrub and 40 forb species noted.

This survey was restricted to the lower slopes of the Palisade, below the vertical cliffs. We hiked through the accessible areas on all four sides of the mountain in late April, May and early June.

Two rare plant species, Dolores skeletonplant (*Lygodesmia doloresensis*) and Fisher milkvetch (*Astragalus piscator*), were already known from the area. Records for these species were updated, with counts of individuals in several areas.

New populations of three additional rare species were found: Utah Penstemon, horseshoe milkvetch and Palmer buckwheat (*Penstemon utahensis*, *Astragalus equisolensis* and *Eriogonum palmerianum*). See Rare Plant profiles section for more details on these species.

The site receives some protection as a BLM Area of Critical Environmental Concern (ACEC), formerly known as the Palisade Outstanding Natural Area (ONA). It is also listed as a Colorado State Natural Area. However, many of the rare plant locations fall outside the boundaries of these two designated areas (Figure 12). We suggest that the ACEC be enlarged to include these plants.



Figure 9. Scattered junipers with blackbrush (*Coleogyne ramosissima*) and mountain pepperweed (*Lepidium montanum*).

Table 3. Natural Heritage plant and community element occurrences at The Palisade

Scientific Name	Common Name	Global Rank	State Rank	EO* Rank and date documented
<i>Lygodesmia doloresensis</i>	Dolores skeleton plant	G1G2	S1	B 2007
<i>Astragalus piscator</i>	Fisher Towers milkvetch	G2G3	S1	A 2007
<i>Penstemon utahensis</i>	Utah Penstemon	G4	S2	C 2007
<i>Astragalus equisolensis</i>	Horseshoe milkvetch	G5T1	S1	C 2007
<i>Eriogonum palmerianum</i>	Palmer buckwheat	G3	S2	C 2007

*Element occurrence rank



Figures 14 – 16. Some common species of the Palisade. Clockwise from upper left: closeup of blackbrush (*Coleogyne ramosissima*); yellow cat's-eye (*Cryptantha flava*), and crescent milkvetch (*Astragalus amphioxys*), a common species easily confused with *A. piscator*. (Note: more rounded leaflets and deeper flower color are good field characters)

Species observed on lower slopes of The Palisade

(Rare plants are in bold type; non-native species are in italics)

Trees

Fraxinus anomala

Juniperus osteosperma

Pinus edulis

Shrubs, sub-shrubs, cacti

Amelanchier utahensis

Artemisia bigelovii

Artemisia frigida

Artemisia tridentata ssp. tridentata

Atriplex confertifolia

Atriplex canescens

Cercocarpus montanus

Chrysothamnus nauseosus

Chrysothamnus viscidiflorus

Coleogyne ramosissima

Echinocereus triglochidiatus

Ephedra torreyana

Ephedra viridis

Fendlera rupicola

Opuntia erinacea

Opuntia phaeacantha

Opuntia polyacantha

Purshia stansburiana

Purshia tridentata

Rhus trilobata

Salix exigua

Sarcobatus vermiculatus

Sclerocactus whipplei

Symphoricarpos oreophilus

Yucca harrimaniae

Grasses

Achnatherum hymenoides

Bromus tectorum

Ereoneuron pilosum

Hesperostipa comata

Vulpia octoflora

Forbs

Androstephium breviflorum

Arabis pulchra

Arabis selbyi

Asclepias cryptoceras

Asclepias asperula

Astragalus amphioxys

Astragalus equisolensis

Astragalus lonchocarpus

Astragalus mollissimus

Astragalus nuttallianus

Astragalus piscator

Astragalus wingatanus

Brickellia microphylla

Brickellia oblongifolia

Calochortus nuttallii

Castilleja chromosa

Chaetopappa ericoides

Chamaesyce fendleri

Cirsium neomexicanum

Comandra umbellata

Cryptantha flava

Descurainia pinnata

Eremogone kingii

Eriogonum corymbosum

Eriogonum palmerianum

Gaillardia pinnatifida

Gilia ophthalmoides

Gutierrezia sarothrae

Hedysarum boreale

Hymenopappus filifolius

Lappula redowskii

Lathyrus brachycalyx

Lepidium montanum

Lupinus sp.

Lygodesmia doloresensis

Machaeranthera grindelioides

Oenothera caespitosa

Oxybaphus lineare

Oxytropis lambertii

Pediomelum megalanthum

Penstemon cyanocaulis

Penstemon moffattii

Penstemon strictus

Penstemon utahensis

Phacelia crenulata
Silene antirrhena
Sisymbrium altissimum
Sphaeralcea parvifolia
Streptanthus cordatus
Tetraneuris ivesiana
Townsendia incana

Lumsden Canyon



Figure 17. Juniper/blackbrush community dominates level areas of Lumsden Canyon

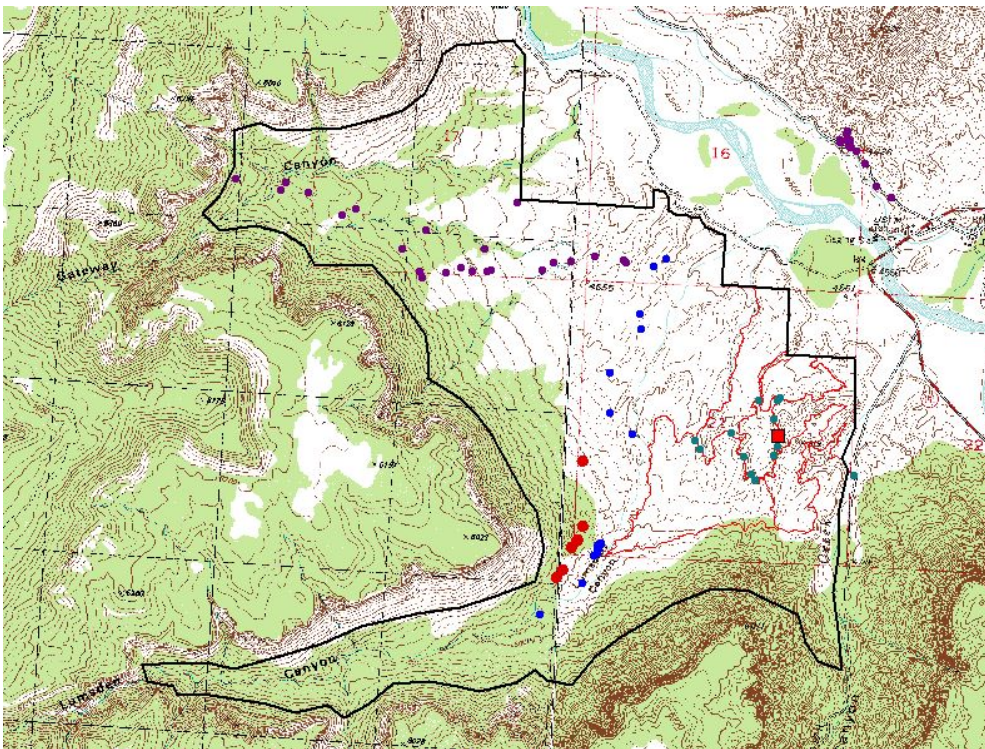


Figure 18. Lumsden Canyon with waypoints taken May 3, May 4, and May 19, 2007. Proposed new trail route in red, with waypoints along flagged route. Red circles are Utah Penstemon (*Penstemon utahensis*) locations; red square is San Juan Gilia (*Gilia haydeni*) location.

The Lumsden Canyon survey area comprises gentle slopes west of the Dolores River, leading up to steep sandstone cliffs. The site is dissected by many small washes running west to east, with infrequent ephemeral streams. The landscape is dominated by Colorado pinyon, Utah juniper, and blackbrush (*Pinus edulis-Juniperus osteosperma/Coleogyne ramosissima*). This community is ranked G3 S2 (globally vulnerable, imperiled in Colorado) by CNHP. It occurs extensively across the Colorado Plateau from southwestern Colorado through southern Utah into Arizona and probably also Nevada (NatureServe 2007). Soils are shallow and sandy, derived from sandstone, with some deeper alluvium at the lower elevations. Geology is mapped as Moenkopi formation (lower Triassic) and Cutler formation (lower Permian), consisting of red siltstone and sandstone, with Quaternary alluvium on the floodplain of the Dolores River. Vegetation is sparse, with much bare ground between shrubs. Common associated species are mountain pepperweed, galleta, blue grama, snakeweed, Mormon tea and yucca (*Lepidium montanum*, *Pleuraphis jamesii*, *Bouteloua gracilis*, *Gutierrezia sarothrae*, *Ephedra torreyana* and *Yucca harrimaniae*). Upper elevations are more steep and rocky, and blackbrush is replaced by mountain mahogany (*Cercocarpus montanus*). The community *Pinus edulis/Cercocarpus montanus* is ranked G5 S4. The main drainage in the far western part of the site has a narrow riparian area with a few cottonwoods (Figure 19). Several patches of grassland are scattered throughout the site. There is a good sized patch of sand dropseed (*Sporobolus cryptandrus*) at the eastern end of the site (Figure 20). Other areas that appeared from a distance to be lush meadows were disappointing, dominated by cactus, snakeweed and weedy species such as cranesbill, cheatgrass, sleepy silene, desert stickseed and small-flowered milkvetch (*Erodium cicutarium*, *Bromus tectorum*, *Silene antirrhinum*, *Lappula redowskii* and *Astragalus nuttallianus*) (Figure 21).

A priority for survey in this area was the route of a new trail. We walked the section of the trail that had been flagged, and listed all species encountered. Two plants that are rare in Colorado were found in Lumsden Canyon: Utah Penstemon (*Penstemon utahensis*, G4 S2) and San Juan Gilia (*Gilia haydenii*, G3 S2). (See plant species profiles for more information).



Figure 19. Cottonwoods (*Populus deltoides* ssp. *wislizenii*) in Lumsden Canyon

Table 4. Natural Heritage plant and community element occurrences at Lumsden Canyon

Scientific Name	Common Name	Global Rank	State Rank	EO* Rank and date documented
<i>Gilia haydenii</i>	San Juan Gilia	G3	S2	C 2007
<i>Penstemon utahensis</i>	Utah Penstemon	G4	S2	C 2007
<i>Lygodesmia doloresensis</i> **	Dolores skeleton plant	G1G2	S1	E 1990
<i>Pinus edulis-Juniperus osteosperma/Coleogyne ramosissima</i>	Western slope pinyon woodlands	G4?	S3?	B 1996

*Element occurrence rank

**Looked for but not found in 2007



Figure 20. Sand dropseed (*Sporobolus cryptandrus*) grassland

Figure 21. Opening in shrubland, apparently disturbed, with weedy species.



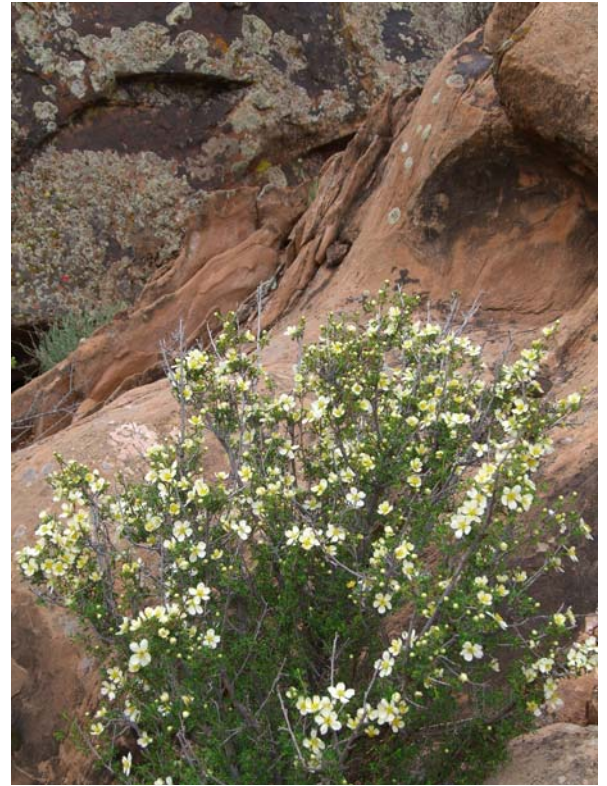


Figure 22 – 26. Some of the common plants in Lumsden Canyon. Clockwise from upper left: claret cup cactus (*Echinocereus triglochidiatus*); cliff rose (*Purshia stansburiana*); Whipple's cactus (*Sclerocactus whipplei*); mock thrift goldenweed (*Stenotus armerioides*); intermountain peavine (*Lathyrus brachycalyx*)

Species observed in Lumsden Canyon

(Rare plants are in bold type; non-native species are in italics)

Trees

Fraxinus anomala

Juniperus osteosperma

Pinus edulis

Populus deltoides ssp. wislizenii

Shrubs, sub-shrubs, cacti

Amelanchier utahensis

Artemisia bigelovii

Artemisia frigida

Artemisia tridentata ssp. tridentata

Atriplex canescens

Brickellia microphylla

Cercocarpus montanus

Chrysothamnus viscidiflorus

Chrysothamnus nauseosus

Coleogyne ramosissima

Echinocereus triglochidiatus

Ephedra torreyana

Ephedra viridis

Fendlera rupicola

Opuntia phaeacantha

Opuntia polyacantha

Purshia stansburiana

Purshia tridentata

Rhus trilobata

Salix exigua

Sarcobatus vermiculatus

Sclerocactus whipplei

Symphoricarpos oreophilus

Typha latifolia

Yucca harrimaniae

Grasses

Aristida purpurea

Bouteloua gracilis

Bromus tectorum

Hesperostipa comata

Pleuraphis jamesii

Oryzopsis hymenoides

Poa fendleriana

Sporobolus cryptandrus

Forbs

Abronia elliptica
Arabis pulchra
Arabis selbyi
Artemisia ludoviciana
Asclepias cryptoceras
Astragalus amphioxys
Astragalus mollissimus
Astragalus nuttallianus
Astragalus wingatanus
Castilleja scabrida
Centaurea repens
Chaetopappa ericoides
Chamaesyce fendleri
Cryptantha flava
Cryptantha flavoculata
Cymopterus fendleri
Delphinium scaposum
Descurainia pinnata
Erigeron concinnus
Eriogonum inflatum
Erodium cicutarium
Gaillardia pinnatifida
Gilia ophthalmoides
Gutierrezia sarothrae
Gymnosteris parvula
Hedysarum boreale
Heterotheca villosa
Hymenopappus filifolius
Lappula redowskii
Lathyrus brachycalyx
Lepidium lasiocarpum
Lepidium montanum
Lithospermum incisum
Machaeranthera grindelioides
Medicago officinale
Meysinium puberulum
Mirabilis multiflora
Oenothera caespitosa
Penstemon cyanocaulis
Penstemon utahensis
Phacelia crenulata
Physaria acutifolia
Plantago patagonica
Silene antirrhina

Sisymbrium altissimum
Sphaeralcea parvifolia
Stanleya pinnata
Stenotus armerioides
Streptanthus cordatus
Tetraneuris ivesiana
Townsendia incana
Vulpia octoflora

Lumsden Canyon, north section

Trees

Juniperus osteosperma
Pinus edulis

Shrubs, sub-shrubs, cacti

Amelanchier utahensis
Artemisia bigelovii
Artemisia tridentata ssp. tridentata
Atriplex canescens
Cercocarpus montanus
Coleogyne ramosissima
Echinocereus triglochidiatus
Ephedra torreyana
Ephedra viridis
Fendlera rupicola
Fraxinus anomala
Opuntia phaeacantha
Opuntia polyacantha
Purshia stansburiana
Sclerocactus parviflorus
Sclerocactus whipplei
Symphoricarpos oreophilus
Yucca harrimaniae

Grasses

Aristida purpurea
Bouteloua gracilis
Bromus tectorum
Erioneuron pilosum
Hesperostipa comata
Pleuraphis jamesii
Oryzopsis hymenoides
Poa fendleriana
Vulpia octoflora

Forbs

Abronia elliptica
Arabis pulchra
Arabis selbyi
Artemisia ludoviciana
Stenotus armerioides
Astragalus amphioxys
Astragalus mollissimus
Astragalus nuttallianus
Astragalus wingatanus
Castilleja chromosa
Chaetopappa ericoides
Chamaesyce fendleri
Cryptantha flava
Cryptantha flavoculata
Cymopterus fendleri
Delphinium scaposum
Descurainia pinnata
Draba cuneifolia
Penstemon utahensis
Erigeron concinnus
Eriogonum inflatum
Eriogonum lonchophyllum
Erodium cicutarium
Gilia ophthalmoides
Gutierrezia sarothrae
Hedysarum boreale
Heterotheca villosa
Hymenopappus filifolius
Lappula redowskii
Lathyrus brachycalyx, wp 35
Lepidium lasiocarpum
Lepidium montanum
Lesquerella rectipes
Lithospermum incisum
Machaeranthera grindelioides
Mirabilis multiflora
Oenothera albicaulis
Oenothera cespitosa
Penstemon moffattii
Phacelia crenulata
Phlox longifolia
Physaria acutifolia
Plantago patagonica

Platyschkuhria integrifolia
Senecio multilobatus
Silene antirrhenum
Sisymbrium altissimum
Sphaeralcea parvifolia
Stenotus armerioides
Streptanthella longirostis
Streptanthus cordatus
Tetraneuris ivesiana
Townsendia incana

New trail route, Lumsden Canyon

Trees

Fraxinus anomala
Juniperus osteosperma
Pinus edulis

Shrubs

Artemisia tridentata ssp. tridentata
Atriplex canescens
Coleogyne ramosissima
Ephedra viridis
Opuntia phaeacantha
Opuntia polyacantha
Purshia stansburiana
Yucca harrimaniae

Grasses

Achnatherum hymenoides
Aristida purpurea
Bouteloua gracilis
Bromus tectorum
Elymus elymoides
Erioneuron pilosum
Hesperostipa comata
Pleuraphis jamesii
Vulpia octoflora

Forbs

Abronia elliptica
Arabis lignifera
Astragalus amphioxys
Astragalus nuttallianus
Astragalus wingatanus
Castilleja scabrida

Chaetopappa ericoides
Chamaesyce fendleri
Cryptantha flava
Cymopterus fendleri
Descurainia pinnata
Gilia haydenii
Eriastrum diffusum
Erodium cicutarium
Gaillardia pinnatifida
Gilia ophthalmoides
Gutierrezia sarothrae
Hedysarum boreale
Heterotheca villosa
Hymenopappus filifolius
Lepidium montanum
Macheranthera grindelioides
Meysineum puberulum
Oenothera cespitosa
Penstemon moffattii
Phacelia crenulata
Phlox hoodii
Physaria acutifolia
Plantago patagonica
Silene antirrhena
Sphaeralcea coccinea
Sphaeralcea parviflora
Stanleya pinnata
Stenotus armerioides
Tetraneuris ivesiana
Townsendia incana

Lumsden Canyon species lists combined

Trees

Fraxinus anomala
Juniperus osteosperma
Pinus edulis
Populus deltoides ssp. wislizenii

Shrubs, sub-shrubs, cacti

Amelanchier utahensis
Artemisia bigelovii
Artemisia frigida
Artemisia tridentata ssp. tridentata
Atriplex canescens

Brickellia microphylla
Cercocarpus montanus
Chrysothamnus viscidiflorus
Chrysothamnus nauseosus
Coleogyne ramosissima
Echinocereus triglochidiatus
Ephedra torreyana
Ephedra viridis
Fendlera rupicola
Opuntia phaeacantha
Opuntia polyacantha
Purshia stansburiana
Purshia tridentata
Rhus trilobata
Salix exigua
Sarcobatus vermiculatus
Sclerocactus parviflorus
Sclerocactus whipplei
Symphoricarpos oreophilus
Typha latifolia
Yucca harrimaniae

Grasses

Achnatherum hymenoides
Aristida purpurea
Bouteloua gracilis
Bromus tectorum
Elymus elymoides
Erioneuron pilosum
Hesperostipa comata
Pleuraphis jamesii
Poa fendleriana
Sporobolus cryptandrus
Vulpia octoflora

Forbs

Abronia elliptica
Arabis pulchra
Arabis selbyi
Arabis sp. cf. lignifera
Artemisia ludoviciana
Asclepias cryptoceras
Astragalus amphioxys
Astragalus molissimus
Astragalus nuttallianus
Astragalus wingatanus

Castilleja chromosa
Castilleja scabrida
Centaurea repens
Chaetopappa ericoides
Chamaesyce fendleri
Cryptantha flava
Cryptantha flavoculata
Cymopterus fendleri
Delphinium scaposum
Descurainia pinnata
Draba cuneifolia
Eriastrum diffusum
Erigeron concinnus
Eriogonum inflatum
Eriogonum lonchophyllum
Erodium cicutarium
Gaillardia pinnatifida
Gilia haydenii
Gilia ophthalmoides
Gutierrezia sarothrae
Gymnosteris parvula
Hedysarum boreale
Heterotheca villosa
Hymenopappus filifolius
Lappula redowskii
Lathyrus brachycalyx
Lepidium lasiocarpum
Lepidium montanum
Lesquerella rectipes
Lithospermum incisum
Macheranthera grindelioides
Medicago officinale
Meysinium puberulum
Mirabilis multiflora
Oenothera albicaulis
Oenothera cespitosa
Penstemon cyanocaulis
Penstemon moffattii
Penstemon utahensis
Phacelia crenulata
Phlox hoodii
Phlox longifolia
Physaria acutifolia
Plantago patagonica
Platyschkuhria integrifolia
Senecio multilobatus

Silene antirrhena
Sisymbrium altissimum
Sphaeralcea coccinea
Sphaeralcea parviflora
Stanleya pinnata
Stenotus armerioides
Streptanthella longirostis
Streptanthus cordatus
Tetraneuris ivesiana
Townsendia incana
Vulpia octoflora

Sinbad Valley



Figure 27. Sinbad Valley, with gypsum outcrops in background.

Sinbad Valley is one of several parallel northwest-southeast trending valleys that were formed by the collapse of ancient salt domes. Others in western Colorado are Paradox Valley, Dry Creek Basin, Big Gypsum Valley and Disappointment Valley to the south. The valley was formed by a large sea embayment separated from the remaining sea that covered this area in the Pennsylvanian age. Upon evaporation of this sea, its salts became concentrated in domes overlain with sedimentary rock. Once these sedimentary rocks were breached by erosion, the domes, comprised of soluble salt and gypsum, were washed away and the flanking structures collapsed, leaving broad valleys.

Sinbad Valley contains the headwaters of Salt Creek, a tributary of the Dolores River. Geology of the western part of the site is mapped as the Hermosa Formation, consisting of arkosic sandstone, conglomerate, shale, and limestone. The Paradox member of this formation, containing gypsum and salt, forms low, barren hills which support two rare plant species, Gypsum Valley cat's-eye (*Cryptantha gypsophila*) and dwarf sand-verbena (*Abronia nana*). The flood plain of the north branch of Salt Creek is mapped as Eolian deposits, and east of that, a strip of higher elevation land is mapped as Cutler and Moenkopi formations.

The valley bottom is dominated by Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), surrounded by pinyon-juniper woodlands. Barren hills of gypsum outcrop along the north side of the valley.

In addition to the rare plants found on the gypsum outcrops, canyon bog orchid (*Limnorchis ensifolius*) was documented along upper Salt Creek in 1994, and two populations of long-flower cat's-eye (*Cryptantha longiflora*) occur in the pinyon-juniper woodland. A state-rare plant community, alkali bulrush marsh (*Schoenplectus maritimus* herbaceous vegetation), an emergent wetland ranked G4 S2, was documented along Salt Creek on the east side of the valley.

There are abundant lichens that have yet to be identified growing with the *Cryptantha* on the gypsum soils (Figure 28). Three rare lichen species were found in similar habitat in Big Gypsum Valley (St. Clair 2005), and may occur in Sinbad Valley as well.

The valley appears to be popular for off-road vehicles, and tracks were observed in the rare plant populations in spite of signing limiting use to established roads and trails (Figures 30, 31). When these were reported to BLM, they responded rapidly by posting signs at the base of one of the hills.

Table 5. Natural Heritage element occurrences at Sinbad Valley

Scientific Name	Common Name	Global Rank	State Rank	EO* Rank and date documented
<i>Cryptantha gypsophila</i>	Gypsum Valley cat's-eye	G1	S1	B, 2007
<i>Cryptantha gypsophila</i>	Gypsum Valley cat's-eye	G1	S1	B, 2007
<i>Abronia nana</i>	Dwarf sand-verbena	G4	S1	A, 2007
<i>Cryptantha longiflora</i>	Long-flower cat's-eye	G3	S3	B, 2007
<i>Cryptantha longiflora</i>	Long-flower cat's-eye	G3	S3	B, 2007
<i>Phacelia constancei</i>	Constance's Phacelia	G4	S1	C, 1988
<i>Limnorchis sparsiflora</i>	Canyon bog orchid	G4G5T4?	S3	E, 1994
<i>Schoenplectus maritimus</i> herbaceous vegetation	Alkali bulrush marsh	G4	S2	C, 2001

*Element occurrence rank



Figure 28. Gypsum knoll with lichens and *Cryptantha gypsophila*

Figure 29. Wilderness Study Area supports a population of *Cryptantha gypsophila* on light colored gypsum hill.



Figures 30, 31. In spite of designation as a limited use area, left, off road vehicles have damaged rare plant habitat, right. BLM has now installed signs at the base of this hill to limit use.

Species observed in Sinbad Valley

(Rare plants are in bold type; non-native species are in italics)

Trees

Juniperus osteosperma

Pinus edulis

Shrubs

Artemisia nova

Artemisia tridentata ssp. tridentata

Artemisia tridentata ssp. wyomingensis

Chrysothamnus nauseosus

Fendlera rupicola,

Opuntia phaeacantha

Opuntia polyacantha

Pediocactus simpsonii

Purshia stansburiana

Purshia tridentata

Sarcobatus vermiculatus

Tamarix ramosissima

Grasses

Aristida purpureus

Bouteloua gracilis

Bromus tectorum

Pleuraphis jamesii

Oryzopsis hymenoides

Forbs

Astragalus amphioxys

Astragalus wingatanus

Collomia linearis

Cryptantha flavoculata.

Cryptantha gypsophila

Cryptantha longiflora

Cymopterus fendleri

Delphinium scaposum

Descurainia pinnata

Eriastrum diffusum

Eriogonum lonchophyllum

Erodium cicutarium

Gutierrezia sarothrae


Hedysarum boreale

Hymenopappus filifolius

Lappula redowskii


Lepidium montanum
Lithospermum incisum
Oenothera albicaulis
Phlox longifolia
Physaria acutifolia
Senecio multilobatus
Sphaeralcea parvifolia
Stanleya pinnata
Stenotus armerioides
Tetraneuris ivesiana
Townsendia incana

***Lygodesmia doloresensis* Tomb. (Dolores skeleton plant)**

<p>Taxonomy Class: Dicotyledoneae Order: Asterales Family: Asteraceae</p> <p>Taxonomic Comments: First described in 1970. Type locality is 6.4 miles south of Gateway. Legitimacy of this taxon as a species has been questioned. Some scientists consider it to be a variety of the more common <i>Lygodesmia grandiflora</i>. It is included in the Flora of North America (2007) as <i>L. grandiflora</i> var <i>doloresensis</i> (Tomb) S. L. Welsh.</p>	 <p>Photo CNHP by Peggy Lyon</p>
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CNHP Ranking: G1G2 S1 (Critically imperiled to imperiled globally)

State/Federal Status: BLM sensitive species list June 2000

 <p>Colorado Distribution</p>	<p>Description and Phenology: <i>Lygodesmia doloresensis</i> is a pink flowered, broomy plant with reduced leaves, appearing to be nearly all stem. Like other members of its tribe, it has milky juice. Each head has (usually) five ray flowers, which distinguish it from the closely related <i>L. grandiflora</i> with 8 or more rays. It is similar to <i>L. grandiflora</i> var. <i>dianthopsis</i>, which is distinguished by being less branched and by having broader leaves (FNA 2007). Plants begin flowering in late May and early June.</p> <p>Habitat Comments: Sandy soils in the desert shrub and pinyon-juniper zone, on benches in the valley. Many of the known occurrences are along roads, and there are fewer plants away from disturbed roadsides.</p>
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Global Range: United States, Colorado and Utah in the Dolores River Valley. Ranked S1 (imperiled) in Utah.

State Range: Mesa County, Dolores River Valley. The Gateway area has the largest number of individuals known. Two other occurrences have been documented to the north, in Rabbit Valley and the Baxter Pass area. Another new occurrence (or possibly new information on one of the existing occurrences) was found in Rabbit Valley, Mesa County, in 2007 (Anna Lincoln, pers. comm.), and will be surveyed further in 2008. A

single record from San Miguel County is questionable and is therefore not shown on the distribution map. Utah occurrences are restricted to the Dolores River north of Gateway.

Distribution/Abundance: There were 12 occurrences documented in the CNHP database at the beginning of this project. However, six of these have been combined into a single occurrence due to their close proximity, leaving a total of seven occurrences. Additional surveys of a new population in Rabbit Valley may add to the number of occurrences known. The Gateway area has several thousand individuals. The single occurrence near Baxter Pass had only a few scattered individuals and is not considered viable. Plants located in 2007 were within the known range of the species.

Known Threats and Management Issues: Cattle grazing, recreation, road building and maintenance are potential threats. The majority of the plants in the Gateway area are along roadsides, and may be threatened by road improvements and maintenance. The fact that more plants are growing under cacti and other shrubs, rather than in the open, suggests that the plants are affected by grazing (probably trampling more than herbivory).



Figure 32. Habitat of *Lygodesmia doloresensis* at base of The Palisade. Flags mark plants counted.

Cryptantha gypsophila (Gypsum Valley cat-eye)

Taxonomy

Class: Dicotyledoneae

Order: Lamiales

Family: Boraginaceae

Taxonomic Comments:

In 2004, *Cryptantha gypsophila* was described as a new species (Reveal 2004). It is similar to the more common *C. paradoxa*, and several herbarium specimens previously identified as *C. paradoxa* have been annotated to *C. gypsophila*.



Photo CNHP by Peggy Lyon

CNHP Ranking: G1G2 S1S2 (Critically imperiled globally)

State/Federal Status: None



Colorado Distribution

Description and Phenology: *Cryptantha gypsophila* plants are low, densely tufted herbaceous perennials, 0.3-2.5 dm high, 0.5-4 dm across, with a highly branched, woody caudex system arising from a deeply-seated taproot. Leaves are glabrous on top and have appressed pustulate-based bristles on lower surface. Basal leaves are tufted, narrowly oblanceolate to narrowly spatulate, 1-2.5 (3) cm long, 1.5-3 mm wide. Cauline leaves are scattered, oblanceolate to spatulate, 1-4 cm long, 2-4 (5) mm wide. Stems are erect and softly hairy. The calyx is turbinate, with segments narrowly lanceolate, 4-6 mm long in anthesis, (4) 6-9 mm long in fruit. The corolla is white with yellow fornications, about 10-12 mm long, prominently exserted from the calyx. Usually all 4 nutlets mature, and are rugose-tuberculate on both surfaces. Styles surpass the nutlet by 4-7 mm (Reveal 2004). Similar to the more common *Cryptantha paradoxa*, *C. gypsophila* can be distinguished in the field by its glabrous upper leaf surfaces. Plants in Sinbad Valley flowered in late April, 2007.

Habitat Comments: *Cryptantha gypsophila* is often the dominant vascular plant on the grayish, near-barren gypsum hills of the Paradox Member of the Hermosa Formation in western Colorado (Reveal 2004). It is also found on other barren shale substrates in the area. In some sites, the dominant species is a whitish gray cryptobiotic lichen. In a 2005 survey of associated lichens, over 20 lichen species were identified, including three that are globally rare (St. Clair 2005). *Cryptantha gypsophila* is found on light gray soils, and

is absent from the adjacent more reddish-brown soils. Associated vascular plant species at Sinbad Valley include big sagebrush, blue grama, galleta, Townsend's Easter daisy, and spearleaf buckwheat (*Artemisia tridentata* ssp. *tridentata*, *Bouteloua gracilis*, *Pleuraphis jamesii*, *Townsendia incana*, and *Eriogonum lonchophyllum*). A potential pollinator, a fly-like bee with a long proboscis, was observed visiting *C. gypsophila* in Sinbad Valley.

Global Range: Endemic to western Colorado.

State Range: Mesa, San Miguel and Montrose counties, primarily in Sinbad Valley, Big Gypsum Valley and Disappointment Valley. Populations are known from Sinbad Valley in southwestern Mesa Co., Big Gypsum Valley and adjacent Little Gypsum Valley in northwestern San Miguel Co. and extreme southwestern Montrose Co., and from Disappointment Valley (San Miguel Co). It was recently also found in Spring Creek Basin, north of Disappointment Valley (Lyon 2005). The area within which all but one site are located is approximately 22 X 7 miles. The occurrence in Sinbad Valley is about 24 miles north of the nearest southern site.


Distribution/Abundance: Currently, the species is known from only eleven locations in western Colorado, in Mesa, Montrose, San Miguel and Dolores counties. However, further survey work is expected to add more locations. The species has probably been overlooked in the past, due to its close resemblance to *C. paradoxa*. Although the species is locally common, with thousands of individuals at a site, it is very restricted as to habitat and geographic range.

Known Threats and Management Issues: ATV off-road use may threaten some populations. Invasion of exotic species such as cheatgrass (*Bromus tectorum*) may be a threat. No plants have been observed in areas dominated by cheatgrass (Lyon 2005). It does not grow in naturally moist or irrigated areas.




Habitat of *Cryptantha gypsophila* in Sinbad Valley

***Astragalus piscator* Barneby & Welsh (Fisher Towers milkvetch)**

<p>Taxonomy Class: Dicotyledoneae Order: Fabales Family: Fabaceae</p> <p>Taxonomic Comments: First described in 1986 (Barneby 1986) . <i>A. piscator</i> is related to <i>A. musiniensis</i>, <i>A. amphioxys</i> and <i>A. chamaeleuce</i>.</p>	 <p>Photo CNHP by Peggy Lyon</p>
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CNHP Ranking: G2G3 S1 (Globally imperiled, very rare in Colorado)

State/Federal Status: BLM sensitive species list June 2000

	<p>Description and Phenology: <i>Astragalus piscator</i> is a short-lived perennial, with three to ten pink “pea type” flowers on leafless stems. Stems are erect when in flower, and often spread out at the base of the leaves when in fruit. The foliage is covered with appressed hairs and is yellowish-green on top and gray-green below. <i>Astragalus piscator</i> is similar to <i>A. amphioxys</i>, which is common in the Gateway area. It can be distinguished in the field by its narrower, more pointed leaflets and lighter flower color. Plants flower in April, and by April 30, 2007, many were already in fruit.</p> <p>Habitat Comments: <i>Astragalus piscator</i> grows on sandy soils of valley benches and in gullied foothills. In Gateway it is found on slightly gravelly soils with mixed red and white particles (see photo above). At Gateway, it was often found on the sides of dry gullies.</p>
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Global Range: United States: in Utah (San Juan, Grand and Wayne counties) and <http://www.swcoloradowildflowers.com/Colorado> (Mesa County). Reported from Arizona. Ranked S2 (imperiled) in Utah.

State Range: Mesa County, Gateway area only.

Distribution/Abundance: Abundance in Utah is not known. There are estimated to be more than 2000 individuals in the Gateway area.

Results of 2007 rare plant survey: The existing record for the species along CR 4.2 was updated, and plants counted. A new sub-population was found farther east, behind the shooting range and community center, on BLM land. For future monitoring, the following counts were made along Road 4.2, beginning at (NAD 83, zone 12) 4283867.4N; 675482.4E at a pullout on the north side of the road, and continuing at 3 more pullouts, ending at 4284917.5N; 675339.8E:

Pullout 1: 140 individuals

Pullout 2: 538

Pullout 3: 428

Pullout 4: ca. 300

About 1000 plants were counted at the new area behind the community center, but this does not represent the entire population.

Known Threats and Management Issues: Road maintenance and off-road vehicle use threaten the population along 4.2 Road. Off-road vehicles also threaten the new population found on the south side of the Palisade.



Figure 34. Habitat of *Astragalus piscator* on lower slopes of The Palisade at Road 4.2.

***Astragalus equisolensis* Barneby (Horseshoe milkvetch)**

(*Astragalus desperatus* M. E. Jones var. *neeseae* Barneby)

Taxonomy

Class: Dicotyledoneae

Order: Fabales

Family: Fabaceae

Taxonomic Comments: Also known as *Astragalus desperatus* M.E. Jones var. *neeseae* Barneby.



Photo by S. Welsh, from Utah Rare Plant field Guide

CNHP Ranking: G5T1 S1 *Astragalus desperatus* is globally secure as a species (G5), but variety *neeseae* is critically imperiled globally (T1). A rank of T1 (for taxon) is considered equivalent to a rank of G2.

State/Federal Status: Formerly a candidate for listing under the Endangered Species Act, the species was removed from consideration by the U. S. Fish and Wildlife Service. The agency based its decision on the population numbers in Utah, which do not appear to be declining, and the discovery of the species in Colorado (Federal Register 9-12-2006).



Colorado distribution

Description and Phenology: *Astragalus equisolensis* is a perennial plant with leafless flower stems and typical pea flowers. The wings and keel are purple, while the banner (large top petal) is bicolored – purple with white stripes. It was in flower on May 20, 2007.

Habitat Comments: *A. equisolensis* is associated with mixed desert and salt desert shrub vegetation communities that are generally dominated by sagebrush, shadscale and horsebrush. The population on The Palisade was in an open pinyon-juniper/blackbrush community at 5150 ft. Associated species were *Eriogonum palmerianum*, *Gilia ophthalmoides*, *Hesperostipa neomexicana* and *Brickellia longifolia*.

Global Range: United States: Utah and Colorado

State Range: Mesa County, Dolores River Valley only.

Distribution/Abundance: Surveys in 1992 estimated the population at 10,000 in Utah and there is no recent information indicating it has declined (USFWS); the Colorado population is a recent discovery, and its abundance is not known.

Known Threats and Management Issues: Potential energy production and recreational impacts. More survey is needed to determine abundance in Colorado.

***Cryptantha longiflora* (A.Nelson) Payson (Long-flower cat's-eye)**

Taxonomy

Class: Dicotyledoneae

Order: Lamiales

Family: Boraginaceae

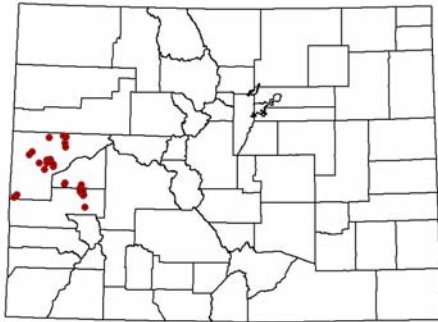
Taxonomic Comments: First described in 1899. The type locality is in Mesa County. Weber (2006) has placed this and all perennial species of *Cryptantha* in the genus *Oreocarya*.



Photo CNHP by Peggy Lyon

CNHP Ranking: G3 S3 (Vulnerable globally and in Colorado)

State/Federal Status: None



Colorado Distribution

Description and Phenology:

Cryptantha longiflora is a short-lived perennial, or possibly biennial, 0.8 to 3 (5) dm tall, with one to several stems. It is one of the most stiffly pubescent of the *Cryptanthas* in Colorado. It has pustulate hairs on both leaf surfaces. Flowers are white with yellow fornicies, with a tubular section 12 to 14 mm long.

Habitat Comments: It is found in salt desert shrub and pinyon-juniper communities. Associated species in Sinbad Valley and Salt Creek include *Fendlera rupicola*, *Lepidium montanum*, *Penstemon strictus*, *Townsendia incana*, *Cryptantha flava*, *Erigeron concinnus*, *Hedysarum boreale*, *Sphaeralcea parvifolia*, *Schoenocrambe linifolia*, *Cryptantha flavoculata* and *Astragalus wingatanus*.

Global Range: Colorado and Utah (Emery and Grand counties). Ranked S2 (imperiled) in Utah.

State Range: Mesa, Delta and Montrose counties.

Distribution/Abundance: There are 40 occurrences in the CNHP database, not including the two documented in 2007. Some occurrences have thousands of individuals.

Known Threats and Management Issues: trampling, off road vehicles, and weed invasion are potential threats.



Figure 35. Habitat of *Cryptantha longiflora* in Salt Creek Canyon (downstream from Sinbad Valley).

***Eriogonum palmerianum* Reveal (Palmer buckwheat)**

Taxonomy

Class: Dicotyledoneae

Order: Polygonales

Family: Polygonaceae

Taxonomic Comments:

Eriogonum palmerianum Reveal published in P. A. Munz, Suppl. Calif. Fl. 58. 1968. Palmer's wild buckwheat.



Photo by Michael L Charters, Fall Blooming Plants of the Mojave, online at <http://www.calflora.net/eastmojave>

CNHP Ranking: G3 S2 (Globally vulnerable, rare in Colorado)

State/Federal Status: None



Colorado Distribution

Description and Phenology:

Plants are low spreading to erect annuals (0.5-) 1-3 dm, mostly floccose to tomentose. Leaves are a basal rosette. Leaf blades are suborbicular to cordate, 0.5-1.5 X 0.5-2 cm, densely white to grayish tomentose abaxially, less so to glabrate and often greenish adaxially; petioles 1-4 cm, floccose. Flowering stems mostly erect, 3-8 cm. Inflorescence forming open crowns of few branches, 0.5-2.5 dm with tips curved outwardly; bracts 3, scalelike, 0.5-3 mm. Peduncles lacking. Involucres campanulate, 1.5-2 X 1.5-2 mm. teeth 5, 0.2-0.2 mm. flowers white to pink or rarely pale yellowish, 1.5-2 mm, glabrous. Flowers from spring to fall.

Habitat comments: Sandy to gravelly washes, flats and slopes in saltbush, greasewood, creosote bush, blackbrush and sagebrush communities, and in pinyon-juniper woodlands, from 2000 to 7500 ft (Welsh 1993) .

Global Range: *Eriogonum palmerianum* occurs in six western states: Arizona, New Mexico, California, Nevada, Utah and Colorado. It is unranked in all but Colorado.

State Range: Mesa and Montezuma counties.

Distribution/Abundance: There are currently three occurrences in the CNHP database, not including the new occurrence found on the east side of the Palisade in 2007.

Known Threats and Management Issues: Weed invasion and recreational impacts are potential threats.

Gilia haydenii Gray (San Juan Gilia)

Taxonomy

Class: Dicotyledoneae
Order: Solanales
Family: Polemoniaceae

Taxonomic Comments:

Townshend Brandegee made the discovery of *Gilia haydenii* on the Hayden Survey of 1874 in Colorado. In Brandegee's "Flora of Southwestern Colorado" report in the Hayden Survey report of 1876, he said of the plant, "[It is] a handsome species common upon the mesas of the Mancos [River]...." (Schneider 2007)



Photo courtesy of Al Schneider, Copyrighted 2001 – 2007 by Al and Betty Schneider.

CNHP Ranking: G3 S2 (Globally vulnerable, rare in Colorado)

State/Federal Status: None



Colorado Distribution

Description and Phenology: Flowers are quite small in an open spray at the top of a swaying 8 to 15 inch slender stalk. Notice the typical *Gilia* scalloped, basal rosette of leaves at the bottom of the flower stalks and behind the ruler. (Schneider 2007)

Habitat comments: Dry places, often on clay knolls or shaley sandstone outcrops, from desert shrub to ponderosa pine communities, often in pinyon-juniper (Cronquist 1984).

Global Range: Western Colorado, eastern Utah and northwestern New Mexico. Ranked S1 in Utah, and apparently uncommon in New Mexico.

State Range: Mesa, Montezuma and La Plata counties. The 2007 record from Gateway is the first from Mesa County.


Distribution/Abundance: There are now seven records of the species in the CNHP data system, including the new one found in Lumsden Canyon in 2007. The population in Lumsden Canyon was small, with about 30 plants, and was ranked C (Fair).

Known Threats and Management Issues: Recreational use may impact the Mesa County population. The Lumsden Canyon population occurred along the route planned for a new trail. Gateway Canyons management was informed, and the trail can be re-routed slightly uphill to avoid the plants, as well as a dangerous steep hillside.




Figure 36. Habitat of *Gilia haydenii* in Lumsden Canyon.

***Abronia nana* S. Wats. (Dwarf sand-verbena)**

<p>Taxonomy</p> <p>Class: Dicotyledoneae Order: Caryophyllales Family: Nyctaginaceae</p> <p>Taxonomic Comments: There are three varieties of <i>Abronia nana</i>. Ours is var. <i>nana</i>. Others are var. <i>covillei</i> in California and Nevada and var. <i>harrisii</i> in Utah.</p>	 <p>Photo CNHP by Peggy Lyon</p>
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CNHP Ranking: G4 S1. (Apparently secure globally but very rare in Colorado)

State/Federal Status: None

 <p>Colorado Distribution</p>	<p>Description and Phenology: A dwarf version of the more common <i>Abronia elliptica</i>, <i>Abronia nana</i> is scapose, from 5 to 16 cm tall. Leaves are glandular. Rose to white flowers are arranged in a head.</p> <p>Habitat Comments: Salt desert shrub and pinyon-juniper communities. In Sinbad Valley, growing with <i>Cryptantha gypsophila</i> on barren hills of the Paradox member of the Hermosa Formation. Other associated species were Wyoming sagebrush, winterfat and globe mallow (<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>, <i>Krascheninnikovia lanata</i>, and <i>Sphaeralcea parviflora</i>).</p>
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Global Range: *Abronia nana* is known from California, Nevada, Arizona, Utah and Colorado. It is ranked S3 (vulnerable) in Utah, and not ranked in California, Nevada or Arizona.

State Range: *Abronia nana* is known in Colorado only from Sinbad Valley. There are three specimens in the CU herbarium, collected from the same area in 1987, 1988 and 1995. However, the occurrence documented in 2007 is the first for the CNHP database.


Distribution/Abundance: Abundance outside Colorado is not known. The population in Sinbad Valley is estimated at over 500 individuals.

Known Threats and Management Issues: The same threats that apply to *Cryptantha gypsophila*, namely off road vehicle use, apply to this species. Invasion of exotic species such as cheatgrass (*Bromus tectorum*) may be a threat. No plants have been observed in areas dominated by cheatgrass (Lyon 2005). It does not grow in naturally moist or irrigated areas.




Figure 37. Habitat of *Abronia nana* in Sinbad Valley.

***Penstemon utahensis* Eastwood (Utah penstemon)**

<p>Taxonomy Class: Dicotyledoneae Order: Scrophulariales Family: Scrophulariaceae</p> <p>Taxonomic Comments: originally described by Alice Eastwood, added to the Colorado Flora in 1979 (Weber <i>et al</i> 1979).</p> <p>.</p>	 <p>Photo CNHP by Peggy Lyon</p>
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CNHP Ranking: G4 S2 (Apparently secure globally, rare in Colorado)

State/Federal Status: None

 <p>Colorado Distribution</p>	<p>Description and Phenology: This spectacular bright red to magenta <i>Penstemon</i> has widely flaring corolla lobes and glaucous leaves. It is one of only four red <i>Penstemons</i> found in western Colorado. The widely spreading lower lip is unusual in red <i>Penstemons</i>, and provides a landing platform for pollinators (Nold 1999). Plants bloom from April to June.</p> <p>Habitat Comments: Sandy soils, rocky slopes in the pinyon-juniper zone.</p>
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Global Range: United States. Colorado, California, Utah, Nevada and Arizona. Ranked S2 (imperiled) in Colorado and California. Not ranked in Utah, Nevada or Arizona.

State Range: Peripheral from Utah in Mesa and Montezuma counties.

Distribution/Abundance: In the Gateway area, we found *P. utahensis* to be frequent, but widely scattered and never in great abundance. Groups of 5 to 10 plants were common.

For comparison, the largest known Colorado population, in Montezuma County, has over 200 individuals.

Known Threats and Management Issues: Recreation impacts from hiking, collecting and off-road vehicles are potential threats to this and all rare species in the area.



Figure 38. Habitat of *Penstemon utahensis* in Lumsden Canyon

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Appendix I

The Natural Heritage Ranking System

Key to the functioning of Natural Heritage Programs is the concept of setting priorities for gathering information and conducting inventories. The number of possible facts and observations that can be gathered about the natural world is essentially limitless. The financial and human resources available to gather such information are not. Because biological inventories tend to be under-funded, there is a premium on devising systems that are both effective in providing information that meets users' needs and efficient in gathering that information. The cornerstone of Natural Heritage inventories is the use of a ranking system to achieve these twin objectives of effectiveness and efficiency.

Ranking species and ecological communities according to their imperilment status provides guidance for where Natural Heritage Programs should focus their information-gathering activities. For species deemed secure, only general information needs to be maintained by Natural Heritage Programs. Fortunately, the more common and secure species constitute the majority of most groups of organisms. On the other hand, for those species that are by their nature rare, more detailed information is needed. Because of these species' rarity, gathering comprehensive and detailed population data can be less daunting than gathering similarly comprehensive information on more abundant species.

To determine the status of species within Colorado, CNHP gathers information on plants, animals, and plant communities. Each of these elements of natural diversity is assigned a rank that indicates its relative degree of imperilment on a five-point scale (for example, 1 = extremely rare/imperiled, 5 = abundant/secure). The primary criterion for ranking elements is the number of occurrences (in other words, the number of known distinct localities or populations). This factor is weighted more heavily than other factors because an element found in one place is more imperiled than something found in twenty-one places. Also of importance are the size of the geographic range, the number of individuals, the trends in both population and distribution, identifiable threats, and the number of protected occurrences.

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State-rank or S-rank) and the element's imperilment over its entire range (its Global-rank or G-rank). Taken together, these two ranks indicate the degree of imperilment of an element. For example, the lynx, which is thought to be secure in northern North America but is known from less than five current locations in Colorado, is ranked G5 S1 (globally-secure, but critically imperiled in this state). The Rocky Mountain Columbine, which is known only in Colorado from about 30 locations, is ranked a G3 S3 (vulnerable both in the state and globally, since it only occurs in Colorado and then in small numbers). Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1 S1 (critically imperiled both in the state and globally, because it exists in a single location). CNHP actively collects, maps, and electronically processes specific occurrence

information for animal and plant species considered extremely imperiled to vulnerable in the state (S1 - S3). Several factors, such as rarity, evolutionary distinctiveness, and endemism (specificity of habitat requirements), contribute to the conservation priority of each species. Certain species are “watchlisted,” meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 1.

This single rank system works readily for all species except those that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding, and resident species. As noted in Table 1, ranks followed by a “B,” for example S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an “N,” for example S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

Table 1. Definition of Natural Heritage Imperilment Ranks

G/S1	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or 1,000 or fewer individuals), or because some factor of its biology makes it especially vulnerable to extinction.
G/S2	Imperiled globally/state because of rarity (6 to 20 occurrences, or 1,000 to 3,000 individuals), or because other factors demonstrably make it very vulnerable to extinction throughout its range.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences, or 3,000 to 10,000 individuals).
G/S4	Apparently secure globally/state, though it may be quite rare in parts of its range, especially at the periphery. Usually more than 100 occurrences and 10,000 individuals.
G/S5	Demonstrably secure globally/state, though it may be quite rare in parts of its range, especially at the periphery.
G/SX	Presumed extinct globally, or extirpated within the state.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G/SH	Historically known, but usually not verified for an extended period of time.
G#T#	Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not residents.
S#N	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used.
SZ	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
SA	Accidental in the state.
SR	Reported to occur in the state but unverified.
S?	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking.

Note: Where two numbers appear in a state or global rank (for example, S2S3), the actual rank of the element is uncertain, but falls within the stated range.

Legal Designations for Rare Species

Natural Heritage imperilment ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare species receive legal protection. Legal status is designated by either the U.S. Fish and Wildlife Service under the Endangered Species Act or by the Colorado Division of Wildlife under Colorado Statutes 33-2-105 Article 2. In addition, the U.S. Forest Service recognizes some species as “Sensitive,” as does the Bureau of Land Management. Table 2 defines the special status assigned by these agencies and provides a key to abbreviations used by CNHP.

Table 2. Federal and State Agency Special Designations for Rare Species

Federal Status:	
1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)	
LE	Listed Endangered: defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.
LT	Listed Threatened: defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range.
P	Proposed: taxa formally proposed for listing as Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule).
C	Candidate: taxa for which substantial biological information exists on file to support proposals to list them as endangered or threatened, but no proposal has been published yet in the Federal Register.
PDL	Proposed for delisting.
XN	Nonessential experimental population.
2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as S’)	
FS	Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by: Significant current or predicted downward trends in population numbers or density. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as “S”)	
BLM	Sensitive: those species found on public lands designated by a State Director that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.
4. State Status:	
The Colorado Division of Wildlife has developed categories of imperilment for non-game species (refer to the Colorado Division of Wildlife’s Chapter 10 – Nongame Wildlife of the Wildlife Commission's regulations). The categories being used and the associated CNHP codes are provided below.	
E	Endangered: those species or subspecies of native wildlife whose prospects for survival or recruitment within this state are in jeopardy, as determined by the Commission.
T	Threatened: those species or subspecies of native wildlife which, as determined by

the Commission, are not in immediate jeopardy of extinction but are vulnerable because they exist in such small numbers, are so extremely restricted in their range, or are experiencing such low recruitment or survival that they may become extinct.

SC

Special Concern: those species or subspecies of native wildlife that have been removed from the state threatened or endangered list within the last five years; are proposed for federal listing (or are a federal listing “candidate species”) and are not already state listed; have experienced, based on the best available data, a downward trend in numbers or distribution lasting at least five years that may lead to an endangered or threatened status; or are otherwise determined to be vulnerable in Colorado.

Appendix 2. Combined Species List, Scientific and Common Names

(Rare plants are in bold type; non-native species are in italics)

Note: Many plants are uncommon enough that they have no real common name. When a common name is not known to us, we have used those given by the USDA PLANTS database, although some are admittedly and embarrassingly contrived.

Scientific Names	Common names
Trees	
<i>Acer negundo</i>	Box elder
<i>Fraxinus anomala</i>	Single leaf ash
<i>Juniperus osteosperma</i>	Utah juniper
<i>Pinus edulis</i>	Colorado pinyon
<i>Populus deltoides</i> ssp. <i>wislizenii</i>	Plains cottonwood
<i>Tamarix ramosissima</i>	<i>Tamarisk</i>
<i>Ulmus pumila</i>	<i>Chinese elm</i>
Shrubs	
<i>Amelanchier utahensis</i>	Utah serviceberry
<i>Artemisia bigelovii</i>	Bigelow's sagebrush
<i>Artemisia frigida</i>	Fringed sagebrush
<i>Artemisia nova</i>	Black sagebrush
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	Basin big sagebrush
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush
<i>Atriplex canescens</i>	Four-wing saltbush
<i>Atriplex confertifolia</i>	Shadscale
<i>Cercocarpus montanus</i>	Mountain mahogany
<i>Chrysothamnus linifolius</i>	Spearleaf rabbitbrush
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush
<i>Chrysothamnus viscidiflorus</i>	Sticky flowered rabbitbrush
<i>Coleogyne ramosissima</i>	Blackbrush
<i>Echinocereus triglochidiatus</i>	Claret cup cactus
<i>Ephedra torreyana</i>	Mormon tea
<i>Ephedra viridis</i>	Mormon tea
<i>Fendlera rupicola</i>	Fendlerbush
<i>Forestiera pubescens</i>	Wild privet
<i>Kochia sieversiana</i>	<i>Kochia</i>
<i>Opuntia erinacea</i>	Grizzly bear prickly pear
<i>Opuntia phaeacantha</i>	Tulip prickly pear
<i>Opuntia polyacantha</i>	Plains prickly pear
<i>Pediocactus simpsonii</i>	Simpson hedgehog cactus
<i>Purshia stansburiana</i>	Cliff rose
<i>Purshia tridentata</i>	Bitterbrush

Rhus trilobata	Skunkbrush
Salix exigua	Coyote willow
Sarcobatus vermiculatus	Greasewood
Sclerocactus parviflorus	Fish hook cactus
Sclerocactus whipplei	Whipple's fish hook cactus
Suaeda moquinii	Mojave seablight
Symphoricarpus oreophilus	Snowberry
<i>Tamarix ramosissima</i>	<i>Tamarisk</i>
Typha latifolia	Cattails
Yucca harrimaniae	Yucca
Grasses	
Achnatherum hymenoides	Indian ricegrass
Agrostis scabra	Rough bentgrass
Aristida purpurea	Three awn
Bouteloua gracilis	Blue grama
<i>Bromus tectorum</i>	<i>Cheatgrass</i>
Distichlis spicata	Inland saltgrass
Elymus elymoides	Squirreltail
Erioneuron pilosum	Hairy woolygrass
Hesperostipa comata	Needle and thread
<i>Phalaris arundinacea</i>	<i>Reed canary grass</i>
Phragmites australis	Giant reed
Pleuraphis jamesii	Galleta
Poa fendleriana	Muttongrass
Sporobolus aeroides	Alkali sacaton
Sporobolus cryptandrus	Sand dropseed
Vulpia octoflora	Six weeks fescue
Forbs	
Abronia elliptica	Sand verbena
Androstephium breviflorum	Pink funnel lily
Arabis pulchra	Beauty rockcress
Arabis selbyi	Selby's rockcress
Arabis sp. cf. lignifera	Desert rockcress
Artemisia ludoviciana	Louisiana sagewort
Asclepias asperula	Spider milkweed
Asclepias cryptoceras	Pallid milkweed
Astragalus amphioxys	Crescent milkvetch
Astragalus equisolensis	Horseshoe milkvetch
Astragalus lonchocarpus	Rushy milkvetch
Astragalus mollissimus	Wooly milkvetch
Astragalus nuttallianus	Nuttall's milkvetch
Astragalus piscator	Fisher milkvetch
Astragalus wingatanus	Fort Wingate milkvetch

Brickellia microphylla	Little leaf brickelbush
Brickellia oblongifolia	Mojave brickelbush
Calochortus nuttallii	Sego lily
Castilleja chromosa	Wavyleaf Indian paintbrush
Castilleja linariifolia	Wyoming Indian paintbrush
Castilleja scabrida	Rough Indian paintbrush
<i>Centaurea repens</i>	<i>Russian knapweed</i>
Chaetopappa ericoides	Rose heath
Chamaesyce fendleri	Fendler's sandmat
Cirsium neomexicanum	New Mexico thistle
Clematis ligusticifolia	Virgin's bower
Collomia linearis	Narrowleaf mountain trumpet
Comandra umbellata	Bastard toadflax
Cryptantha flava	Yellow cat's-eye
Cryptantha flavoculata	Roughseed cat's-eye
Cryptantha gypsophila	Gypsum Valley cat's-eye
Cryptantha longiflora	Longflower cat's-eye
Cymopterus fendleri	Fendler's spring parsley
Delphinium scaposum	Tall mountain larkspur
Descurainia pinnata	Western tansy mustard
Draba cuneifolia	Wedgeleaf whitlowgrass
Eremogone kingii	King's sandwort
Eriastrum diffusum	Miniature woolstar
Erigeron concinnus	Navajo fleabane
Eriogonum corymbosum	Crispleaf buckwheat
Eriogonum inflatum	Native American pipeweed
Eriogonum lonchophyllum	Spearleaf buckwheat
Eriogonum palmerianum	Palmer buckwheat
<i>Erodium cicutarium</i>	<i>Crane's bill</i>
Gaillardia pinnatifida	Blanket flower
Gilia haydenii	San Juan Gilia
Gilia ophthalmoides	Eyed Gilia
Glycyrrhiza lepidota	American licorice
Gutierrezia sarothrae	Snakeweed
Gymnosteris parvula	Gymnosteris
Hedysarum boreale	Chainpod
Heterotheca villosa	Hairy golden aster
Hymenopappus filifolius	Fineleaf Hymenopappus
Lappula redowskii	Flatspine stickseed
Lathyrus brachycalyx	Bonneville peavine
Lepidium lasiocarpum	Shaggyfruit pepperweed
Lepidium montanum	Mountain pepperweed
Lesquerella rectipes	Straight bladderpod
Lithospermum incisum	Narrowleaf gromwell
Lupinus sp.	Lupine sp.

Lygodesmia doloresensis	Dolores skeleton plant
<i>Machaeranthera bigelovii</i>	Bigelow's tansy aster
<i>Machaeranthera grindelioides</i>	Rayless aster
<i>Marrubium vulgare</i>	<i>Horehound</i>
<i>Medicago officinale</i>	<i>Alfalfa</i>
<i>Meysinium puberulum</i>	Plains flax
<i>Mirabilis multiflora</i>	Four o'clock
<i>Oenothera albicaulis</i>	White evening primrose
<i>Oenothera cespitosa</i>	Tufted evening primrose
<i>Oxybaphus linearis</i>	Narrowleaf four o'clock
<i>Oxytropis lambertii</i>	Lambert's crazyweed
<i>Pediomelum megalanthum</i>	Indian breadroot
<i>Penstemon cyanocaulis</i>	Bluestem beardtongue
<i>Penstemon moffattii</i>	Moffat's beardtongue
<i>Penstemon strictus</i>	Rocky Mountain Penstemon
Penstemon utahensis	Utah Penstemon
<i>Phacelia crenulata</i>	Wild heliotrope
<i>Phlox hoodii</i>	Hood's phlox
<i>Phlox longifolia</i>	Longleaf phlox
<i>Physaria acutifolia</i>	Sharpleaf twinpod
<i>Plantago patagonica</i>	Wooly plantain
<i>Platyschkuhria integrifolia</i>	Bahia
<i>Salsola australis</i>	<i>Russian thistle</i>
<i>Senecio multilobatus</i>	Lobeleaf groundsel
<i>Silene antirrhena</i>	<i>Sleepy silene</i>
<i>Sisymbrium altissimum</i>	<i>Jim Hill mustard</i>
<i>Sphaeralcea coccinea</i>	Scarlet globemallow
<i>Sphaeralcea parviflora</i>	Smallflower globemallow
<i>Stanleya pinnata</i>	Prince's plume
<i>Stenotus armerioides</i>	Thrift mock goldenweed
<i>Streptanthella longirostis</i>	Longbeak streptanthella
<i>Streptanthus cordatus</i>	Heartleaf twistflower
<i>Tetranneuris ivesiana</i>	Ives' four-nerved daisy
<i>Townsendia incana</i>	Townsend's Easter daisy