

# **Survey of Critical Biological Resources Garfield County, Colorado Volume I**

Prepared for  
Garfield County Commissioners  
Glenwood Springs, CO

By  
Peggy Lyon, Western Slope Botanist  
John Sovell, Western Slope Zoologist  
Joe Rocchio, Wetland Ecologist

Colorado Natural Heritage Program  
College of Natural Resources  
Colorado State University  
254 General Services Building  
Fort Collins, CO 80523-4061  
970-491-1309

[heritage@lamar.colostate.edu](mailto:heritage@lamar.colostate.edu)

<http://www.cnhp.colostate.edu>

©2001 by Colorado Natural Heritage Program

## ACKNOWLEDGEMENTS

This project would not have been possible without the help of many dedicated individuals.

We thank Garfield County for sponsoring the project, and Great Outdoors Colorado for providing the funding. Additional funding was contributed by the municipalities of Rifle and New Castle. We appreciate the support of the Garfield County Commissioners, the Planning Department, and the Assessor's office.

We received much help and good advice from the Bureau of Land Management, especially Carla Scheck and Dan Sokal in the Glenwood Springs Resource Area, and Ron Lambeth, David Smith and Dave Trappett in the Grand Junction Resource Area.

We thank Kim Potter and Christine Hirsch of the United States Forest Service for information on rare animal species in the White River National Forest, Garfield County. Pam Schnurr and Scott Atrain at the Colorado division of Wildlife, Grand Junction supplied GIS coverage of rare animals of concern to CDOW in Garfield County. This information assisted us in the direction of our field survey efforts. John Broderick of CDOW shared his extensive knowledge of the county.

Members of the Colorado Native Plant Society and other friends and volunteers helped in the field and in the office. Dickson Pratt and Joan Schmid accompanied us on our explorations, while Chris Lantz helped with preliminary planning. Volunteers Dickson Pratt and Jodi Peterson edited the final report.

We are grateful to the landowners who gave us permission to survey their property. We enjoyed meeting them, and in some cases hiking with them on their property.

Our staff in Fort Collins, including Susan Spackman, Jill Handwerk, Dave Anderson, Denise Culver, Jodie Bell, Renee Rondeau, Barry Baker, Amy Lavender, Jeremy Siemers, Rob Schorr, and Mike Wunder all worked with us patiently. Michael Denslow helped write plant descriptions, and the maps were prepared by Amy Lavender and Ian Hanou.

## Table of Contents

<b>Executive Summary</b> - - - - -	Page i
<b>I. The Natural Heritage Network and Biodiversity</b> - - - - -	1
What is Biological Diversity?	1
The Colorado Natural Heritage Program	2
The Natural Heritage Ranking System	3
Legal Designations	4
Element Occurrence Ranking	5
Potential Conservation Areas	7
<b>II. Methods</b> - - - - -	10
<b>III. Results</b> - - - - -	13
<b>IV. Potential Conservation Areas</b> - - - - -	15
<b>V. The Natural Heritage of Garfield County</b> - - - - -	17
Location and Physical Characteristics	17
Vegetation	22
Exotic Plants (Weeds)	31
Rare and Imperiled Plants	36
Rare and Imperiled Animals	53
<b>VI. Threats to Biological Diversity</b> - - - - -	79
<b>VII. Conservation Strategies</b> - - - - -	83
<b>VIII. Potential Conservation Area Profiles</b> - - - - -	87
4A Ridge	87
Anvil Points	93
Anvil Points Rim	97
Barrel Spring Point	103
Bear Creek at Glenwood Canyon	107
Beaver Creek at Battlement Mesa	110
Brush Creek at Skinner Ridge	113
Burning Mountain	116
Butler Creek	119
Calf Canyon	122
Cattle Creek at Coulter Creek	125
Chimney Rock at Long Point	128

Clear Creek	131
Coal Ridge	135
Conn Creek	138
Cow Ridge	142
Crystal Springs Road	145
Deep Creek	148
Deep Creek at Clark Ridge	153
Divide Creek	156
Douglas Pass	159
East Divide Creek	162
East Douglas Creek	165
East Elk Creek	169
East Fork Parachute Creek	173
East Rifle Creek	179
East Salt Creek Headwaters	183
Flatiron Mesa	187
Fourmile Creek at Sunlight	190
Garfield Creek	194
Grizzly Creek Canyon	197
Hanging Lake	201
Headwaters of Patterson Creek	205
Horse Mountain	208
Hubbard Cave	211
Kaiser Stevens Ditch	214
Main Elk Creek	217
Main Elk Creek West	221
Meadow Creek at Deep Creek Point	224
Middle Dry Fork	227
Middle Fork Derby Creek	230
Middle Rifle Creek	233
Missouri Heights	237
Mitchell Creek	240
Mitchell Road	243
Mount Callahan	247
Mount Logan Foothills	251
Mt Logan Road	255
No Name Creek	258
North Fork Derby Creek	261
Northwater Creek	264
Parachute Creek	269
Prairie and South Canyons	275
Ranch at the Roaring Fork	279
Red Pinnacle	283
Rifle Falls State Park	286
Rifle Hogback	290
Rifle Stretch Colorado River	293



Roan Creek	299
Sheep Creek Uplands	303
Skinner Ridge	306
Smith Gulch	310
Sutank	313
Sweetwater Lake	316
The Crown	319
The Meadows	322
Trapper Creek	325
Trappers Lake	329
Turret Creek	333
Upper Cow Creek	336
W Mountain	339
Wagonwheel Creek	342
West Elk Creek	345

## VIII. Literature Cited - - - - - 348

### List of Figures

1. Map of Potential Conservation Areas- - - - -	14
2. Location of Garfield County in Colorado	17
3. Ecoregions in Garfield County	18
4. Precipitation map of Garfield County	20
5. Municipalities and major rivers	20
6. Land ownership map	21
7. Geology of Garfield County	21
8. Distribution of agricultural lands	22
9. Distribution of salt desert shrublands	22
10. Distribution of pinyon-juniper woodlands	23
11. Distribution of shale barrens	23
12. Distribution of sagebrush communities	23
13. Distribution of mountain shrub communities	24
14. Distribution of grasslands	25
15. Distribution of aspen forests	25
16. Distribution of Douglas fir and mixed conifer forests	26
17. Distribution of spruce- fir forests	26
18. Distribution of alpine tundra and meadows	27
19. Canada thistle ( <i>Cirsium arvense</i> )	34
20. Common burdock ( <i>Arctium minus</i> )	34
21. Hound's tongue ( <i>Cynoglossum officinale</i> )	34
22. Musk thistle ( <i>Carduus nutans</i> )	34
23. Russian olive ( <i>Eleagnus angustifolia</i> )	34
24. Tamarisk ( <i>Tamarix ramosissima</i> )	34
25. Utah fescue ( <i>Argilochloa dasyclada</i> )	41

26. DeBeque milkvetch ( <i>Astragalus debequaeus</i> )	41
27. Naturita milkvetch ( <i>Astragalus naturitensis</i> )	41
28. Wetherill milkvetch ( <i>Astragalus wetherillii</i> )	41
29. Grand buckwheat ( <i>Eriogonum contortum</i> )	42
30. Large flower globemallow ( <i>Iliamna grandiflora</i> )	42
31. Piceance bladderpod ( <i>Lesquerella parviflora</i> )	42
32. Canyon bog orchid ( <i>Limnorchis ensifolia</i> )	42
33. Mountain wild mint ( <i>Monardella odoratissima</i> )	47
34. Arapien stickleaf ( <i>Nuttallia argillosa</i> )	47
35. Parachute penstemon ( <i>Penstemon debilis</i> )	47
36. Harrington beardtongue ( <i>Penstemon harringtonii</i> )	47
37. DeBeque phacelia ( <i>Phacelia scopulina</i> var. <i>submutica</i> )	48
38. Sun-loving meadowrue ( <i>Thalictrum heliophilum</i> )	48
39. Hanging garden sullivantia ( <i>Sullivantia hapemannii</i> var. <i>purpusii</i> )	48
40. Uinta Basin hookless cactus ( <i>Sclerocactus glaucus</i> )	48
41. American Peregrine Falcon	62
42. Boreal Owl	62
43. Bald Eagle	62
44. Boreal toad	62
45. Barrow's Goldeneye	62
46. Colorado River cutthroat trout	62
47. Columbian Sharp-tailed Grouse	62
48. Black Swift	62
49. Ferruginous Hawk	66
50. Greater Sandhill Crane	66
51. Flannelmouth sucker	66
52. Kit fox	66
53. Gray Vireo	66
54. Great Basin spadefoot	66
55. Longnose leopard lizard	66
56. Lynx	66
57. Mountain whitefish	73
58. Plateau striped whiptail	73
59. Northern Goshawk	73
60. Roundtail chub	73
61. Northern leopard frog	73
62. Sage Grouse	73
63. Pale lump-nose bat	73
64. Sage Sparrow	73
65. Spotted bat	78
66. White-faced Ibis	78
67. Theano alpine	78
68. White-tailed prairie dog	78
69. Tree lizard	78
70. Wolverine	78

**List of tables**

1. Definition of Natural Heritage Imperilment Ranks - - - - -	5
2. Federal and State Agency Special Designations	6
3. Plant Communities Documented in Garfield County	28
4. Rare Plants of Garfield County	37
5. Rare Animals of Garfield County	54

## **Executive Summary**

Citizens of Garfield County are concerned about issues of open space, wildlife habitat, and conservation of their unique natural surroundings. They recognize the need to plan for the conservation of the plants, animals and natural communities that are native to Garfield County. They also recognize that, with limited resources, it is important to prioritize their conservation efforts. The need for information on the locations of the most significant biological resources of the area is urgent. In 1999, the Colorado Natural Heritage Program (CNHP) proposed to the

In 1999, the Colorado Natural Heritage Program (CNHP) proposed to the Garfield County Board of Commissioners that a biological assessment be conducted for Garfield County. The goal of the project would be to systematically identify the localities of rare, threatened, or endangered species and the locations of significant natural plant communities, and to identify and prioritize Potential Conservation Areas of critical habitat for these species and communities. In addition, CNHP offered to present the results of the study to the county commissioners, county planning departments, and interested local groups, and to assist in protection efforts.

Funding for the biological assessment was provided by a Great Outdoors Colorado planning grant to Garfield County. The county then contracted with Colorado Natural Heritage Program to perform the biological assessment. A related study of wetland and riparian resources funded by the Colorado Department of Natural Resources was conducted simultaneously by CNHP. Significant elements of diversity and Potential Conservation Areas resulting from that survey are included in this report.

The Colorado Natural Heritage Program began its research by updating its Biological and Conservation Data System with existing information. These data were obtained from previous studies by various individuals and organizations, including the Colorado Division of Wildlife (CDOW) database, regional and local herbaria, local experts, federal agencies, and others. Based on this updated data set, we identified about 200 targeted inventory areas (TIAs) for field research. Additional areas of interest were added to this list during the field surveys. At the request of the Garfield County Planning Department, field work for this project was concentrated in the relatively unstudied western half of the county.

Field surveys began in April 2000 and continued through September, 2000. Results of the survey confirm that Garfield County contains areas with high biological significance. Of particular importance are plants that are unique to the Green River shale of the Roan Plateau and Bookcliff areas. There are several extremely rare plants and animals that depend on this area for the survival of their species, including one plant, the Parachute penstemon, known only from five locations in the world, all in Garfield County. Altogether, thirty rare or imperiled plant species, thirty-three animal species, and seventy-five plant communities of concern have been documented for Garfield County. Of these, one plant species, seven animal species, and three plant communities were recorded for the first time in the CNHP database for the county. This is truly a unique county with an amazing richness of rare fauna and flora well worth preserving for future generations.

We have identified 73 Potential Conservation Areas (PCAs), containing from one to 51 occurrences of rare or imperiled plants, animals, and natural communities. Each PCA is ranked according to its biodiversity significance. Results of the survey are presented here, with descriptions and discussion of each Potential Conservation Area. The results will also be provided to the counties county in GIS format, and will be available to the public on the CNHP website: (<http://www.cnhp.colostate.edu>).

The delineation of Potential Conservation Area boundaries in this report does not confer any regulatory protection of recommended areas. They are intended to be used to support informed planning and decision making for the conservation of these significant areas. Additional information may be requested from Colorado Natural Heritage Program, 254 General Services Building, Colorado State University, Fort Collins, CO 80523.

## **I. The Natural Heritage Network and Biological Diversity**

Colorado is well known for its rich diversity of geography, wildlife, plants, and plant communities. However, like many other states, it is experiencing a loss of much of its flora and fauna. This decline in biological diversity is a global trend resulting from human population growth, land development, and subsequent habitat loss. Globally, the loss in species diversity has become so rapid and severe that it has been compared to the great natural catastrophes at the end of the Paleozoic and Mesozoic eras (Wilson 1988). The need to address this loss in biological diversity has been recognized for decades in the scientific community. However, many conservation efforts made in this country have not been based upon preserving biological diversity; instead, they have primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address the absence of a methodical, science-based approach to preserving biological diversity, Robert Jenkins, in association with The Nature Conservancy, developed the Natural Heritage Methodology in 1978.

Recognizing that rare and imperiled species are more likely to become extinct than common ones, the Natural Heritage Methodology ranks species according to their rarity or degree of imperilment. The ranking system is based upon the number of known locations of the species as well as its biology and known threats. By ranking the relative rarity or imperilment of a species, the quality of its populations, and the importance of associated conservation sites, the methodology can facilitate the prioritization of conservation efforts so the most rare and imperiled species may be preserved first. As the scientific community began to realize that plant communities are equally important as individual species, this methodology has also been applied to ranking and preserving rare plant communities as well as the best examples of common communities.

The Natural Heritage Methodology is used by Natural Heritage Programs throughout North, Central, and South America, forming an international database network. Natural Heritage Network data centers are located in each of the 50 U.S. states, five provinces of Canada, and 13 countries in South and Central America and the Caribbean. This network enables scientists to monitor the status of species from a state, national, and global perspective. It also enables conservationists and natural resource managers to make informed, objective decisions in prioritizing and focusing conservation efforts.

### **What is Biological Diversity?**

Protecting biological diversity has become an important management issue for many natural resource professionals. Biological diversity at its most basic level includes the full range of species on earth, from unicellular bacteria and protists through multicellular plants, animals, and fungi. At finer levels of organization, biological diversity includes the genetic variation within species, both among geographically separated populations and among individuals within a single population. On a wider scale, diversity includes variations in the biological communities in which species live, the ecosystems in which communities exist, and the interactions among these levels. All levels are necessary for the continued survival of species and plant communities, and all are important for the well being of humans. It stands to reason that biological diversity should be of concern to all people.

The biological diversity of an area can be described at four levels:

1. **Genetic Diversity** -- the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species is variable between populations within its geographic range. Loss of a population results in a loss of genetic diversity for that species and a reduction of total biological diversity for the region. Once lost, this unique genetic information cannot be reclaimed.
2. **Species Diversity** -- the total number and abundance of plant and animal species and subspecies in an area.
3. **Community Diversity** -- the variety of plant communities within an area that represent the range of species relationships and interdependence. These communities may be characteristic of or even endemic to an area. It is within communities that all life dwells.
4. **Landscape Diversity** -- the type, condition, pattern, and connectedness of plant communities. A landscape consisting of a mosaic of plant communities may contain one multifaceted ecosystem, such as a wetland ecosystem. A landscape also may contain several distinct ecosystems, such as a riparian corridor meandering through shortgrass prairie. Fragmentation of landscapes, loss of connections and migratory corridors, and loss of natural communities all result in a loss of biological diversity for a region. Humans and the results of their activities are integral parts of most landscapes.

The conservation of biological diversity must include all levels of diversity: genetic, species, community, and landscape. Each level is dependent on the other levels and inextricably linked. In addition, and all too often omitted, humans are also linked to all levels of this hierarchy. We at the Colorado Natural Heritage Program believe that a healthy natural environment and human environment go hand in hand, and that recognition of the most imperiled species or communities is an important step in comprehensive conservation planning.

## **Colorado's Natural Heritage Program**

To place this document in context, it is useful to understand the history and functions of the Colorado Natural Heritage Program (CNHP).

CNHP is the state's primary comprehensive biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. After operating in Colorado for fourteen years, the Program was relocated from the State Division of Parks and Outdoor Recreation to the University of Colorado Museum in 1992 and then in 1994 to the College of Natural Resources at Colorado State University.

CNHP's multi-disciplinary team of scientists and information managers gathers comprehensive information on rare, threatened, and endangered species and significant plant communities of Colorado. Life history, status, and locational data are incorporated into a continually updated data system. Sources include published and unpublished literature, museum

and herbaria labels, and field surveys conducted by knowledgeable naturalists, experts, agency personnel, and our own staff of botanists, ecologists, and zoologists. Information management staff carefully plot the locations on 1:24,000 scale U.S.G.S. maps and enter it into the Biological and Conservation Data System (BCD). The data are also stored in a geographic information system (Arc/INFO and ArcView GIS). The database can be accessed through a variety of attributes, including taxonomic group, global and state rarity rank, federal and state legal status, source, observation date, county, quadrangle map, watershed, management area, township, range, and section, precision, and conservation unit.

CNHP is part of an international network of conservation data centers that uses the Biological and Conservation Data System (BCD) developed by The Nature Conservancy. CNHP has effective relationships with several state and federal agencies, including the Colorado Natural Areas Program, Colorado Department of Natural Resources and the Colorado Division of Wildlife, the U.S. Environmental Protection Agency, the U.S. Bureau of Land Management and the U.S. Forest Service. Numerous local governments and private entities also work closely with CNHP. Use of the data by many different individuals and organizations, including Great Outdoors Colorado, encourages a proactive approach to development and conservation thereby reducing the potential for conflict. Information collected by the Natural Heritage Programs around the globe provides a means to protect species before the need for legal endangerment status arises.

Concentrating on site-specific data for each species or community enables the evaluation of the significance of each location with respect to the conservation of natural biological diversity in Colorado and the nation. By using species imperilment ranks and quality ratings for each location, priorities can be established for the protection of the most sensitive or imperiled sites. A continually updated locational database and priority-setting system such as that maintained by CNHP provides an effective, proactive land-planning tool.

## **The Natural Heritage Ranking System**

Each of the plant and animal species and plant communities tracked by CNHP is considered an **element of natural diversity**, or simply an **element**. Each element is assigned a rank that indicates its relative degree of imperilment on a five-point scale (e.g., 1 = extremely rare/imperiled, 5 = abundant/secure). The primary criterion for ranking elements is the number of occurrences, i.e., the number of known distinct localities or populations. This factor is weighted more heavily because an element found in one place is more imperiled than something found in twenty-one places. Also considered in the ranking is the size of the geographic range, the number of individuals, trends in population and distribution, identifiable threats, and the number of already protected occurrences.

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State or S-rank) and the element's imperilment over its entire range (its Global 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 5 current locations in Colorado, is ranked G5S1. *Naturita* milkvetch, which is known from 37 locations in the Four Corners Area, is ranked a G3S3, vulnerable both globally and in Colorado. Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1S1, critically imperiled both globally and in Colorado. CNHP actively collects, maps, and electronically processes specific



occurrence information for elements considered extremely imperiled to vulnerable (S1 - S3). Those with a ranking of S3S4 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", e.g., S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N", e.g., 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.

## **Legal Designations**

**Natural Heritage imperilment ranks are not legal designations and should not be interpreted as such.** 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. State designations apply to animals only; Colorado has no legal list of threatened and endangered plant species (Buckner and Bunin 1992).

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 the abbreviations used by CNHP.

Please note that the U.S. Fish and Wildlife Service has issued a Notice of Review in the February 28, 1996 Federal Register for plants and animal species that are "candidates" for listing as endangered or threatened under the Endangered Species Act. The revised candidate list replaces an old system that listed many more species under three categories: Category 1 (C1), Category 2 (C2), and Category 3 (including 3A, 3B, 3C). Beginning with the February 28, 1996 notice, the Service will recognize as candidates for listing most species that would have been included in the former Category 1. This includes those species for which the Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act.

Candidate species listed in the February 28, 1996 Federal Register are indicated with a "C". While obsolete legal status codes (Category 2 and 3) are no longer used, CNHP will continue to maintain them in its Biological and Conservation Data system for reference.

**Table 1. Definition of Colorado Natural Heritage Imperilment Ranks.**

Global imperilment ranks are based on the range-wide status of a species. State imperilment ranks are based on the status of a species in an individual state. State and Global ranks are denoted, respectively, with an "S" or a "G" followed by a character. <b>These ranks should not be interpreted as legal designations.</b>	
<b>G/S1</b>	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or very few remaining individuals), or because some factor of its biology makes it especially vulnerable to extinction.
<b>G/S2</b>	Imperiled globally/state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
<b>G/S3</b>	Vulnerable throughout its range or found locally in a restricted range (21 to 100 occurrences).
<b>G/S4</b>	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
<b>G/S5</b>	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
<b>GX</b>	Presumed extinct.
<b>G#?</b>	Indicates uncertainty about an assigned global rank.
<b>G/SU</b>	Unable to assign rank due to lack of available information.
<b>GQ</b>	Indicates uncertainty about taxonomic status.
<b>G/SH</b>	Historically known, but not verified for an extended period.
<b>G#T#</b>	Trinomial rank (T) is used for subspecies or varieties. These species or subspecies are ranked on the same criteria as G1-G5.
<b>S#B</b>	Refers to the breeding season imperilment of elements that are not permanent residents.
<b>S#N</b>	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
<b>SZ</b>	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
<b>SA</b>	Accidental in the state.
<b>SR</b>	Reported to occur in the state, but unverified.
<b>S?</b>	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking.
Notes: Where two numbers appear in a state or global rank (e.g., S2S3), the actual rank of the element falls between the two numbers.	

## Element Occurrence Ranking

Actual locations of elements, whether they be single organisms, populations, or plant communities, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology. In order to prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to the estimated viability or probability of persistence (whenever sufficient information is available). This ranking system is designed to indicate which occurrences are the healthiest and ecologically the most viable, thus focusing conservation efforts where they will be most successful. The EO-Rank is based on 3 factors:

**Size** – a quantitative measure of the area and/or abundance of an occurrence such as area of occupancy, population abundance, population density, or population fluctuation.

**Condition** – an integrated measure of the quality of biotic and abiotic factors, structures, and processes within the occurrence, and the degree to which they affect the continued existence of the occurrence. Components may include reproduction and health, development/maturity for communities, ecological processes, species composition and structure, and abiotic physical or chemical factors.

**Table 2. Federal and State Agency Special Designations .**

<b>Federal Status:</b>	
1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)	
<b>LE</b>	Endangered; species or subspecies formally listed as endangered.
<b>E(S/A)</b>	Endangered due to similarity of appearance with listed species.
<b>LT</b>	Threatened; species or subspecies formally listed as threatened.
<b>P</b>	Potential Endangered or Threatened; species or subspecies formally listed as potentially endangered or threatened.
<b>PD</b>	Potential for delisting
<b>C</b>	Candidate: species or subspecies for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.
2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as “S”)	
<b>FS</b>	Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by: <ul style="list-style-type: none"> <li>a. Significant current or predicted downward trends in population numbers or density.</li> <li>b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.</li> </ul>
3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as “S”)	
<b>BLM</b>	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. This list does not include species that are listed endangered (LE) or threatened (LT).
<b>State Status:</b>	
1. Colorado Division of Wildlife	
	<b>CO-E</b> Endangered
	<b>CO-T</b> Threatened
	<b>CO-SC</b> Special Concern

**Landscape Context** – an integrated measure of the quality of biotic and abiotic factors, and processes surrounding the occurrence, and the degree to which they affect the continued existence of the occurrence. Components may include landscape structure and extent, genetic connectivity, and condition of the surrounding landscape.

Each of these factors is rated on a scale of A through D, with A representing an excellent grade and D representing a poor grade. These grades are then averaged to determine an appropriate EO-Rank for the occurrence. If there is insufficient information available to rank an element occurrence, an EO-Rank is not assigned. Possible EO-Ranks and their appropriate definitions are as follows:

- A** Excellent estimated viability.
- B** Good estimated viability.
- C** Fair estimated viability.
- D** Poor estimated viability.
- E** Viability has not been assessed.
- H** Historically known, but not verified for an extended period of time
- X** Extirpated

## Potential Conservation Areas

In order to successfully protect populations or occurrences, it is necessary to delineate conservation areas. These conservation areas focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence of biological diversity significance. Conservation areas may include a single occurrence of a rare element or a suite of rare element occurrences or significant features. Not all element occurrences are included in Potential Conservation Areas (PCAs). Sites are ordinarily drawn for A to C ranked G1 to G3 and S1 or S2 elements only. Other lower ranked element occurrences may fall geographically within the site boundaries, and are thus included, but would not warrant a PCA on their own. In addition, sites may be drawn for lower ranked species that are of local conservation interest, e.g. the Colorado River cutthroat trout or Black Swift.

The goal of the process is to identify a land area that can provide the habitat and ecological processes upon which a particular element occurrence or suite of element occurrences depends for its continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses.

In developing Potential Conservation Area boundaries, CNHP staff consider a number of factors that include, but are not limited to:

- the extent of current and potential habitat for the elements present, considering the ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the site and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater, e.g., by protecting recharge zones;
- land intended to buffer the site against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

**The proposed boundary does not necessarily recommend the exclusion of all activity.** It is hypothesized that some activities will prove degrading to the element or the process on which the element depends, while others will not. Specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based and other significant elements that fall within the site.

The boundaries presented here are for planning purposes. They delineate ecologically sensitive areas where land-use practices should be carefully planned and managed to ensure that they are compatible with protection goals for natural heritage resources and sensitive species. Please note that these boundaries are based primarily on our understanding of the ecological

systems. A thorough analysis of the human context and potential stresses was not conducted. All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape that requires thoughtful land-use planning at all levels.

### **Off-Site Considerations**

It is often the case that all relevant ecological processes cannot be contained within a Potential Conservation Area of reasonable size. For instance, while a PCA for Colorado River cutthroat trout may be drawn to include only the riparian zone of a river or creek, it should be remembered that activities in the entire watershed can affect water quality, which will in turn affect the trout population. The boundaries illustrated in this report signify the immediate, and therefore most important, area in need of protection. Continued landscape level conservation efforts are needed. This will involve countywide efforts as well as coordination and cooperation with private landowners, neighboring land planners, and state and federal agencies.

## **Ranking of Potential Conservation Areas**

### **Biological diversity Rank**

One of the strongest ways that the CNHP uses element and element occurrence ranks is to assess the overall biological diversity significance of a site, which may include one or many element occurrences. If an element occurrence is unranked due to a lack of information, the element occurrence rank is considered a C rank. Similarly, if an element is a GU or G? it is treated as a G4. Based on these ranks, each site is assigned a **biological diversity rank (B rank)**:

**B1**    Outstanding Significance: the only site known for an element or an excellent occurrence of a G1 species.

**B2**    Very High Significance: one of the best examples of a community type, good occurrence of a G1 species, or excellent occurrence of a G2 or G3 species.

**B3**    High Significance: excellent example of any community type, good occurrence of a G3 species, or a large concentration of good occurrences of state rare species.

**B4**    Moderate or Regional Significance: good example of a community type, excellent or good occurrence of state-rare species.

**B5**    General or Statewide Biological diversity Significance: good or marginal occurrence of a community type, S1, or S2 species.

## Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the time frame in which conservation protection should occur in order to prevent the loss of the element. In most cases, this rank refers to the need for a major change of protective status (e.g., agency special area designations or ownership). The urgency for protection rating reflects the need to take legal, political, or other administrative measures to alleviate potential threats that are related to land ownership or designation. The following codes are used to indicate the urgency to protect the area:

- P1** May be immediately threatened by severely destructive forces, within 1 year of rank date; protect now or never!
- P2** Threat expected within 5 years.
- P3** Definable threat but not in the next 5 years.
- P4** No threat known for foreseeable future.
- P5** Land protection complete or adequate reasons exists not to protect the site; do not act on this site.

A protection action involves increasing the current level of legal protection accorded one or more tracts of a potential conservation area. Protection strategies on private lands may involve outright purchase, purchase of development rights, or creation of conservation easements. On public lands, they may include special designations such as Wilderness, Research Natural Areas, or Areas of Critical Environmental Concern (ACEC). They may also include activities such as educational or public relations campaigns or collaborative planning efforts with public or private entities to minimize adverse impacts to element occurrences at a site. Protection in this sense does not include management actions. Threats that may require a protection action are as follows:

- 1) Anthropogenic forces that threaten the existence of one or more element occurrences at a site; e.g., development that would destroy, degrade or seriously compromise the long-term viability of an element occurrence and timber, range, recreational, or hydrologic management that is incompatible with an element occurrence's existence;
- 2) The inability to undertake a management action in the absence of a protection action; e.g., obtaining a management agreement;
- 3) In extraordinary circumstances, a prospective change in ownership that will make future protection actions more difficult.

## Management Urgency Ranks

Management urgency ranks (M-ranks) indicate the time frame in which a change in management of the element or site must occur in order to ensure the element's future existence. Using best scientific estimates, this rank refers to the need for management in contrast to protection (e.g., increased fire frequency, decreased grazing, weed control, etc.). The urgency for management rating focuses on land use management or land stewardship action required to maintain element occurrences at the potential conservation area.

A management action may include biological management (prescribed burning, removal of exotics, mowing, etc.) or people and site management (building barriers, rerouting trails, patrolling for collectors, hunters, or trespassers, etc.). It may also include conducting further research or monitoring. Management action does not include legal, political, or administrative

measures taken to protect a potential conservation area. The following codes are used to indicate the action needed at the area:

- M1** Management action may be required immediately or element occurrences could be lost or irretrievably degraded within one year.
- M2** New management action may be needed within 5 years to prevent the loss of element occurrences.
- M3** New management action may be needed within 5 years to maintain current quality of element occurrences.
- M4** Although the element is not currently threatened, management may be needed in the future to maintain the current quality of element occurrences.
- M5** No serious management needs known or anticipated at the site.

## **II. Methods**

The methods for assessing and prioritizing conservation needs over a large area are necessarily diverse. This study follows a general method that the Colorado Natural Heritage Program has and continues to develop specifically for this purpose. The Survey of Critical Biological Resources of Garfield County was conducted in several steps summarized below.

### **Collect available information**

CNHP databases were updated with information regarding the known locations of species and significant plant communities Garfield County. A variety of information sources were consulted for this information. The Colorado State University museums and herbarium were searched, as were plant and animal collections at the University of Colorado, Rocky Mountain Herbarium, and local private collections. Both general and specific literature sources were incorporated into CNHP databases, as either locational information or as biological data pertaining to a species in general. Such information covers basic species and community biology including range, habitat, phenology (timing), food sources, and substrates. This information was entered into CNHP databases, and much of it is available to the public through the internet at [www.Natureserve.org](http://www.Natureserve.org).

Sources of information for Garfield County included previous studies by CNHP (Spackman 1997, 1998; Spackman and Fayette 1998; Spackman *et al.* 1997; Rondeau 1996; Kittel and Decoursey 1992; Kittel and Randolph 1993; Kittel and Spackman 1994; Lyon 1995); surveys and status reports by and for federal agencies (Artz *et al.* 1997, Atkins 1984, Bunin 1992, Dorn 1987); Colorado Division of Wildlife databases and literature; surveys conducted by private consultants for oil and gas companies (Harner 1983, 1984; Ellis 1982; ERT 1981, Keammerer 1981); and two masters theses (Vanderhorst 1993; Jankowsky 1994). Much of the initial work of classifying plant communities was done by W. L. Baker (1984).

## **Identify rare or imperiled species and significant plant communities with potential to occur in Garfield County.**

The information collected in the previous step was used to refine the potential element list and to identify our search areas. In general, species and plant communities that have been recorded from Garfield County, or from adjacent counties, are included in this list. Species or plant communities that prefer habitats that are not included in this study area were removed from the list.

The amount of effort given to the inventory for each of these elements was prioritized according to the element's rank. Globally rare (G1 - G3) elements were given highest priority, state rare elements were secondary.

### **Identify targeted inventory areas**

Survey sites were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities. At the request of the Garfield County Planning Department, the western half of the county was given top priority. Known locations were targeted, and additional potential areas were chosen using a variety of information sources, such as aerial photography. Precisely known element locations were always included so that they could be verified and updated. Many locations were not precisely known due to ambiguities in the original data. In such cases, survey sites for that element were chosen in likely areas in the general vicinity. Areas with potentially high natural values were chosen using aerial photographs, geology maps, vegetation surveys, personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists. In addition, we took care that all major ecosystems, vegetation types and elevational zones in the area were included, as well as areas that are of particular local concern or interest for open space. Using the biological information stored in the CNHP databases, these information sources were analyzed for sites that have the highest potential for supporting specific elements. General habitat types can be discerned from the aerial photographs, and those chosen for survey sites were those that appeared to be in the most natural condition. In general, this means those sites that are the largest, least fragmented, and relatively free of visible disturbances such as roads, trails, fences, quarries, etc.

This process was used to delineate over 200 survey areas that were believed to have relatively high probability of harboring natural heritage resources. These areas vary in size from less than 10 to several thousand acres and include all major habitat types in the study area.

Roadside surveys were useful in further resolving the natural condition of these areas. The condition of grasslands is especially difficult to discern from aerial photographs, and a quick survey from the road can reveal such features as weed infestation or overgrazing.

Because of the overwhelming number of potential sites and limited resources, surveys for all elements were prioritized by the degree of imperilment. For example, all species with Natural Heritage ranks of G1-G3 were the primary target of our inventory efforts. Although species with lower Natural Heritage ranks were not the main focus of inventory efforts, many of these species occupy similar habitats as the targeted species, and were searched for and documented as they were encountered.



### **Contact Landowner**

Obtaining permission to conduct surveys on private property was essential to this project. Once survey sites were chosen, land ownership of these areas was determined using records at the Garfield County assessor's office. Landowners were then either contacted by phone or in person. If landowners could not be contacted, or if permission to access the property was denied, this was recorded and the site was not visited. **Under no circumstances were properties surveyed without landowner permission.** Private lands that were not visited may be included in Potential Conservation Areas, however, if they are adjacent to and have similar habitats to public lands that were surveyed.

### **Conduct Field Surveys**

Field surveys were conducted from April through September 2000. Survey sites where access could be attained were visited at the appropriate time as dictated by the phenology of the individual elements. It is essential that surveys take place during a time when the targeted elements are detectable. For instance, breeding birds cannot be surveyed outside of the breeding season and plants are often not identifiable without flowers or fruit which are only present during certain times of the season. Many of the plants in the western parts of Garfield County have extremely short flowering seasons and all but disappear by mid-summer. May and June are the prime survey times for most of these species.

The methods used in the surveys necessarily vary according to the elements that were being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion that attempted to cover the area as thoroughly as possible in the given time. Some types of organisms require special techniques in order to capture and document their presence. These are summarized below:

**Amphibians:** visual or with aquatic nets

**Mammals:** Sherman live traps, pitfall traps

**Birds:** visual or by song/call, evidence of breeding sought

**Insects:** aerial net, pit fall traps, moth lighting

**Plant communities:** visual, collect qualitative or quantitative composition data

**Wetland plant communities:** visual, collect qualitative or quantitative composition, soil, and hydrological function and value data

**Fishes:** electroshocking, seining, barbless fly-fishing, observation

When necessary and permitted, voucher specimens were collected and deposited in local university museums and herbaria.

When a rare species or significant natural community was discovered, its precise location and known extent was recorded on 1:24,000 scale topographic maps. Other data recorded at each occurrence included numbers observed, breeding status, habitat description, disturbance features, observable threats, and potential protection and management needs. The overall significance of each occurrence, relative to others of the same element, was estimated by rating the viability of the population, based on size, condition and landscape context. These factors are combined into an element occurrence rank, useful in refining conservation priorities. See the section on Natural Heritage Methodology for more about element occurrence ranking.

It should be noted that observations made in any one year may not represent the range of conditions over the long term. The spring and summer of 2000 were unusually dry, and some plants such as the DeBeque phacelia apparently never germinated, while others were dried out and difficult to locate by early summer. Continued observations over several years may prove to modify some of our assessments.

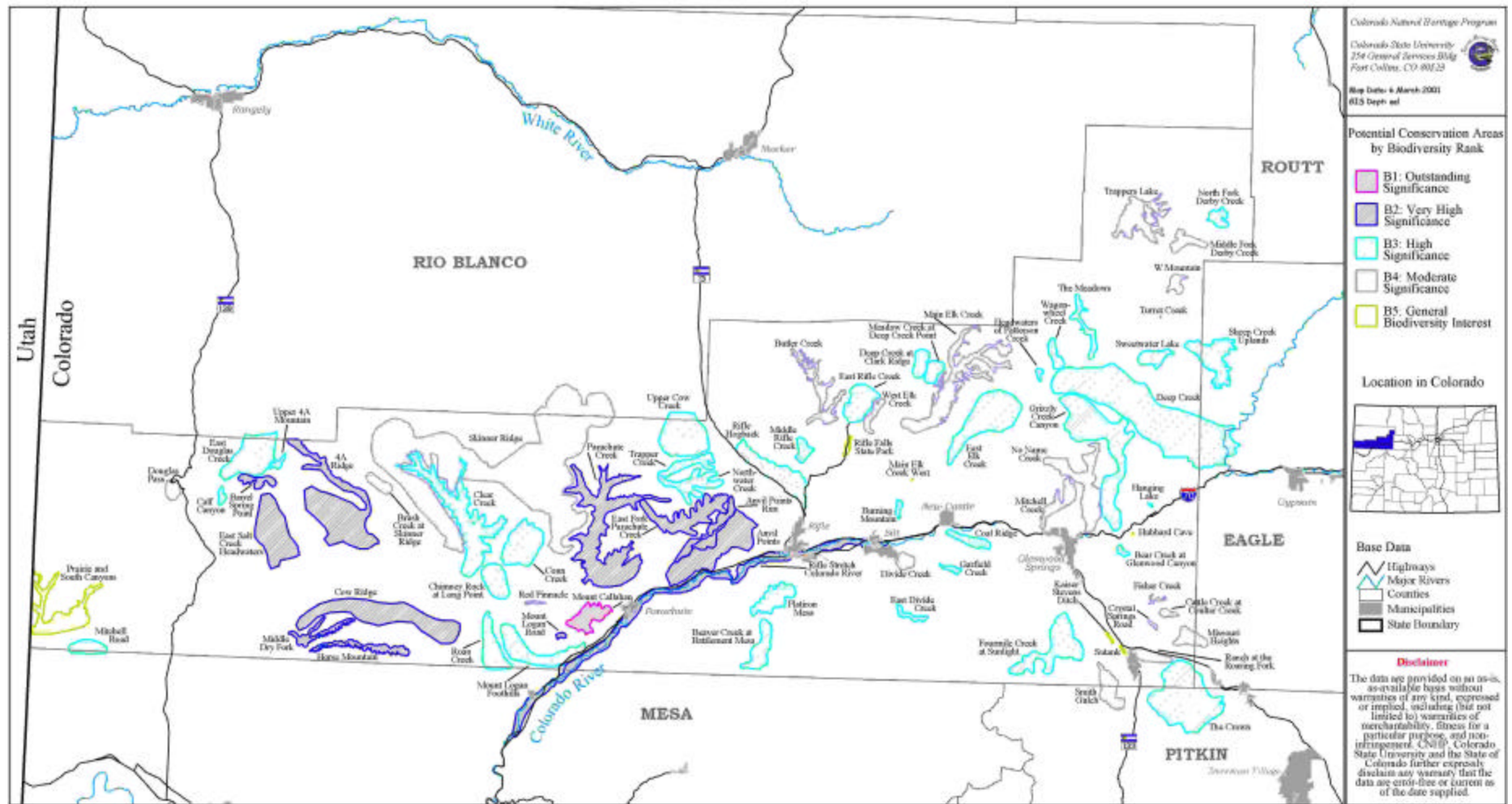
#### **Delineate Potential Conservation Site Boundaries**

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, potential conservation planning boundaries were delineated. Such a boundary is an estimation of the minimum area needed to assure persistence of the element. Primarily, in order to insure the preservation of an element, the ecological processes that support that occurrence must be preserved. The preliminary conservation planning boundary is meant to include features on the surrounding landscape that provide these functions. Data collected in the field are essential to delineating such a boundary, but other sources of information such as aerial photography are also used. These boundaries are considered preliminary and additional information about the site or the element may call for alterations of the boundaries. Given the extremely large area covered in a short period of time, there are doubtless many other significant sites that were not surveyed. There is a continuing need for additional research, both to locate new areas and to update known occurrences.

### **III. Results**

As a result of this survey, 96 new records were entered in the CNHP database, and many others updated. This brings the total element occurrences in the CNHP data system for the county to 677. One plant, seven animals and 3 natural communities were documented in Garfield County for the first time. Based on these element occurrences, we have identified 73 Potential Conservation Areas (Figure 1), which include 485 occurrences of rare or imperiled plants, animals, and natural communities. Each PCA has from one to 51 element occurrences within its boundaries. Results of the survey are presented here, with descriptions and discussion of each Potential Conservation Area. PCAs are listed below in order of their overall priority (biological diversity rank), and described beginning on page 87, where they are arranged alphabetically by name regardless of rank.

# CNHP Potential Conservation Areas in Garfield County



## **IV. Potential Conservation Areas by biological diversity rank**

### **B1: Outstanding biological diversity significance**

Mount Callahan

### **B2: Very high biological diversity significance**

4A Ridge  
Anvil Points  
Anvil Points Rim  
Barrel Spring Point  
Cow Ridge  
East Fork Parachute Creek  
East Salt Creek Headwaters  
Horse Mountain  
Middle Dry Fork  
Mount Logan Road  
Parachute Creek  
Rifle Stretch Colorado River

### **B3: High biological diversity significance**

Bear Creek at Glenwood Canyon  
Beaver Creek at Battlement Mesa  
Burning Mountain  
Calf Canyon  
Chimney Rock at Long Point  
Clear Creek  
Coal Ridge  
Conn Creek  
Deep Creek  
Deep Creek at Clark Ridge  
East Divide Creek  
East Douglas Creek  
East Elk Creek  
East Rifle Creek  
Flatiron Mesa  
Fourmile Creek at Sunlight  
Garfield Creek  
Grizzly Creek Canyon  
Hanging Lake  
Headwaters of Patterson Creek  
Meadow Creek at Deep Creek Point  
Middle Rifle Creek  
Mitchell Road  
Mount Logan Foothills  
North Fork Derby Creek

Northwater Creek  
Rifle Hogback  
Roan Creek  
Sheep Creek Uplands  
Sweetwater Lake  
The Crown  
The Meadows  
Trapper Creek  
Upper 4A Mountain  
Upper Cow Creek  
Wagonwheel Creek

**B4: Moderate biological diversity significance**

Brush Creek at Skinner Ridge  
Butler Creek  
Cattle Creek at Coulter Creek  
Crystal Springs Road  
Divide Creek  
Douglas Pass  
Main Elk Creek  
Middle Fork Derby Creek  
Missouri Heights  
Mitchell Creek  
No Name Creek  
Ranch at the Roaring Fork  
Red Pinnacle  
Skinner Ridge  
Smith Gulch  
Turret Creek  
W Mountain  
West Elk Creek  
Trappers Lake

**B5: General biological diversity significance**

Hubbard Cave  
Kaiser Stevens Ditch  
Main Elk Creek West  
Prairie and South Canyons  
Rifle Falls State Park  
Sutank

## **V. The Natural Heritage of Garfield County**

### **Location and Physical Characteristics**

Garfield County is located in northwestern Colorado (Figure 2), extending over one hundred miles from the Utah border eastward. It encompasses 2,948 square miles. It is bordered by Rio Blanco County on the north, Mesa and Pitkin counties on the south, and Routt and Eagle counties on the east.

Garfield County lies primarily within two geologically distinct regions: the plateau country in the western half, and the Rocky Mountains in the eastern half. The boundary between the two regions is defined by the western edge of the Grand Hogback, a large monocline

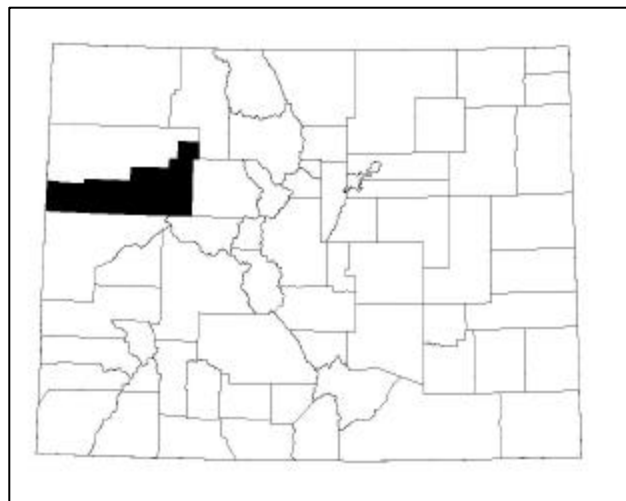


Figure 2. Location of Garfield County in Colorado

that runs north to south through the county. The Rocky Mountain section in Garfield County is within the White River Plateau, one of three areas in the state that are capped by volcanic rock. (The other two are the West Elk Mountains and the San Juan Mountains.) The White River Plateau includes the Flat Tops, the Glenwood Canyon area and the Roaring Fork Valley. Major features within the western plateau area are the Roan Plateau and the Book Cliffs, along with a small part of the Grand Valley south of the Book Cliffs in the southwest.

Bailey (1984) defines the ecoregions found in Garfield County as the Utah High Plateaus in the west, and the Rocky Mountains in the east. The small area south of the Book Cliffs falls within the Colorado Plateau ecoregion (Figure 3).

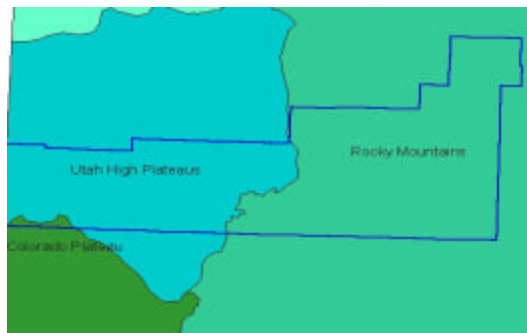


Figure 3. Ecoregions of Garfield County, from The Western Regional Office of the Nature Conservation Service, 2000

The entire county is in the drainage of the Colorado River. While most of the area drains south directly into the Colorado River, a small area in the northern part of the county drains into the White River, which is a tributary of the Colorado. The Colorado River enters the county at the eastern end of Glenwood Canyon, about 12 miles east of Glenwood Springs, and flows southwest for about 62 miles before leaving the county between Parachute and DeBeque. Major tributaries in Garfield County are Parachute Creek, Roan Creek, Rifle Creek, Deep Creek, Elk Creek, Grizzly Creek, and the Roaring Fork River.

Elevations in the county range from 4,960 ft. where the Colorado River crosses the Garfield-Mesa County line, to 12,241 feet at Sheep Mountain in the Flat Tops. The Colorado River Valley averages between 5,000 and 6,000 feet, the Book Cliffs around 7,000 feet, the Roan Plateau around 8,000 feet, and the Flat Tops between 10,000 and 12,000 feet.

Climate of the county varies greatly with elevation. The driest areas are in the southwest, the southeast, and in the central area around Rifle to New Castle, with between 10 and 15 inches annual precipitation (Figure 4). Mountainous areas such as the Flat Tops and Battlement Mesa may receive as much as 45 to 50 inches annually. Glenwood Springs records average annual high temperatures of 62.8 degrees F. and low temperatures of 31.2 degrees F. Rifle is only slightly warmer, with average highs of 64.2 degrees and lows of 31.1 degrees (Western Regional Climate Center).

Major population centers in the county are located along the Colorado River and the Roaring Fork River: Glenwood Springs, New Castle, Silt, Rifle, Parachute, and Carbondale. As of the 1990 census, the population of the county was 29,974, centered mainly in the Glenwood Springs, Carbondale, and Rifle areas. Outside of the Colorado and Roaring Fork valleys, the county is very sparsely populated (Figure 5).

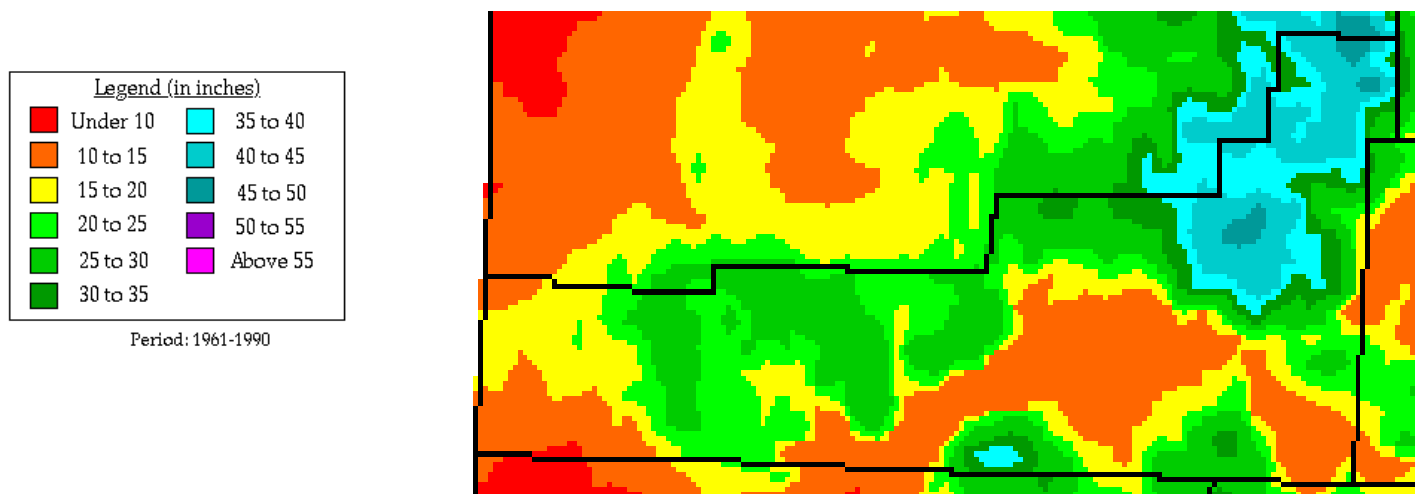
Ownership is about equally divided between private, BLM and US Forest Service lands (Figure 6). Private lands are located primarily along the river corridors and on the Roan Plateau, where much of the land is either owned or leased by oil and gas companies. Although private lands often comprise only a narrow strip along streams and roads, they effectively block access to vast amounts of public lands. BLM land is found mainly in the western part of the county, and managed by the Grand Junction and Glenwood Springs Resource Areas. The White River National Forest occupies the northeastern part of the county, and includes the Flat Tops Wilderness. Another large parcel of land on the Roan Plateau represents the Naval Oil Shale

Reserves, which were transferred from the Department of Defense to BLM in 1997. The state of Colorado holds land south of New Castle, in the Garfield State Wildlife Area. Of the 73 Potential Conservation Areas identified in this survey, 14 occur (all or in part) on U. S. Forest Service land; 36 on BLM land; and 37 on private land.

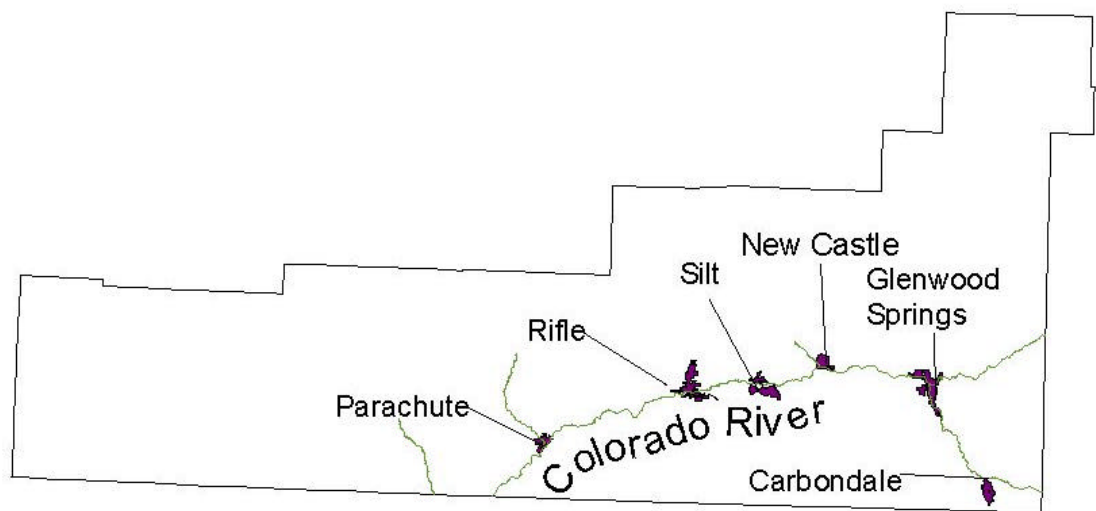
The geologic features of the county span the entire spectrum of ages, from quaternary alluvial deposits to Precambrian rocks exposed in Glenwood Canyon (Figure 7). The Plateau area in the western part of the county consists of relatively horizontal layers of sandstone that were deposited during the Cretaceous Period when the area was covered by a great inland sea, and during the Tertiary Period, when much of the area was under a large inland lake known as Lake Uinta. Beginning in the southwest, with the oldest layers, Cretaceous Mancos shale is exposed in the Grand Valley south of the Book Cliffs. This formation is more extensive in Mesa County. To the north, the Book Cliffs are composed of Mesaverde Formation sandstone and shale. Mesa tops in this area are capped by the Cretaceous Hunter Canyon Formation. Farther east, the Roan Plateau is composed of soft, erodable shales of the Tertiary Green River Formation, capped by the more resistant Uinta Formation. The Roan Cliffs, visible from Interstate 70 between Rifle and DeBeque, expose thousands of feet of pink and gray Green River Formation, with the Wasatch Formation at their base. The Green River Formation holds the richest oil-shale beds in the world, with over 1.8 trillion barrels (Chronic 1980). One layer of this formation, the Mahogany Ledge, is said to average 27 gallons of oil per ton. (Chronic 1980). Although it is not presently economical to mine the oil shale, there are numerous operating natural gas wells in the area. The Green River Formation is exposed again south of the Colorado River on Battlement Mesa. South and southeast of the Roan Plateau, above the Colorado River the soft sandstones and shales of the Tertiary Wasatch and Ohio Formations form a transitional zone between the alluvial deposits of the Colorado River Valley and the Green River Formation. This formation represents the sediments on the floodplains around Lake Uinta.

The White River Plateau is a broad anticlinal dome, composed of a complex mix of folded and faulted Paleozoic layers (Cambrian, Ordovician, Silurian, Devonian, Mississippian, Permian and Pennsylvanian) that were uplifted during the Tertiary Period, and in some areas are capped by volcanic basalt flows. Deep canyons, carved through the rock during the Pleistocene, expose successively older layers, down to Precambrian granite in Glenwood Canyon and other tributary canyons. Interesting features include the karst area of limestone deposits that are home to several caves, and the deep red Maroon Formation exposed in the Roaring Fork Valley. The Grand Hogback, which forms the western boundary of the White River Plateau, is composed of Mesaverde sandstone that contains rich coal resources. The town of New Castle, located next to the Grand Hogback, is named for the coal mining area in Wales. To the west, the town of Silt is named for the silty shale of the younger Wasatch formation. The Flat Tops are volcanic mountains formed by Cenozoic basalt flows. Numerous small lakes are evidence of glaciation in the Pleistocene.





**Figure 4 Precipitation in Garfield County. From Western Regional Climate Center (2001) .**



**Figure 5. Municipalities and major rivers of Garfield County**

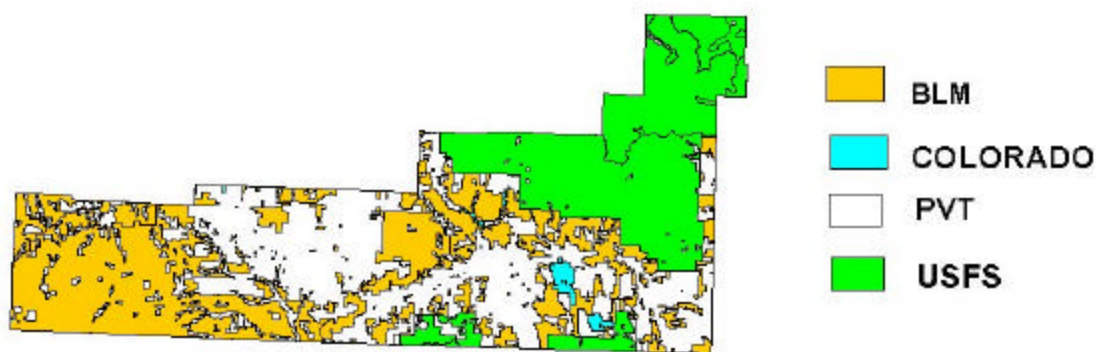


Figure 6. Land ownership of Garfield County

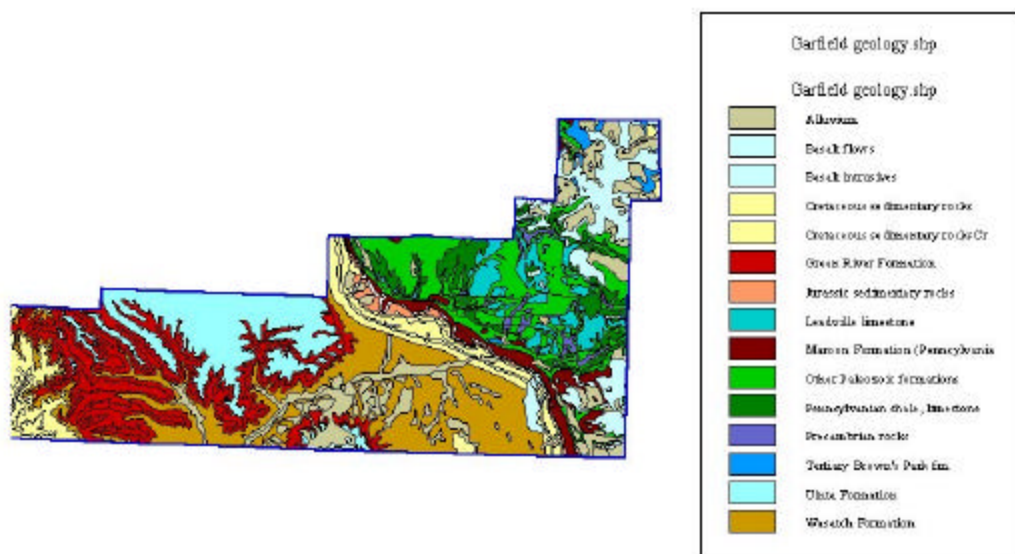


Figure 7 Geology of Garfield County (simplified from USGS [Tweto] 1985.)

## Vegetation

Vegetation in Garfield County is closely related to geology and elevation. Ten broad upland vegetation types can be recognized. In order of ascending elevation, they are: salt desert shrublands; shale barrens; sagebrush shrublands; piñon-juniper woodlands; mixed mountain shrublands; mountain and foothill grasslands; aspen forests; Douglas fir forests; spruce-fir forests; alpine, including mountain meadows and tundra. Riparian vegetation varies with elevation, and is found in conjunction with all of the upland vegetation types above. In addition to the natural vegetation types, there is a small amount of agricultural land, both dryland and irrigated. This classification is simplified; in reality there is much overlap between the types described below, and mosaics consisting of patches of several different types often occur within a small area.

**Agricultural land** (Figure 8) is concentrated along the major river valleys, The Colorado, Roaring Fork, and to a lesser extent, Parachute, Roan and Divide Creeks, where crops are irrigated. Dry land agriculture is practiced on mesa tops such as Hunter Mesa and Hubbard Mesa. Major crops are grass hay and alfalfa.



Figure 8. Distribution of agricultural land in Garfield County

**Salt desert shrublands** (Figure 9) are found primarily at low elevations (5,000 to 6,000 ft), in the Grand Valley south of the Book Cliffs, in the southwestern part of Garfield County. Soils here are derived from Mancos Shale, and support a mixed shrub and grass community dominated



Figure 9 Distribution of salt desert shrublands in Garfield County

by members of the Goosefoot Family (*Chenopodiaceae*). Common shrubs are shadscale (*Atriplex confertifolia*), Gardner saltbush (*A. gardneri*), mat saltbush (*A. corrugata*), and greasewood (*Sarcobatus vermiculatus*). Common grasses in the community are galleta (*Hilaria jamesii*), needle and thread (*Stipa comata*), Indian rice grass (*Oryzopsis hymenoides*), and Salina wildrye (*Leymus salinus*) and inland saltgrass (*Distichlis spicata*). A frequent invasive exotic species is cheatgrass (*Bromus tectorum*). The harsh environment produced by the

highly erodable Mancos shale limits the species that are able to survive in this habitat, and has produced several rare plants, such as Grand buckwheat (*Eriogonum contortum*). Salt desert shrublands also occur in the Roan Creek drainage on Wasatch and Green River formations, although they tend to be in small patches that are not shown on the map. In addition to the species mentioned above, bluebunch wheatgrass (*Pseudoroegneria spicata*) is often associated with the shrubs here. The rare Uinta Basin hookless cactus (*Sclerocactus glaucus*) is found in this area, as well as in the piñon-juniper woodlands in the foothills around Roan Creek. Plant communities within this type that are tracked by CNHP include *Atriplex confertifolia*/*Leymus*

*salinus*, *Atriplex confertifolia*/*Oryzopsis hymenoides*, *Atriplex confertifolia*/*Pseudoroegneria spicata*, and *Distichlis spicata* salt meadows. This vegetation type is more extensive in Mesa County and to the west in Utah.

**Piñon-juniper woodlands** (Figure 10) are the most extensive vegetation type in Garfield County, as well as much of southwestern Colorado. They are found primarily in the foothills areas between the valley bottoms and the mesa tops.

The dominant species are Colorado piñon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). In cooler and more moist areas, the Utah juniper may be replaced by Rocky Mountain juniper (*Juniperus scopulorum*). The understory of piñon-juniper woodlands varies widely depending on the age and structure of the tree canopy. Open woodlands might include species such as sagebrush, oak, serviceberry, snowberry, and mountain mahogany mixed with grasses and forbs. Often there is considerable bare ground. Rare plants found in the piñon-juniper communities of Garfield County include DeBeque milkvetch (*Astragalus debequaeus*), DeBeque phacelia (*Phacelia scopulina* var. *submutica*), Wetherill milkvetch (*Astragalus wetherillii*), and Naturita milkvetch (*Astragalus naturitensis*).



Figure 10. Distribution of piñon -juniper woodlands in Garfield County

**Shale barrens** (Figure 11) are an outstanding feature of Garfield County. They occur on the Roan Plateau, primarily on south facing slopes of the Green River shale. These areas are shown

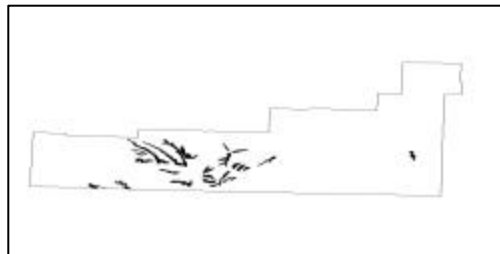


Figure 11. Distribution of shale barrens in Garfield County

on vegetation maps as exposed rock, and although they appear from a distance to be devoid of vegetation, they support a very specific array of plants that are adapted to this habitat. These species are able to survive in the constantly moving scree, often by having elongated, flexible root systems. They are also able to survive the severe drought that results from the inability of the shale to hold moisture. Several rare and endemic plant species are found in this community, including the

Parachute penstemon (*Penstemon debilis*), Piceance bladderpod (*Lesquerella parviflora*), Arapien stickleaf (*Nuttallia argillosa*), sun-loving meadowrue (*Thalictrum heliophilum*), and Utah fescue (*Argillochloa dasyclada*). These plants are described beginning on page 36.

**Sagebrush shrublands** (Figure 12) are widespread throughout Garfield County, both at elevations below and above piñon-juniper woodlands. They are often found on mesa tops where sagebrush forms nearly pure stands. In addition to the areas where sagebrush is dominant (the area shown in Figure 12), sagebrush is



Figure 12. Distribution of sagebrush shrubland in Garfield County

often an important constituent of piñon-juniper woodlands and salt desert shrublands. Several species of sagebrush occur here, including Big sagebrush (*Artemisia tridentata* ssp. *tridentata*), the largest species, which is usually found in deep alluvial soils along bottom lands and on stream terraces, often associated with greasewood (*Sarcobatus vermiculatus*) fourwing saltbush (*Atriplex canescens*), and rabbitbrush (*Chrysothamnus nauseosus*). Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) are found at higher elevations in open upland areas, commonly mixed with other shrubs such as snowberry (*Symphoricarpos oreophilus*), Utah serviceberry (*Amelanchier utahensis*), and various grasses and forbs. Common understory species at lower elevations include Indian rice grass (*Oryzopsis hymenoides*) and needle and thread (*Stipa comata*). Common associated species at the upper elevations include Kentucky bluegrass (*Poa pratensis*), Idaho fescue (*Festuca idahoensis*) and Thurber fescue (*Festuca thurberi*). Rare plants that are associated with sagebrush include Harrington beardtongue (*Penstemon harringtonii*). Less common in Garfield County is black sagebrush, a low shrub usually found in drier piñon-juniper communities.

**Mountain shrublands** (Figure 13) are found throughout the county, at elevations between the piñon-juniper and forested areas. Most mountain shrublands are dominated by Gambel's oak,



Figure 12. Distribution of mountain shrublands in Garfield County

with associated shrubs that include mountain mahogany, serviceberry, chokecherry and snowberry. Typical associated species in drier sites include mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), arrowleaf balsamroot (*Balsamorhiza sagittata*), rabbitbrush (*Chrysothamnus* sp.), muttongrass (*Poa fendleriana*), junegrass (*Koeleria macrantha*), prickly pear cactus (*Opuntia polyacantha*), and longleaf phlox (*Phlox longifolia*). More mesic shrublands have understories with elk sedge (*Carex geyeri*), mountain lover (*Paxistima myrsinites*), and Oregon grape (*Mahonia repens*). Gambel

oak and other associated shrubs often occur as understory or in patches in the piñon-juniper zone below and the forested zones above. None of the rare plants of the county were found in this community.

**Mountain and foothill grasslands** (Figure 14) are scattered throughout the county, but often occur in patches within other vegetation types that are too small to be mapped at this scale.

Some of the most extensive grasslands occur south of the Colorado River between Rifle and Silt, at around 6,000 feet elevation. The deep rich soils that support the grasslands also make this an important agricultural area. Another large grass dominated area occurs on Coulter Mesa, north of Rifle. Native grass species that are sometimes dominant in Garfield County include (roughly from lower to higher elevations): inland saltgrass

(*Distichlis spicata*), galleta (*Hilaria jamesii*), Basin wildrye (*Elymus cinereus*), Salina wildrye (*Leymus salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), muttongrass (*Poa fendleriana*), Thurber fescue (*Festuca thurberi*), Idaho fescue (*Festuca idahoensis*), slender wheatgrass (*Elymus trachycaulus*) and tufted hairgrass (*Deschampsia cespitosa*). Forbs are often important components of these communities. Common forbs found in montane meadow sites include orange sneezeweed (*Dugaldia hoopsii*), Geranium (*Geranium* sp.), white peavine (*Lathyrus leucanthus*), American vetch (*Vicia americana*), edible valerian (*Valeriana edulis*). Wet subalpine meadows dominated by tufted hairgrass are often associated with marsh marigold (*Caltha leptosepala*), elephantella (*Pedicularis groenlandica*), and several species of sedges and rushes.

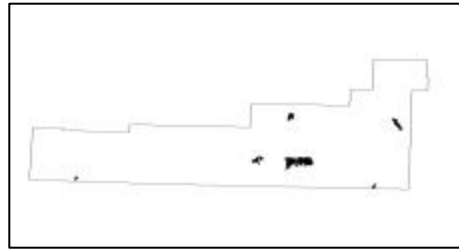


Figure 14 Distribution of grasslands in Garfield County

**Aspen forests** (Figure 15) are found in the northwest corner of the county, on the Roan Plateau, the Flat Tops, and Battlement Mesa, mostly at elevations between 8,000 and 9,000 feet. The aspen groves often form a mosaic with patches of Douglas fir, mixed shrubs, grassland and meadows, and at upper elevations, Engelmann spruce. Understory species are extremely varied. Common species found in aspen communities are snowberry (*Symphoricarpos oreophilus*), serviceberry (*Amelanchier utahensis*), mountain lover (*Paxistima myrsinties*), white peavine

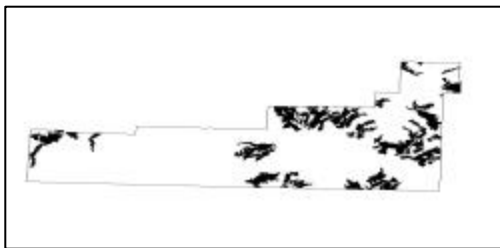


Figure 15. Distribution of aspen forests in Garfield County

(*Lathyrus leucanthus*), butterweed groundsel (*Senecio serra*), meadowrue (*Thalictrum fendleri*), blue wildrye (*Elymus glaucus*), and elk sedge (*Carex geyeri*).

Generally considered to be a pioneer species, aspen thrives on disturbance. It is usually the dominant tree species where it occurs. It is a clonal species and sprouts new growth from suckers or shoots of old roots. It has been suggested that the root systems of aspen clones are among the largest living organisms on earth, although the individual trees themselves are not long lived (75-80 years) In many cases aspen will

eventually be replaced by a shade tolerant species such as Douglas fir or Engelmann spruce. A rare plant associated with aspen is the large flower globemallow (*Iliamna grandiflora*), described below.

**Douglas fir forests** (Figure 16) are concentrated in the western half of the county, but are also scattered throughout the White River Plateau, especially in the deeper canyons. They tend to

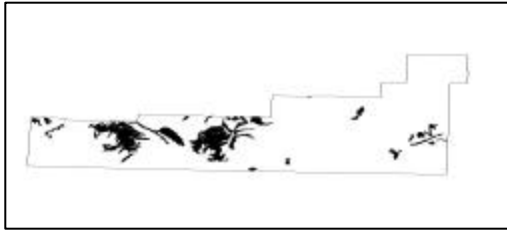


Figure 16 Distribution of Douglas fir and mixed conifer forest in Garfield County

occur at the same elevations as aspen, but on cooler sites. Common understory species occurring with Douglas fir include snowberry (*Symphoricarpos oreophilus*), mountain lover (*Paxistima myrsinites*), elk sedge (*Carex geyeri*), Oregon grape (*Mahonia repens*) and Gambel oak (*Quercus gambelii*). Occasionally ponderosa pine may be mixed with the fir, but in general, ponderosa pine is uncommon in the county. At middle elevations, forested areas often have a mixture of Douglas fir, Engelmann spruce, subalpine fir, aspen, and lodgepole pine. These mixed forests are included in the distribution map (Figure 15).

**Spruce-fir forests** (Figure 17), dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) are located primarily in the White River National Forest north of Glenwood Springs, including the Flat Tops Wilderness. They are also found south of the Colorado River on Battlement Mesa and in the White River National Forest west of the Roaring Fork Valley in the Fourmile Creek area around the Sunlight Ski Area. Elevations are mostly between 9000 and 11,000 feet. On the Flat Tops, spruce bark beetle epidemics in the 1940's left many standing dead trees, sometimes called "silver forests". At their upper elevational limit, these spruce trees form islands and dense patches of dwarfed trees called "krummholz". Common understory species include elk sedge (*Carex geyeri*), whortleberry (*Vaccinium* sp.), heartleaf arnica (*Arnica cordifolia*), parrot's beak (*Pedicularis racemosa*), thimbleberry (*Rubus parviflorus*), and Jacob's ladder (*Polemonium pulcherrimum*). Two state rare plants, the northern twayblade (*Listera borealis*), an orchid which is known historically from a forest wetland, and the common moonwort (*Botrychium lunaria*) have been found within this vegetation type in Garfield County.



Figure 17 Distribution of spruce-fir forests in Garfield County

**Alpine vegetation** (figure 18), including meadows and shrub-dominated tundra, is found above treeline in the highest parts of the White River National Forest, mainly in the Flat Tops

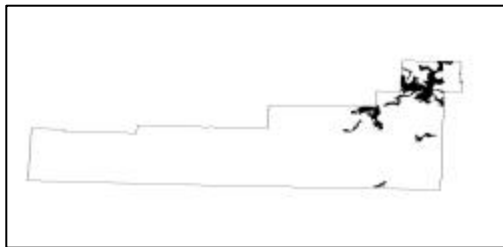


Figure 18. Distribution of alpine tundra in Garfield County

Wilderness. Elevations are usually above 11,500 feet. Animals tracked by CNHP that occur in the alpine zone of Garfield County include the waterfowl Barrow's Goldeneye (*Bucephala islandica*), a butterfly, alpine theano (*Erebia theano*) and the boreal toad (*Bufo boreas*). Plant communities include tufted hairgrass (*Deschampsia cespitosa*) wet meadows, alpine meadows dominated by alpine avens (*Geum rossii*), alpine clover (*Trifolium* sp.) and false strawberry (*Sibbaldia procumbens*), and scrub tundra with dwarf blueberry (*Vaccinium* sp.). Surprisingly, no rare plants are known from this habitat in Garfield County.

*Wetland and Riparian Vegetation* in Garfield County is of extreme importance, although the actual area covered is relatively small. It has been estimated that only 1 to 2% of the land area of Colorado is covered by riparian or wetland vegetation, but that 75-80% of wildlife depend on these areas for all, or at least part, of their life cycle. The riparian zone is the most highly used and altered by humans.

Species composition of Garfield County's wetland and riparian zones varies with elevation. At higher elevations along subalpine and montane streams, common dominant trees and shrubs are narrowleaf cottonwood (*Populus angustifolia*), aspen (*P. tremuloides*), Colorado blue spruce (*Picea pungens*), subalpine fir (*Abies lasiocarpa*), thinleaf alder (*Alnus incana*), and red-osier dogwood (*Cornus sericea*). At somewhat lower elevations, along major tributaries of the Colorado River, narrowleaf cottonwood, skunkbrush (*Rhus trilobata*), river birch (*Betula occidentalis*), thinleaf alder, coyote willow (*Salix exigua*), and mountain willow (*S. monticola*) are common. Fremont's cottonwood (*Populus deltoides* ssp. *wislizenii*), narrowleaf cottonwood, skunkbrush, silver buffaloberry (*Shepherdia argentea*), Russian olive (*Elaeagnus angustifolia*), and tamarisk (*Tamarix ramosissima*) are dominant along the Colorado River.

Subalpine and montane herbaceous wetlands are typically dominated by various sedges and rushes (e.g., *Carex utriculata*, *C. simulata*, *C. lanuginosa*, *Eleocharis palustris*, and *Juncus balticus*). Herbaceous wetlands along the Colorado River's floodplain are often dominated by cattail (*Typha latifolia*), bulrushes (*Scirpus acutus* and *S. pungens*), saltgrass (*Distichlis spicata*), and Baltic rush (*Juncus balticus*). Seep and spring wetlands are normally dominated by beaked sedge (*Carex utriculata*), monkshood (*Aconitum columbianum*), fowl mannagrass (*Glyceria striata*), Baltic rush, oil shale columbine (*Aquilegia barnebyi*), and the rare hanging garden sullivantia (*Sullivantia hapemnanii* var. *purpusii*). Other rare plants associated with wetland and riparian are canyon bog-orchid (*Limnorchis ensifolia*), yellow lady's slipper (*Cypripedium calceolus*), and the lesser panicle sedge (*Carex diandra*).



The following chart shows plant communities documented in Garfield County in the CNHP data system. Note that this is not a complete list of all the communities that occur here, but only those that are tracked by CNHP.

**Table 3. PLANT COMMUNITIES DOCUMENTED IN GARFIELD COUNTY**

Element	Common name	Global rank	State rank
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Alnus incana</i>	Montane riparian forests	G5	S5
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Ribes</i> spp.	Coniferous wetland forests	G5	S3
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Mertensia ciliata</i>	Montane riparian forests	G5	S5
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Salix drummondiana</i>	Montane riparian forests	G5	S4
<i>Abies lasiocarpa</i> / <i>Rubus parviflorus</i>	Subalpine forests	G5	S2
<i>Acer negundo</i> - <i>Populus angustifolia</i> / <i>Cornus sericea</i>	Narrowleaf cottonwood riparian forests	G2	S2
<i>Acer negundo</i> / <i>Cornus sericea</i>	Montane riparian deciduous forest	G3?	S2
<i>Acer negundo</i> / <i>Prunus virginiana</i>	Montane riparian deciduous forest	G3	S2
<i>Alnus incana</i> - <i>Cornus sericea</i>	Thinleaf alder-red osier dogwood riparian tribunal	G3G4	S3
<i>Amelanchier utahensis</i> / <i>Carex geyeri</i>	Mixed mountain shrublands	GU	S2S3
<i>Aquilegia micrantha</i> - <i>Mimulus eastwoodiae</i>	Hanging gardens	G2G3	S2S3
<i>Artemisia nova</i> / <i>Pseudoroegneria spicata</i>	Western Slope sagebrush shrublands	G5	S2?
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca thurberi</i>	Western Slope sagebrush shrublands	GU	S1S2
<i>Artemisia vaseyana</i> / <i>Pseudoroegneria spicata</i>	Western Slope sagebrush shrublands	G5	S2
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Oryzopsis hymenoides</i>	Xeric sagebrush shrublands	GU	S2S3
<i>Atriplex confertifolia</i> / <i>Leymus salinus</i>	Cold desert shrublands	G4G5	S3
<i>Atriplex confertifolia</i> / <i>Oryzopsis hymenoides</i>	Cold desert shrublands	G2	S2
<i>Atriplex confertifolia</i> / <i>Pseudoroegneria spicata</i>	Cold desert shrublands	G3	S2S3
<i>Betula occidentalis</i> / <i>mesic forb</i>	Foothills riparian shrubland	G3	S2
<i>Cardamine cordifolia</i> - <i>Mertensia ciliata</i> - <i>Senecio triangularis</i>	Alpine wetlands	G4	S4
<i>Carex aquatilis</i>	Montane wet meadows	G5	S4
<i>Carex aquatilis</i> - <i>Carex utriculata</i>	Montane wet meadows	G4	S4

Plant communities cont'd.

Element	Common name	Global rank	State rank
<i>Carex nebrascensis</i>	Wet meadows	G4	S3
<i>Carex utriculata</i>	Beaked sedge montane wet meadows	G5	S4
<i>Catabrosa aquatica-Mimulus spp.</i>	Spring wetland	GU	S3
<i>Cercocarpus montanus</i> / <i>Pseudoroegneria spicata</i>	Mixed mountain shrublands	G4	S3
<i>Cornus sericea</i>	Foothills riparian shrubland	G4	S3
<i>Deschampsia cespitosa</i>	Mesic alpine meadow	G4?	S4
<i>Distichlis spicata</i>	Salt meadows	G5	S3
<i>Eleocharis quinqueflora</i>	Alpine wetlands	G4	S3S4
<i>Festuca idahoensis-Elymus</i> <i>trachycaulus</i>	Montane grasslands	G3	S1
<i>Festuca idahoensis</i> / <i>Festuca thurberi</i>	Montane grasslands	G3G4	S3S4
<i>Geum rossii-Sibbaldia procumbens</i>	Mesic alpine meadows	GU	SU
<i>Geum rossii/Trifolium spp.</i>	Alpine meadows	G3G4	S3S4
<i>Juncus balticus var. montanus</i>	Western Slope wet meadows	G5	S5
<i>Leymus cinereus</i>	Western Slope grasslands	G4	S1S2
<i>Picea engelmannii</i> / <i>Cornus sericea</i>	Montane riparian forests	GU	SU
<i>Picea pungens</i> / <i>Betula occidentalis</i>	Montane riparian woodland	G2	S2
<i>Picea pungens</i> / <i>Cornus sericea</i>	Montane riparian forest	G4	S2
<i>Pinus edulis</i> / <i>Cercocarpus montanus</i>	Mesic western Slope piñon-juniper woodlands	G5	S4
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Montane riparian forest	G3?	S3
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	Montane riparian forest	G3?	S2
<i>Populus angustifolia</i> / <i>Cornus sericea</i>	Cottonwood riparian forest	G4	S3
<i>Populus angustifolia</i> / <i>Rhus trilobata</i>	Narrowleaf cottonwood/skunkbrush	G3	S3
<i>Populus deltoides ssp.</i> <i>wislizenii/Rhus trilobata</i>	Fremont's cottonwood riparian forests	G2	S2
<i>Populus tremuloides</i> / <i>Acer glabrum</i>	Montane riparian forests	G2	S1S2
<i>Populus tremuloides</i> / <i>Alnus incana</i>	Montane riparian forests	G3	S3
<i>Populus tremuloides</i> / <i>Ceanothus velutinus</i>	Aspen forests	G2G3	S2S3
<i>Populus tremuloides</i> / <i>Pteridium aquilinum</i>	Aspen wetland forests	G4	S3S4
<i>Populus tremuloides</i> / <i>tall forbs</i>	Montane aspen forest	G5	S5
<i>Pseudoroegneria spicata</i>	Western Slope grasslands	G2?	S2?
<i>Pseudoroegneria spicata-Oryzopsis</i> <i>hymenoides</i>	Western Slope grasslands	G3	SU

Plant communities cont'd.

Element	Common name	Global rank	State rank
<i>Pseudoroegneria spicata</i> - <i>Poa secunda</i>	Montane grasslands	G4	S1
<i>Pseudotsuga menziesii</i> / <i>Cornus sericea</i>	Lower montane riparian forests	G4	S2
<i>Pseudotsuga menziesii</i> / <i>Paxistima myrsinites</i>	Lower montane forests	G2G3	S2S3
<i>Pseudotsuga menziesii</i> / <i>Quercus gambelii</i>	Western Slope douglas fir forests	G5	S4
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos oreophilus</i>	Western Slope douglas fir forests	G5	S4
<i>Quercus gambelii</i> - <i>Amelanchier utahensis</i>	Mixed mountain shrubland	G4G5	SU
<i>Quercus gambelii</i> - <i>Cercocarpus montanus</i> / <i>Carex geyeri</i>	Mixed mountain shrublands	G3	S3
<i>Quercus gambelii</i> / <i>Paxistima myrsinites</i>	Mixed mountain shrublands	GU	SU
<i>Quercus gambelii</i> / <i>Symphoricarpos oreophilus</i>	Mixed mountain shrublands	G5	S3S4
<i>Salix brachycarpa</i> - <i>Deschampsia cespitosa</i> - <i>Geum rossii</i>	Alpine willow scrub	G4	S3S4
<i>Salix boothii</i> /mesic forb	Booth's willow/mesic forb	G3	S3
<i>Salix brachycarpa</i> /mesic forb	Alpine willow scrub	G4	S4
<i>Salix drummondiana</i> / <i>Carex utriculata</i>	Montane willow carr	GU	S3
<i>Salix drummondiana</i> / mesic forb	Drummonds willow/mesic forb	G4	S4
<i>Salix monticola</i> / <i>Carex utriculata</i>	Montane riparian willow carr	G3	S3
<i>Salix monticola</i> /mesic forb	Montane riparian willow carr	G3	S3
<i>Salix planifolia</i> / <i>Caltha leptosepala</i>	Subalpine riparian willow carr	G4	S4
<i>Salix planifolia</i> / <i>Carex aquatilis</i>	Subalpine riparian willow carr	G5	S4
<i>Salix wolfii</i> / <i>Carex aquatilis</i>	Subalpine riparian willow carr	G4	S3
<i>Salix wolfii</i> /mesic forb	Subalpine riparian willow carr	G3	S3
<i>Vaccinium cespitosum</i> / <i>Vaccinium scoparium</i>	Alpine scrub	G4	S1?

## Exotic plants

Exotic plant invasion is an increasingly serious problem in Colorado. Colorado now contains about 70 noxious weed species that infest at least 1.5 – 2.0 million acres. Weeds tend to take advantage of any disturbance of the soil. Wind, water, animals, people and vehicles can disperse their seeds. In some cases, we have planted them intentionally. Once established, they often lack the native competitors, predators, and pathogens that would keep them under control in their native habitat. The current thinking in weed management is to aim for “early detection and early treatment....if you have one acre of spotted knapweed in a county, it makes more sense to devote resources to that and try to contain the spread before it’s too late” (Anthony 2001). The following plants have been listed as noxious weeds by Garfield County. The names in bold type are the exotic plant species that we encountered most frequently during this survey.

### GARFIELD COUNTY NOXIOUS WEED LIST

<b>Canada thistle</b>	<i>Cirsium arvense</i>
Chicory	<i>Cichorium intybus</i>
<b>Common burdock</b>	<i>Arctium minus</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
<b>Hoary cress</b>	<i>Cardaria draba</i>
<b>Houndstongue</b>	<i>Cynoglossum officinale</i>
Jointed Goatgrass	<i>Aegilops cylindrica</i>
Leafy spurge	<i>Euphorbia esula</i>
<b>Musk thistle</b>	<i>Carduus nutans</i>
<b>Oxeye Daisy</b>	<i>Chrysanthemum Leucanthemum</i>
Plumeless thistle	<i>Carduus acanthoides</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Russian knapweed	<i>Acroptilon repens</i>
<b>Russian olive</b>	<i>Elaeagnus angustifolia</i>
<b>Saltcedar</b>	<i>Tamarix parviflora</i>
Saltcedar	<i>Tamarix ramosissima</i>
Scotch thistle	<i>Onopordum acanthium</i>
Spotted knapweed	<i>Centaurea maculosa</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
<b>Yellow toadflax</b>	<i>Linaria vulgaris</i>

Other exotic plant species that were observed during this survey that are not on the county list are listed below.

Alyssum	<i>Alyssum</i> sp.
Annual wheatgrass	<i>Eremopyron triticeum</i>
Bindweed	<i>Convolvulus arvensis</i>
Bur buttercup	<i>Ranunculus testiculatus</i>

Cheatgrass	<i>Bromus tectorum</i>
Clasping pepperweed	<i>Lepidium perfoliatum</i>
Cocklebur	<i>Xanthium minus</i>
Common dandelion	<i>Taraxacum officinale</i>
Cranesbill	<i>Erodium cicutarium</i>
Halogeton	<i>Halogeton glomerata</i>
Horehound	<i>Marrubium vulgare</i>
Jim Hill mustard	<i>Sisymbrium altissimum</i>
Kochia	<i>Kochia americana</i>
Prickly lettuce	<i>Lactuca serriola</i>
Purple mustard	<i>Chorispora tenella</i>
Russian thistle	<i>Salsola iberica</i>
Tansy	<i>Tanacetum vulgare</i>

Species that are commonly planted for pasture or for erosion control are frequent throughout the area. These species are especially evident along roads and trails. They usually are not found in the interior of the forests away from trails.

Non-native species planted for pasture or revegetation:

Agropyron spicatum	<i>Crested wheat grass</i>
Alfalfa	<i>Medicago officinalis</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Siberian elm	<i>Ulmus pumilus</i>
Smooth brome	<i>Bromus inermis</i>
White sweet clover	<i>Melilotus alba</i>
Yellow sweet clover	<i>Melilotus officinalis</i>

Selected species are described and pictured below:

Burdock (Figure 20) is found throughout the area in moist disturbed sites.

Canada thistle (Figure 19) is widespread throughout the area. It invades almost anywhere, from the desert to the montane zone, where soils are disturbed and there is sufficient moisture. It is difficult to eradicate because it has underground stems, or rhizomes, which will continue to produce new shoots after the above ground parts of the plant are killed or removed. Digging and hand pulling are rarely effective. In addition, its seeds can remain dormant in the soil for many years. Prevention, by avoiding any unnecessary disturbance of the soil, is the best defense. *Although many people are under the impression that all thistles are bad, it is important to note that there are native thistles that are not aggressive and should not be destroyed.*

Cheatgrass is found in the semi-desert shrublands, sagebrush shrublands, piñon-juniper and mountain shrubland zones, wherever there has been disturbance such as fire or heavy grazing. It is extremely difficult to eliminate, once it has invaded an area. Cheatgrass is an annual grass and is able to complete its life cycle in the spring before the summer dry weather begins. When dry, it is extremely flammable. Frequent fires favor cheatgrass by eliminating competing perennial vegetation. Its seeds survive in the unburned organic material on a site. Rapid growth and vigorous reproduction assure cheatgrass dominance in postburn stands (FEIS 1999). Range managers advise grazing early in the season for several years, before the grass sets

seed, to keep it under control. The species is so well established that actively investing time and resources in its control is considered futile, and therefore Garfield County does not include it on its weed list

Dandelions are common in the mountains in disturbed and heavily grazed sites.

Although not considered a serious problem by many people, they do replace native grasses and forbs.

Diffuse knapweed is found along I-70 west of Rifle (Anthony 2001).

Hoary cress (or white top) can be found in disturbed areas, often invading hayfields and roadsides.

Hound's tongue (Figure 21) is widespread and abundant at higher elevations, particularly in the montane zone. It is thought to increase with poor grazing management (Anthony, personal communication).

Kentucky bluegrass is very abundant in moist areas, replacing native grasses. Although it provides feed, its shallow roots are not as effective in holding soil on stream banks as other native species are (FEIS 1996). It is particularly abundant in the montane zone.

Musk thistle (Figure 22) and other invasive biennial thistles tend to be found in moist areas in the middle elevations. At its worst, it can form thickets that are impenetrable to livestock and wildlife.

Oxeye daisy was originally planted as an ornamental, but has become a major invader in Western Colorado, particularly in mountainous areas.

Purple loosestrife This tall purple-flowered plant invades wet areas and is potentially a serious threat to wetlands and riparian areas. It has not yet been seen in Garfield County, but it is present in neighboring counties, and vigilance is called for.

Russian knapweed is Colorado's third most common noxious weed (approximately 170,000 acres), located primarily on the West Slope where it causes tremendous damage to private and public lands. There are large infestations in Garfield County south of the Colorado River between New Castle and Rifle (Anthony 2001).

Yellow toadflax, like oxeye daisy, was originally planted as an ornamental, and escaped to become an invasive weed.

Russian olive (Figure 23) is found in riparian areas along the Colorado River and most of its lower elevation tributaries.

Siberian elm has been planted as a fast growing shade tree. It reseeds readily and has replaced native cottonwoods and willows in many riparian areas.

Tamarisk (or salt cedar) (Figure 24) occupies similar riparian habitats.

Tansy was noted several times in the Roaring Fork Valley.

Yellow star thistle is an extremely aggressive invader that has taken over large areas to the west. It has not yet been found in Garfield County, but is known from Montrose and Delta counties, and weed managers are keeping alert.

Some observations of locations of weeds made during this survey follow:

At lower elevations in the southwest part of county, in the East and West Salt Creek drainages, tamarisk and Canada thistle are common in the riparian areas. Sagebrush areas that have been burned or otherwise disturbed are weedy, with much cheatgrass. Greasewood flats often have an understory of cheatgrass and annual mustards such as purple mustard, alyssum and clasping pepperweed. Other weeds that are common in the area are: common dandelion,



Figure 19.  
(left) Canada  
thistle (*Cirsium*  
*arvense*).

Figure 20.  
(right)  
Common  
burdock  
(*Arctium minus*)

Figure 21. (left)  
Hound's tongue  
(*Cynoglossum*  
*officinale*)

Figure 22.  
(right) Musk  
thistle (*Carduus*



Figure 23. (left) Russian  
olive (*Eleagnus*  
*angustifolia*)

Figure 24. (right)  
Tamarisk, or salt cedar  
(*Tamarix ramossissima*)



bur buttercup, and halogeton, a potentially very troublesome weed. Annual wheatgrass, Jim Hill mustard, sweet clover, and smooth brome are common along roads and pipelines.

In the south central part of the county, e.g. the Roan Creek and Mt. Logan foothills areas, weeds are similar to those in the southwest; we have noted tamarisk, cheatgrass, Canada thistle and annual mustards to be common here as well. Other species in this area include horehound, cranesbill, bindweed, and Russian thistle. Areas that have been disturbed by water developments such as stock ponds are especially prone to weed invasion. The bottomland of Logan Wash is particularly weedy with salt cedar, clasping pepperweed, cheatgrass, crested wheat grass, Russian thistle and burdock. Halogeton was observed along the pipeline that crosses the road.

In the Divide Creek and Hunter Mesa areas Canada thistle, cheatgrass, Russian thistle, Jim Hill mustard, hound's tongue, horehound, and yellow sweet clover are common along roads and in disturbed areas. Some cultivated areas and roadsides have significant hoary cress, and there are pastures dominated by purple mustard and alyssum. Flatiron Mesa has houndstongue along the roads and powerlines.

The Rifle area, particularly along the Rifle Creek trail through the city, has an abundance of weedy species, including the major tree species, salt cedar, Siberian elm and Russian olive, which have replaced the native cottonwoods and willows. The understory in this area contains smooth brome, cheatgrass, kochia, prickly lettuce, alfalfa, yellow sweet clover, Kentucky bluegrass, Russian thistle, and Jim Hill mustard.

New Castle's central open space, Mount Madearis, is quite weed-free above, but the trailhead parking area is weedy with cheatgrass, purple mustard, bindweed, and dandelion. Control of these weeds will help prevent invasion into the as yet uncontaminated open space. The drainage below has Siberian elm mixed with the native narrowleaf cottonwood.

At higher elevations in the county, such as the area around Douglas Pass, the most serious weed is houndstongue, which is abundant in moist areas, particularly in the aspen zone. This area also has Canada thistle, purple mustard, cheatgrass, and Russian thistle. Farther east, the Rifle Mountain Park area has Canada thistle, houndstongue, Kentucky bluegrass, common dandelion, and smooth brome (the most abundant grass along Rifle Creek). A bad infestation of common burdock occurs along the trail to the ice caves in the park. Moist areas on the Roan Plateau also have houndstongue, Canada thistle, Kentucky bluegrass, yellow sweet clover, and musk thistle. Climbing up the Box Canyon Road toward Triangle Park, both oxeye daisy and yellow toadflax can be seen along the road. These two high elevation weeds were also observed on the Buford-New Castle Road.



## Rare and imperiled plants

Thirty rare plant species are known from Garfield County. Nineteen of these, shown in bold type in the table below, have been included in the PCAs for Garfield County. Descriptions are given below for those in PCAs. The eleven species shown in regular type are not included in PCAs. These may not warrant a PCA because they are based on historic records; represent occurrences that are unranked or of low quality (D-ranked); or lack sufficient locational precision. A brief discussion of those eleven species follows the rare plant descriptions below.

In the table below, in addition to scientific and common names and CNHP global and state ranks, the plants' federal status under the Endangered Species Act, and their status within federal agencies is given. LE or LT refers to Listed as Endangered or Threatened under the ESA. BLM and USFS indicate that the Bureau of Land Management or U.S. Forest Service considers the species to be of special concern. Colorado has no legal state list of threatened and endangered plant species (Buckner and Bunin 1992).

Among the nineteen species discussed below, the most rare and geographically restricted is the Parachute penstemon (*Penstemon debilis*), known from only five locations in the world, all in Garfield County on the oil shale of the Green River Formation. Several other species are restricted to this formation in Colorado: *Lesquerella parviflora*, known from Garfield and Rio Blanco counties, and *Thalictrum heliophilum* known from Garfield, Rio Blanco and one occurrence on Battlement Mesa in Mesa County. Two of the plants occur only on the Green River Formation in Colorado and Utah: *Argillochloa dasyclada* and *Nuttallia argillosa*. Six additional species are endemic to other habitats in Colorado: *Astragalus debequaeus*, *A. wetherillii*, *Iliamna grandiflora*, *Penstemon harringtonii*, *Phacelia submutica*, and *Sullivantia hapemannii*. Species known only from Colorado and Utah are *Astragalus naturitensis*, *Eriogonum contortum*, and *Sclerocactus glaucus*. Five species, *Carex diandra*, *Ceanothus martinii*, *Cypripedium calceolus* var. *parviflorum*, *Limnorchis ensifolia*, and *Monardella odoratissima* have broader distributions, but limited habitat.

**Table 4. RARE PLANTS OF GARFIELD COUNTY**

(note: bold type indicates that plant is included in a PCA)

Element	Common name	Global rank	State rank	Federal/ State status
<i>Allium nevadense</i>	Nevada onion	G4	S2	
<b><i>Argilochloa dasyclada</i></b>	<b>Utah fescue</b>	<b>G3</b>	<b>S3</b>	
<i>Asplenium trichomanes-ramosum</i>	Green spleenwort	G4	S1S2	
<i>Astragalus argophyllus</i> var. <i>martinii</i>	Meadow milkvetch	G5T4	S1	
<b><i>Astragalus debequaeus</i></b>	<b>Debeque milkvetch</b>	<b>G2</b>	<b>S2</b>	<b>BLM</b>
<b><i>Astragalus naturitensis</i></b>	<b>Naturita milkvetch</b>	<b>G3</b>	<b>S3</b>	
<b><i>Astragalus wetherillii</i></b>	<b>Wetherill milkvetch</b>	<b>G3</b>	<b>S3</b>	
<i>Botrychium lunaria</i>	Common moonwort	G5	S2S3	
<b><i>Carex diandra</i></b>	<b>Lesser panicled sedge</b>	<b>G5</b>	<b>S1</b>	
<b><i>Ceanothus martinii</i></b>	<b>Utah mountain lilac</b>	<b>G4</b>	<b>S1</b>	
<b><i>Cypripedium calceolus</i> ssp. <i>parviflorum</i></b>	<b>Yellow lady's-slipper</b>	<b>G5</b>	<b>S2</b>	
<i>Draba spectabilis</i>	Draba	G3?T3Q	S3	
<b><i>Eriogonum contortum</i></b>	<b>Grand buckwheat</b>	<b>G3</b>	<b>S2</b>	<b>BLM</b>
<b><i>Iliamna grandiflora</i></b>	<b>Large-flower globe-mallow</b>	<b>G3?Q</b>	<b>S1</b>	
<b><i>Lesquerella parviflora</i></b>	<b>Piceance bladderpod</b>	<b>G2G3</b>	<b>S2S3</b>	
<b><i>Limnorchis ensifolia</i></b>	<b>Canyon bog-orchid</b>	<b>G4G5T3</b> <b>?</b>	<b>S3</b>	
<i>Listera borealis</i>	Northern twayblade	G4	S2	BLM
<b><i>Monardella odoratissima</i></b>	<b>Mountain wild mint</b>	<b>G4G5</b>	<b>S2</b>	
<b><i>Nuttallia argillosa</i></b>	<b>Arapien stickleaf</b>	<b>G3</b>	<b>S2</b>	
<i>Oreocarya cana</i>	Mountain cat's-eye	G5	S2	
<i>Oreocarya mensana</i>	Carbon cryptanth	G3	S1	
<i>Pellaea atropurpurea</i>	Purple cliff-brake	G5	S2S3	
<i>Pellaea breweri</i>	Brewer's cliff-brake	G5	S2	
<i>Pellaea suksdorfiana</i>	Smooth cliff-brake	G5T4?	S2	
<b><i>Penstemon debilis</i></b>	<b>Parachute penstemon</b>	<b>G1</b>	<b>S1</b>	<b>C</b>
<b><i>Penstemon harringtonii</i></b>	<b>Harrington beardtongue</b>	<b>G3</b>	<b>S3</b>	<b>FS/BLM</b>
<b><i>Phacelia scopulina</i> var. <i>submutica</i></b>	<b>DeBeque phacelia</b>	<b>G4T2</b>	<b>S2</b>	<b>C</b> <b>FS/BLM</b>
<b><i>Sclerocactus glaucus</i></b>	<b>Uinta basin hookless cactus</b>	<b>G3</b>	<b>S3</b>	<b>LT</b>
<b><i>Sullivantia hapemanii</i> var. <i>purpusii</i></b>	<b>Hanging garden sullivantia</b>	<b>G3T3</b>	<b>S3</b>	<b>FS</b>
<b><i>Thalictrum heliophilum</i></b>	<b>Sun-loving meadowrue</b>	<b>G3</b>	<b>S3</b>	

*Argillochloa dasyclada* (Hackel) Weber (*Festuca dasyclada*)  
**Utah Fescue**  
**G3S3**

Utah fescue (Figure 25), also known as sedge fescue, is a perennial grass, characterized by having one or two florets per spikelet and the panicle branches distinctly pubescent under 10X magnification. It is a regional endemic, preferring oil shale deposits, often on the Green River Formation. Regional endemism is uncommon in North American grasses and this is one of two such examples in Colorado (the other being *Ptilogrostis porteri*). Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County. The one record from Mesa County is from Battlement Mesa, which is geologically an extension of the Roan Plateau and supports the same regional endemic species. Oil and gas development and grazing pressure are the main potential threats. Most of the occurrences occur on private land owned by oil companies; however there are four occurrences on BLM and five on DOE property. Utah Fescue occurs in 16 of the PCAs identified in Garfield County, all on the Roan Plateau.

*Astragalus debequaeus* Welsh  
**DeBeque Milkvetch**  
**G2S2**

DeBeque milkvetch (Figure 26) is a multi-branched, clump-forming perennial plant (Spackman *et al.* 1997). The flowers are white to yellowish and the pods are inflated and glabrous. The species is a Colorado endemic, only known from the Colorado River Valley near DeBeque in Mesa county and around Anvil Points in Garfield County, about 20 miles northeast of the DeBeque area, between Parachute and Rifle. The total range of the species is about 300 square miles, and there are 15 populations with 44 subpopulations currently known. This species is restricted to a very specific geologic formation, the Atwell Gulch Member of the Wasatch Formation, at 5100 to 6400 feet elevation (Welsh 1993). Soils are seleniferous and sometimes saline sand or clay. Plants are usually found on toe slopes and along drainages, but can also occur on steep sideslopes. They flower in April and May, and set fruit by June. Associated plants often include yellow milkvetch (*Astragalus flavus*), spiny hopsage (*Atriplex grayi*), bahia (*Platyschuhria integrifolia*), sagebrush (*Artemisia* sp.), cats-eye (*Cryptantha* sp.), buckwheat (*Eriogonum* sp.), gumweed (*Grindelia squarrosa*), and squirrel tail (*Elymus elymoides*). Potential threats to the DeBeque Milkvetch include recreation, grazing, the spread of exotic plant species and disturbance from roads and off-road vehicles, as well as oil and gas development. At least one subpopulation occurs within an area of private land that has been approved for a gas well density of one well to 20 acres, the most dense in the world. The other Garfield County locations are within a mile of this area, on BLM and NOSR property. Both the well pads and access roads can directly destroy the plants, as well as opening up areas for recreational vehicles and exotic species invasion. Most of the land *A. debequaeus* grows on is used for grazing cattle. The impact of grazing is unknown; however, plants trampled by cattle have been observed. All three Garfield County populations, with an additional nine subpopulations, are included in the Anvil Points PCA.

***Astragalus naturitensis* Payson**  
**Naturita milkvetch**  
**G3S3**

Naturita milkvetch (Figure 27) was first described by Edwin Payson (1915) as a “new and noteworthy” species, similar to *A. desperatus*, but “bicolored with conspicuously mottled pods.” Naturita milkvetch is a white and purple flowered member of the pea family (*Fabaceae*), growing from a basal rosette of leaves. The plants are often only vegetative, and have extremely small pinnate leaves with tiny gray-green leaflets that tend to fold in half, showing their lighter-colored undersides. The pods are red-mottled, firm-walled, and dorsiventrally compressed. The species is known from 39 occurrences in Utah, New Mexico and Garfield, Mesa, Montrose, San Miguel, and Montezuma counties in Colorado. This species was not previously known from Garfield County until its first location was documented during the 2000 field season. It is found in piñon-juniper woodlands, in areas with shallow soils over exposed bedrock. Elevations range from 5,000 to 7,000 feet (Spackman *et al.* 1997). In Garfield County, it was found in association with a previously undocumented plant community, Utah juniper-mountain mahogany/spiny greasebush. Usually it is found in small soil pockets or rock crevices in sandstone pavement along canyon rims, although it sometimes also occurs nearby in deeper sandy soils, with or without soil crusts. The milkvetch seems to tolerate and even thrive on some disturbance. The plants have been found around power poles and in the compacted tracks of dirt roads. Past and current land uses known for most sites involve livestock grazing. The extent of grazing is unknown on some populations. The limited size of the populations and the limited range of the species make it vulnerable to extinction through environmental change and the potential loss of habitat. *Astragalus naturitensis* is represented in Garfield County in the Mount Logan Foothills and Roan Creek PCAs.

***Astragalus wetherillii* Jones**  
**Wetherill milkvetch**  
**G3S3**

Wetherill milkvetch (Figure 28), a member of the pea family (*Fabaceae*) has pinkish white flowers and rather large, inflated pods. The leaflets of its pinnately compound leaves are almost round. It grows on steep slopes, canyon benches, and talus under cliffs, in sandy clay soils derived from shale or sandstone (Barneby 1964). It is often the only plant growing in small dry washes on rocky clay hillsides, where its very light-weight pods are dispersed downhill by gravity and seasonal surface water. Plants flower from early May to late June. Associated plant species include piñon pine, Utah juniper, mountain mahogany, Gambel oak and sagebrush. Potential threats to the species include oil and gas development, overgrazing, road construction and other habitat modifications (O’Kane 1988). The species is known from seven western Colorado counties and from Utah. There are thirty-eight known occurrences, with an estimated total of 9,000 individuals. The majority of occurrences are on BLM land. It is found in Garfield County within ten miles of the Colorado River, along the Grand Hogback, and on the Roan Plateau. It is represented in seven PCAs: Anvil Points, Burning Mountain, Coal Ridge, Divide Creek, East Divide Creek, Rifle Creeks and Rifle Hogback.

***Carex diandra* Schrank**  
**Lesser panicled sedge**  
**G5 S1**

*Carex* is the largest genus of plants in Colorado, and species are often distinguished by very technical characteristics. *Carex diandra* is a grass-like plant that is characterized by its densely clumped habit and narrow leaves. The ecology of sedges is extremely varied. They grow in all natural climatic zones from sea level to high mountain areas (Egorova 1999) and are often the dominant plant in many communities. *Carex diandra* belongs to a group of sedges which grow in shallow water on the shores of rivers and lakes, from 8400 to 11,000 feet in elevation. In Garfield County, the sedge was found in clumps growing on partially submerged logs in a small permanent pond. The plants flower from May to July, and bear fruit in late July and August.

This species is circumboreal in its distribution, but is rarely encountered south of the Canadian border in North America (Hurd et. al.1998 ). In Colorado, it is known only from three locations, one each in Garfield, Boulder and Larimer counties. Because of its limited distribution in the U.S., all locations for this species deserve to be protected. Potential threats to the species include hydrological modifications such as dams and diversions that would alter its habitat, and logging close to the site. The lesser panicled sedge occurs in the Turret Creek PCA.

***Ceanothus martinii* M.E. Jones**  
**Utah mountain lilac**  
**G4S1**

Utah mountain lilac is a low, widely spreading shrub with rigid branches. The small white flowers are on long terminating shoots. The leaves are small (10-20 cm), deciduous and three veined from the base. This rare little shrub is easily recognized in its vegetative state. Utah mountain lilac (or Martin *Ceanothus* as it is sometimes known) occurs from eastern Nevada to southwest Wyoming, south to northwest Arizona and east to Colorado. It is known from five locations in Colorado, in Garfield and Rio Blanco counties. The Garfield County populations represent the eastern extent of its range. Rangewide, it can be found in a variety of different habitats, but in Colorado it is generally found in mixed mountain shrub communities with Gambel oak. This species may be threatened by habitat loss from road construction, off-road vehicles, or grazing. The full extent of these threats has not been determined. (Fertig 2000). *Ceanothus martinii* is represented in the Mount Logan Road and Parachute Creek PCAs.

***Cypripedium calceolus* L. ssp *parviflorum* (Salisbury) Hulten**  
**Yellow Lady's-Slipper**  
**G5 S2**

Yellow lady's slipper is a large flowered yellow orchid species. It is the showiest orchid in Colorado. Its flowers are usually solitary and have a prominent lip resembling a slipper, which gives the genus its common name. Recently the genus has been moved from the orchid family (*Orchidaceae*) to a new family, the *Cypripediaceae*, based on several unique characters



Figure 25. Utah fescue  
(*Argilochloa dasyclada*)



Figure 26. DeBeque milkvetch (*Astragalus debequaeus*), in fruit



Figure 27. Naturita  
milkvetch (*Astragalus naturitensis*)

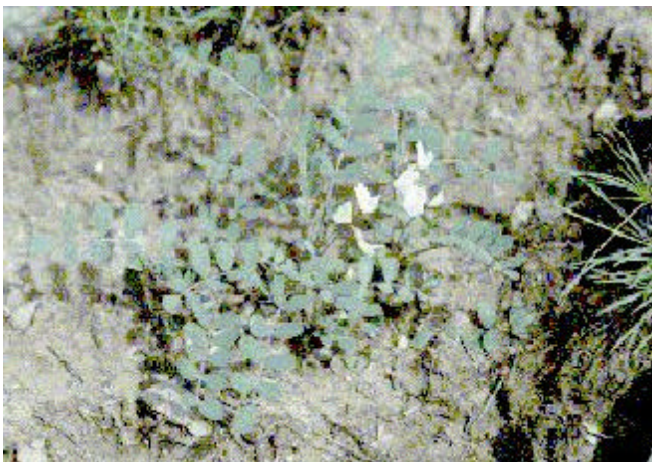


Figure 28. Wetherill milkvetch  
(*Astragalus wetherillii*)





Figure 29. Grand buckwheat (*Eriogonum contortum*)



Figure 30. Large flower globemallow (*Iliamna grandiflora*)



Figure 31. Piceance bladderpod (*Lesquerella parviflora*)



Figure 32. Canyon bog orchid (*Limnorchis*)

(Weber 1996). This species is known from 26 locations throughout Colorado, as well as the continental U.S., Alaska and Canada. However, it is sparsely distributed and uncommon. It is found in wetlands and in rich humus and decaying leaf litter in wooded areas in aspen and ponderosa pine/ Douglas-fir zones (Spackman *et al.* 1997). Associated species in the Garfield County sites include starry false Solomonseal (*Maianthemum stellatum*), coyote willow (*Salix exigua*), Rocky Mountain willow (*Salix monticola*), thinleaf alder (*Alnus incana*), woods rose (*Rosa woodsii*), rushes (*Juncus* spp.), horsetails (*Equisetum arvense*), and twinberry honeysuckle (*Distegia involucrata*). Potential threats to this species include trampling, exotic plant invasion, logging, and alterations of the hydrology on which its wetland habitats depend. Constant moisture is very important to this species during germination and early development. According to William Weber (1996), “all species of *Cypripedium* are rare and potentially endangered, and should not be disturbed”. The yellow lady’s slipper is represented in Garfield County in the Sutank and Ranch at Roaring Fork PCAs, both in the Roaring Fork Valley.

***Eriogonum contortum* Small**  
**Grand Buckwheat**  
**G3S2**

Grand Buckwheat (Figure 29) is a dwarf perennial shrub, with a woody root system and bright yellow flowers. The species is known only from Mesa and Garfield counties in Colorado, and Grand County, Utah. Thirty-two occurrences are known in Colorado (all but one in Mesa County) and thirteen in Utah. The range in Colorado extends from the Utah border to 28 miles east, and from the Mesa/Garfield county line to 16 miles south. All records are for locations north of the Colorado River and south of the Book Cliffs, except for one specimen recorded from Howard Canyon in Garfield county in 1969. This population was searched for in 2000 and was not found. We suspect that the collection label had the wrong location information, as it is quite far removed from all other occurrences of this plant, and the habitat at this location was not suitable. One new occurrence was located in Garfield County in 2000, right at the Mesa County line, and is the farthest north occurrence known for this plant in Colorado. The Grand Buckwheat prefers Mancos Shale badlands, gently rolling hills with sparse salt desert shrub vegetation (Spackman *et al.* 1997). Common associated species include shadscale (*Atriplex confertifolia*), Gardner saltbush (*A. gardneri*), pretty buckwheat (*Eriogonum bicolor*), snakeweed (*Gutierrezia sarothrae*), and Prince’s plume (*Stanleya pinnata*). Frequent weeds in this habitat include cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomerata*), and Jim Hill mustard (*Sisymbrium altissimum*). Improper grazing and the proximity of roads may threaten this species. Grand buckwheat is found in Garfield County in the Mitchell Road PCA.

***Iliamna grandiflora* (Rydberg) Wiggins**  
**Large-flower globe-mallow**  
**G2G3Q S1**

Large-flower globe-mallow (Figure 30) is a handsome, bushy plant with rose-pink to white flowers. The plants grow up to 5 feet tall and have large maple-like leaves. It is found on banks, slopes, meadows, and along streams (Harrington 1954). In Garfield County, several



occurrences were along roads in moist forested areas, where the plants may benefit from extra moisture from run-off. The plants seem to thrive on disturbed soils, both along roadsides and in areas with natural erosion. Associated species included Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), Rocky Mountain maple (*Acer glabrum*) and Gambel's oak (*Quercus gambelii*).

It is considered to be a Colorado endemic species. However, there is some question as to the taxonomic distinctiveness of this species, as it is very similar, and possibly synonymous, with the more common *I. rivularis*. The two species are distinguished mainly by size, and are suspected to intergrade in Colorado. However, those found in Garfield County in 2000 appear to fall within the upper range of flower size.

There were previously only 12 small occurrences of this species in the state, two in Garfield County, and others in Ouray, Routt, Pitkin and Montezuma counties. Three new occurrences were found in Garfield County during this survey, bringing the total to five in the county, and 15 in the state. None have any protection to date.

Potential threats to the species include logging and road maintenance activities such as weed spraying and grading. Effects of grazing are not known, although herbivory by cattle has been observed. The large-flower globe-mallow is represented in the Douglas Pass and Anvil Points Rim PCAs.

***Lesquerella parviflora* Rollins**  
**Piceance Bladderpod**  
**G2G3 S2S3**

Piceance Bladderpod (Figure 31) is a perennial herb in the mustard family, covered with silvery stellate hairs. It has small bright yellow flowers and can be distinguished from most similar species by the recurved pedicels of its fruit. The Piceance Bladderpod is a Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation. Elevations range from 6,200 to 8,600 feet (Spackman *et al.* 1997). It prefers ledges and slopes in open areas. Frequently associated species include rabbitbrush (*Chrysothamnus nauseosus*), snowberry (*Symphoricarpos oreophilus*), dragon milkvetch (*Astragalus lutosus*), Arapien stickleaf (*Nuttallia argillosa*), Colorado bedstraw (*Galium coloradense*), Indian rice grass (*Oryzopsis hymenoides*), mat penstemon (*Penstemon caespitosus*), rayless aster (*Machaeranthera grindelioides*) and Utah fescue (*Argillochloa dasyclada*). There are thirty-one good sized populations known. Oil and gas development pose the greatest potential threats to this species. It is represented in ten PCAs in Garfield County, all in the western half of the Roan Plateau.

***Limnorchis ensifolia* (*Platanthera sparsiflora* var. *ensifolia*)**  
**Canyon Bog Orchid**  
**G4G5T3? S3**

The canyon bog orchid (Figure 32) is a tall spike-like plant with small greenish flowers scattered along the stem, and tulip-like leaves. The genus is also classified by some botanists as *Habenaria* or *Platanthera*. It grows in moist or wet soil in mountain meadows, marshes, swamps, fens, open or dense forests, on stream banks and open seepage, frequently about springs. It has a wide range, from Oregon to Mexico, but good habitat is limited. The orchid's

survival depends on a reliable year-round supply of moisture. The combination of grazing and trampling by livestock in the mucky areas where the orchid grows may eradicate the plant. In Garfield County, it is known from seven locations, one in East Elk Creek, and six in the Roaring Fork Valley. It is represented in three PCAs, Kaiser Stevens Ditch, Ranch at the Roaring Fork, and Sutank.

***Monardella odoratissima* Bentham**  
**Mountain Wild Mint**  
**G4G5 S1**

Mountain wild mint (Figure 33), also called Coyote Mint, has small pink to lavender flowers in clusters at the top of the stem. It is a bushy plant that grows to approximately one foot tall, and has foliage with a very strong and distinctive scent. The plant is usually smelled before it is seen. It is distributed throughout western United States and Canada, but only known from five localities in Colorado, in Ouray, Montrose and Garfield counties. This plant is found in arid sagebrush, grass and spruce-fir communities. In Garfield county, it was found at 7,000 feet on talus slopes of Green River shale, along with several oil shale endemic species: Parachute penstemon (*Penstemon debilis*), sun-loving meadowrue (*Thalictrum heliophilum*), Arapien stickleaf (*Nuttallia argillosa*), and Utah fescue (*Argillochloa dasyclada*). Potential threats to the species in Garfield County are probably not imminent, but future oil shale extraction could extirpate the species from the county. Mountain wild mint is included in the Anvil Points Rim and Mount Callahan PCAs.

***Nuttallia argillosa* (Darlington) Weber**  
**Arapien Stickleaf**  
**G3 S2**

Arapien stickleaf (Figure 34) is a perennial herb with showy yellow flowers. The hairs on this plant are very unusual and will stick to just about anything, hence its common name. It is an oil shale endemic, restricted to two distinct and widely separated regions: central Utah and west-central Colorado. It has been suggested that the two populations represent distinct species (Spackman *et al.* 1997). The species may be locally common in some areas, but its range is restricted to about 30 square miles in Colorado. The 21 documented occurrences in Colorado all occur in Garfield County on Green River shale on the Roan Plateau. *Nuttallia argillosa* grows on steep eroding talus slopes of the Green River Formation, and is adapted to survive on the constantly moving scree. It is frequently found with other oil shale endemics, notably *Astragalus lutosus*, *Thalictrum heliophilum*, *Penstemon debilis*, and *Argillochloa dasyclada*. Oil, gas, and oil shale mining are potential threats to this species. There are no protected occurrences of the species. Arapien stickleaf is included in ten of the PCAs in Garfield County, all on the Roan Plateau: Parachute Creek, Mount Callahan, Red Pinnacle, East Fork Parachute Creek, Anvil Points, Anvil Points Rim, Mount Logan Road, Clear Creek, Conn Creek, and Horse Ridge PCAs.

***Penstemon debilis* O’Kane & Anderson**  
**Parachute Penstemon**  
**G1S1**

This dwarf, mat-forming, perennial herb (Figure 35) with thick, bluish leaves and funnel-shaped, white to pale lavender flowers belongs to the genus *Penstemon*, the largest plant genus endemic to North America. The Parachute Penstemon is only known to occur in Garfield County and is arguably one of the rarest plants in Colorado, with only five known occurrences. The Parachute Penstemon grows on sparsely vegetated, south facing, steep, white shale talus in the Mahogany Zone of the Parachute Creek Member of the Green River Formation (Spackman *et al.* 1997), between 7,800 and 9,000 feet. The species has adapted to this habitat by producing a root system which can survive frequent burial and movement of the shale substrate.

Frequently associated species include other oil shale endemics such as Utah fescue (*Argilochloa dasyclada*), sun loving meadowrue (*Thalictrum heliophilum*), Arapian stickleaf (*Nuttallia argillosa*), mountain wild mint (*Monardella odoratissima*), and dragon milkvetch (*Astragalus lutosus*), as well as more common species like viscid rabbitbrush (*Chrysothamnus viscidiflorus*), spearleaf buckwheat (*Eriogonum lonchophyllum*), mat penstemon (*Penstemon caespitosus*), rayless aster (*Machaeranthera grindelioides*), Colorado bedstraw (*Galium coloradoense*), and rock spirea (*Holodiscus dumosus*).

Due to the steep nature of *P. debilis* habitat there is little threat from direct human or livestock impacts or exotic species invasions; however this habitat is economically important for its natural gas and oil shale development, and extraction or pipelines could pose a future threat. The largest occurrences are in the Mount Callahan PCA. Other locations are the Anvil Points Rim and Mount Logan Road PCAs.

***Penstemon harringtonii* Penland**  
**Harrington beardtongue**  
**G3S3**

Harrington beardtongue (Figure 36) was named for Professor H. D. Harrington of Colorado State University, one of Colorado’s premier botanists. This showy species grows to two and a half feet and has pink to light blue flowers in interrupted spikes. An easily recognizable feature of the flowers is the two lower stamens that stick out of the flower tube. This species is a Colorado endemic and known from 41 locations in Eagle, Garfield, Grand, Pitkin, Routt and Summit Counties (Spackman *et al.* 1997). The habitat of *P. harringtonii* includes sagebrush, road-cuts and occasionally piñon-juniper habitats. Its distribution is centered around Edwards, Colorado. This species is most threatened by residential development. Improper grazing can also affect the populations of this plant. It is represented in six PCAs in Garfield County: Crystal Springs Road, Flatiron Mesa, Missouri Heights, Sheep Creek Uplands, Smith Gulch, and The Crown.



Figure33. Mountain wild mint (*Monardella odoratissima*). Purple flower in lower left.



Figure 34. Arapien stickleaf (*Nuttallia argillosa*). Inset, fruit.



Figure 35. Parachute penstemon (*Penstemon debilis*). Garfield County's rarest plant.



Figure 36. Harrington beardtongue (*Penstemon harringtonii*)





Figure 37. DeBeque Phacelia (*Phacelia*



Figure 38. Sun loving meadowrue (*Thalictrum heliophilum*)



Figure 39. Hanging garden sullivantia (*Sullivantia hapemannii*).



Figure 40. Uinta Basin hookless cactus (*Sclerocactus glaucus*). Garfield County's only federally listed plant.

***Phacelia scopulina* var. *submutica***  
**DeBeque Phacelia**  
**G4T2 S2**

DeBeque Phacelia (Figure 37) is a diminutive annual plant with a small rosette of reddish leaves and minute cream to yellowish flowers. The plant is given species status by some botanists, and known as *Phacelia submutica*. This easily overlooked plant blooms in late May through June when moisture conditions are favorable. It is found on sparsely vegetated, steep slopes, in clay soils on the Atwell Gulch and Shire Members of the Wasatch Formation. The seeds germinate in cracks created by the shrinking and swelling of the clay soils. The plants often shrivel and blow away by the end of the summer, or in drought years like 2000, even by May. No evidence of this annual plant remains from one year to the next (Spackman *et al.* 1997). We were unable to locate the plants this year, and it may be that they never germinated. The species has a very limited range, occurring only in Mesa and Garfield counties in Colorado in a small area around DeBeque. The same area supports two other rare plants, DeBeque milkvetch (*Astragalus debequaeus*) and Uinta Basin hookless cactus (*Sclerocactus glaucus*). Although plants are not eaten by herbivores, the species cannot tolerate trampling. Grazing of domestic livestock occurs in the area and the BLM and USFS have established policies to regulate livestock numbers and seasons of use. Parcels of private land have no such management constraints (O’Kane 1988). The four occurrences of DeBeque Phacelia in Garfield County all fall within the Roan Creek PCA.

***Sclerocactus glaucus* (K. Schumann) Benson**  
**Uinta Basin hookless cactus**  
**G3S3**  
**Listed Threatened**

The Uinta Basin hookless cactus (Figure 40) has very showy pink flowers; however, when the plant is not in bloom it becomes very difficult to see (Spackman *et al.* 1997). This species is similar to *S. whipplei* and is distinguished by a straight, rather than hooked, central spine, and generally smaller habit. Ongoing taxonomic research will attempt to resolve the distinction between these two species. Uinta Basin hookless cactus is found on river benches, valley slopes, and rolling hills, in xeric, fine textured soils overlain with cobbles and pebbles. It grows in salt desert shrub and piñon-juniper communities (Heil and Porter 1993). This habitat is generally threatened by energy/mineral and water developments, trampling by cattle and off-road vehicle use (Heil and Porter 1993). The plants are highly regarded for their beautiful flowers and are sought by professional and amateur cactus growers (USFWS 2000). Because the species is rare and highly endemic, it has been prized by collectors (USFWS 2000). Although section 9 of the Endangered Species Act forbids the removal of species listed from lands under Federal Jurisdiction, there has been evidence of commercial collecting. In Garfield County, the cactus populations tend to be small and scattered. However, the sites in Garfield County represent the northeastern extent of the range of this species. The Uinta Basin hookless cactus is found in the Mount Logan Foothills and Roan Creek PCAs.

***Sullivantia hapemanii* var. *purpusii***  
**Hanging Garden Sullivantia**  
**G3T3 S3**

Hanging garden sullivantia (Figure 39) grows on wet cliffs and seeps, often covering the walls with its shiny round, sharply toothed leaves and white flowers. It can be distinguished from all other Colorado members of the Saxifrage family by its five, instead of ten, stamens (Spackman *et al.* 1997). It is often found at the head of a drainage, where it occurs on a variety of different rock types from limestone to shale and quartz. It is frequently associated with another Colorado endemic, oil shale columbine (*Aquilegia barnebyi*). This taxon is sometimes considered a distinct species (*Sullivantia purpusii*). The variety (or species) is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals. Most populations occur on public lands managed by the United States Forest Service. The species is potentially threatened by recreational rock climbing, although the plant generally grows in areas that are inaccessible and have few direct threats. Hanging garden sullivantia has been documented in eleven of the PCAs in Garfield County: 4A Ridge, Bear Point, Clear Creek, Conn Creek, Deep Creek, East Fork Parachute Creek, East Rifle Creek, Hanging Lake, Horse Ridge, Parachute Creek and Upper 4A Mountain.

***Thalictrum heliophilum* Wilken & DeMott**  
**Sun-Loving meadowrue**  
**G3 S3**

Sun-loving meadowrue (Figure 38) is the only member of the genus *Thalictrum* in Colorado that thrives in full sun locations. This plant grows to about 3 feet, has small glaucous leaves and is monoecious, that is, it has separate male and female flowers on the same plant. It can be distinguished from the more common Fendler's meadowrue (*T. fendleri*), which grows in meadows and shady aspen forests, by its smaller, waxy leaves and fewer pistils per flower. This interesting species was not discovered until 1983. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties (Spackman *et al.* 1997), with 36 known occurrences and approximately 130,000 individuals. The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. Associated species include rabbitbrush (*Chrysothamnus nauseosus*), snowberry (*Symphoricarpos oreophilus*), oil shale milkvetch (*Astragalus lutosus*), Arapien stickleaf (*Nuttallia argillosa*) and Utah fescue (*Argillochloa dasyclada*) (Scheck 1994). Although oil shale development poses its biggest potential threat, oil companies have successfully used this species to revegetate following shale extraction (O'Kane 1988). Sun loving meadowrue has been documented in nine of the PCAs in Garfield County: 4A Ridge, Bear Point, Brush Mountain, Clear Creek, Conn Creek, Horse Mountain, Horse Ridge, Mount Callahan, and twelve occurrences in the Parachute Creek PCA.

The following plants have also been recorded in the CNHP database for Garfield County, but did not warrant inclusion in PCAs for one or more of these reasons: They are historic records, or the location is too imprecise, or they are unranked occurrences of species with low-ranked biological diversity significance (lower than G3 or S2).

***Allium nevadense***: One historic (1973), unranked occurrence from Demarree Canyon at 5180 ft., based on an herbarium specimen, minutes record.

***Asplenium trichomanes-ramosum***: One unranked occurrence from the Flat Tops, found in horizontal cracks in limestone rimrock at 11,200 ft. Extent of population unknown, mostly on inaccessible cliffs.

***Astragalus argophyllus* var. *martinii***: One unranked occurrence based on a 1977 herbarium specimen from Glenwood Canyon, Grizzly Creek area. A 1997 search to relocate it was unsuccessful.

***Botrychium lunaria***: One unranked historic record, reported by Wherry (1938) in The American Fern Journal from Trappers Lake.

***Draba spectabilis* var. *oxyloba***: Two unranked occurrences from Grizzly Creek and Deep Creek from 1995, but with some question as to identification of variety.

***Listera borealis***: One historic (1936) record from Deep Lake, unranked, minutes precision.

***Oreocarya cana***: One unranked historic record, minutes precision, questionably mapped in downtown Glenwood Springs

***Oreocarya mensana***: One unranked historic record from 1982 near Douglas Pass. Unable to relocate in 2000.

***Pellaea atropurpurea***: One unranked historic record from Rifle Falls in 1952, minutes precision, unable to relocate.

***Pellaea breweri***: One record from limestone rimrock at Blair Mountain, 1991, minutes precision, unranked.

***Pellaea suksdorfiana***: One unranked historic (1973) record from limestone cliffs at Canyon Creek, based on herbarium specimen.



The following plants tracked by CNHP may be present in Garfield County, but they have not yet been recorded in CNHP's data system for the county.

***Cirsium barnebyi***—This species is ranked G3S3, or vulnerable on both a global and state scale. One record of a specimen at the University of Colorado herbarium is shown in the herbarium's Garfield County species list; however, the specimen was not in file, and its whereabouts were unknown. Thistles observed and collected in the Conn Creek area are still being studied. They appear to be closely related to *C. barnebyi*, but do not conform entirely to the characteristics of that species as it is presently described (Barlow, pers. comm.). If they are determined to be *C. barnebyi*, they will be added to the CNHP database, and further investigation in Garfield County will be warranted.

***Astragalus musiniensis***—This species, ranked G2S1, or globally imperiled and very rare in Colorado, is known from western Mesa County, in the Mancos shale area south of the Book Cliffs. It occupies habitat similar to that of *Eriogonum contortum*, which was found in Garfield County in 2000 (see Mitchell Road PCA). There is one specimen in the University of Colorado herbarium with a Garfield County location given, but the location information is questionable. However, suitable habitat for this species exists in Garfield County.

***Oreocarya (Cryptantha) elata***—This species is also known from the Mancos shale area in western Mesa County. There are no records as yet from Garfield County, but there is potential habitat.

***Cirsium perplexans***—Rocky Mountain thistle is ranked G2S2, or imperiled globally and in Colorado. It has been found in Mesa County in the DeBeque area, close to the Garfield County line. Suitable habitat exists in Garfield County north of DeBeque.

## Rare and Imperiled Animals of Garfield County.

Within the boundaries of Garfield County there are numerous ecosystems supporting a rich diversity of flora. From this diversity in vegetation comes a diversity in animal life that includes rare lizards on the arid western lands to a rare alpine butterfly found in the Flat Tops Wilderness Area. This is truly a unique county with an amazing richness of rare fauna well worth preserving for future generations. A total of 33 animal species that are rare or imperiled, globally or in Colorado, have been documented from Garfield County during the last ten years. They are described below, and all but four are included in Proposed Conservation Areas.

One other species, *Ursos arctos* (the grizzly bear) was documented from the area, but was not included, since we lack confidence in the records because they were reported more than ten years ago.

Forty-eight new rare animal occurrences were located during this survey, and were entered into the CNHP database to join the previously documented 102, making a total of 150 occurrences for Garfield County.

Seven animal species were recorded in the CNHP database in 2000 for the first time for this study area. They are the razorback sucker, flannelmouth sucker, mountain whitefish, Sage Grouse, kit fox, plateau striped whiptail and white-tailed prairie dog.

In the table that follows, Federal and State legal status is listed in the last column, farthest to the right. State legal status is listed after federal status, it is preceded by a forward slash (/) and a CO identifying it as Colorado legal status. Here is a brief definition of the legal codes found in that column:

### Federal Status

#### *Endangered Species Act (USFWS)*

**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.

**C** - Candidate (formerly C1) - taxa for which substantial biological information exists on file to support a proposal to list as Endangered or Threatened, but no proposal has yet been published in the Federal Register.

**(PS)** – Population segment – species is endangered in part of its range.

**LE-PDL** - Listed Endangered-Proposed for Delisting - those species whose recovery warrants re-evaluation of legal status on the Federal Registry.

### *Other Agency Status*

**FS** - Forest Service Sensitive - those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by i) significant current or predicted downward trends in population numbers or density and ii) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

**BLM** - Bureau of Land Management 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.

### State Status

**CO-E** - Colorado Endangered - those species or subspecies of native wildlife whose prospects for survival or recruitment within the state are in jeopardy, as determined by the Commission.

**CO-SC** - Colorado Special Concern - species or subspecies of wildlife which have been removed from the state threatened or endangered list within the last five years; are proposed for federal listing (or are a federally listed "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 which may lead to threatened or endangered status; or are otherwise determined to be vulnerable in Colorado.

**Table 5. RARE ANIMALS OF GARFIELD COUNTY**

Element	Common name	Global rank	State rank	Federal/ State status
<b>BIRDS</b>				
<i>Accipiter gentilis</i>	Northern Goshawk	G5	S3B,SZN	
<i>Aegolius funereus</i>	Boreal Owl	G5	S2	
<i>Amphispiza belli</i>	Sage Sparrow	G5	S3B,SZN	(PS)
<i>Bucephala islandica</i>	Barrow's Goldeneye	G5	S2B,SZN	
<i>Buteo regalis</i>	Ferruginous Hawk	G4	S3B,S4N	
<i>Centrocercus urophasianus</i>	Sage Grouse	G5	S4	BLM/CO-SC
<i>Cypseloides niger</i>	Black Swift	G4	S3B	
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T3	S2B,SZN	LE-PDL
<i>Grus canadensis tabida</i>	Greater Sandhill Crane	G5T4	S2B,S4N	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4T?Q	S1B,S3N	LT
<i>Plegadis chihi</i>	White-Faced Ibis	G5	S2B,SZN	
<i>Tympanuchus phasianellus columbianus</i>	Columbian Sharp-Tailed Grouse	G4T3	S2	
<i>Vireo vicinior</i>	Gray Vireo	G4	S2B,SZN	
<b>FISH</b>				
<i>Catostomus latipinnis</i>	Flannelmouth sucker	G3G4	S3	BLM
<i>Gila robusta</i>	Roundtail chub	G2G3	S2	
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3	
<i>Prosopium williamsoni</i>	Mountain whitefish	G5	S3	
<i>Xyrauchen texanus</i>	Razorback sucker	G1	S1	LE/CO-E

REPTILES AND AMPHIBIANS				
<i>Bufo boreas pop 1</i>	Boreal toad (Southern Rocky Mountain population)	G4T1Q	S1	C/CO-E
<i>Cnemidophorus velox</i>	Plateau striped whiptail	G5	S4	
<i>Coluber constrictor mormon</i>	Western yellowbelly racer	G5T5	S3	
<i>Gambelia wislizenii</i>	Longnose Leopard Lizard	G5	S1	
<i>Crotalus viridis concolor</i>	Midget faded rattlesnake	G5T4	S3?	
<i>Rana pipiens</i>	Northern leopard frog	G5	S3	
<i>Spea intermontana</i>	Great Basin spadefoot	G5	S3	
<i>Urosaurus ornatus</i>	Tree lizard			
MAMMALS				
<i>Cynomys leucurus</i>	White-tailed prairie dog	G4	S4	
<i>Euderma maculata</i>	Spotted bat	G4	S2	FS, BLM
<i>Gulo gulo</i>	Wolverine	G4	S1	
<i>Lynx canadensis</i>	Lynx	G5	S1	(PS)
<i>Corynorhinus townsendii pallescens</i>	Pale lump-nose bat subsp.	G4T4	S2	
<i>Vulpes macrotis</i>	Kit fox	G4	S1	/CO-E
INVERTEBRATES				
<i>Erebia theano</i>	Theano Alpine	G4	S3	

#### **AMERICAN PEREGRINE FALCON (*Falco peregrinus anatum*) G4T3 S3B SZN**

Recorded from the Anvil Points Rim, Rifle Stretch Colorado River and The Meadows PCAs. Status: Federally Endangered, listed October 13, 1970; no state status. Description: this is a medium sized raptor with dark gray/brown back and a white chest with black streaks. The Peregrine Falcon saw widespread decline throughout its range in the late 1960s and into the 1970s. Although they've never been abundant, their numbers in Colorado became critically low in 1972. In that year, there were no breeding pairs in the state. These declines were traced to the effect that pesticides, particularly DDT, had on thinning of eggs and subsequent death of unhatched chicks due to egg loss. Primary threats include environmental toxins, habitat loss, human disturbance, and illegal take. Today the Peregrine Falcon is recovering from regional extirpation due to the effects of pesticide poisoning, and numbers currently are stable or increasing. The recovery objectives have been met in most areas and the bird is widely distributed, with large numbers of occurrences in remote wilderness. In Colorado, through intensive reintroduction efforts over the past 17 years, more than 300 American Peregrine Falcons have been released in various locations throughout the state, including downtown Denver. Throughout the 1990s Colorado has had approximately 24 breeding pairs of peregrines including nests near Anvil Points on the cliffs of the Roan Plateau active in 2000, a nest on the south rim of the Roan Plateau last active in 1986, and a nest west of Glenwood Springs in Glenwood Canyon active in 1999. The West Slope population of peregrines is stable and should increase naturally. Continued existence of Peregrine Falcons in Colorado is dependent upon protection of traditional nesting sites, identification and protection of critical habitat both for the breeding areas and for wintering, foraging, and roosting areas. Some additional relief to the peregrine's plight in Colorado can be provided by keeping the remaining nest sites free from human intrusions during nesting season (February through July) and by ensuring that land use changes protect habitat that supports the peregrine's prey species.

**BALD EAGLE (*Haliaeetus leucocephalus*) G4 S1B SZN**

Recorded from the Rifle Stretch Colorado River PCA and Kaiser Stevens Ditch PCA. Status: Threatened in both Colorado and Federally; listed March 11, 1967. Description: dark gray/brown body with white head and large yellow hooked bill. Threats include loss of habitat, poisons, and human intrusion. The Bald Eagle, so named because of its white head, is found only in North America, and is the continent's third largest raptor. Only the California condor, also on the federally endangered list, and the Golden Eagle are larger. Populations of this symbolic species are present in Colorado and according to recent surveys Bald Eagle populations seem to be making significant comebacks (Winternitz 1998). Like other raptor populations, DDT use after WWII is thought to have been a major cause for great declines in numbers. Since the banning of this pesticide and the listing of this species, on both state and federal ESA levels, recovery has seemed successful. Recently, due to the successful increase in Bald Eagle populations, the USFWS (US Fish and Wildlife Service) has called for a reevaluation of this species status in order to determine if it should be delisted from the Endangered species list. Historically, only two to three pairs of bald eagles nested in Colorado, but the nesting pairs have increased steadily since the 1980s to 38 confirmed nests in 1995 (Winternitz 1998). There were active nests along the Colorado River and near Carbondale in the mid-1990s, but they have not been successful since the early 1980s. It is probably just a matter of time before eagles successfully nest in these areas again. The state is a very popular wintering area for bald eagles. The annual midwinter count shows a stable population of 600 to 800 eagles. Two of these wintering areas occur in Garfield County, one at Carbondale and the other at New Castle. Eagle abundance declined nationally due to increased human impacts in primary nesting areas. These impacts included habitat destruction, illegal shooting and pesticide poisoning. To combat those problems in Colorado, existing nest sites and adjacent hunting areas must be kept free of human intrusion during the breeding seasons (February through July) and key areas must also be maintained along the major river systems like the Roaring Fork and Colorado Rivers for wintering Bald Eagles.

**BARROW'S GOLDENEYE (*Bucephala islandica*) G5 S2B, SZN**

Recorded from Trappers Lake PCA. Status: BLM Sensitive species: State Special Concern. Description: this waterfowl is puffy in appearance, with an oval-shaped head, steep forehead, and stubby triangular bill. Males have a white crescent on each side of the face. In Colorado, there are no apparent threats to this species and it is considered globally stable (G5), but Barrow's Goldeneye is ranked imperiled in Colorado (S2B) based primarily on small numbers of actual breeding localities, uncertain population status, and the small number of protected occurrences within Colorado. Breeding populations occur in the northern U. S., across Canada and in Greenland and Iceland. Monitoring efforts inadequately sample this species within the continent; however, Stokes and Stokes (1996) suggested that Barrow's Goldeneye were increasing in the western region. There are at least twelve confirmed or possible breeding occurrences documented in Colorado since the 1980s (Andrews and Righter 1992), from four northwestern counties. More recent attention to this species has resulted in additional breeding records, but its population trend is unknown. Two new records of this species were documented during this survey near Trappers Lake where breeding was documented in 1990. There are additional breeding records from the Flat Tops Wilderness at Wall and Twin Lakes from 1998 when 15 broods were observed and from 1990 at Crescent Lake where one brood was observed. Barrow's Goldeneye require standing snags or hollow trees for nesting as nests are usually built

in a natural tree cavity or abandoned woodpecker hole. They often nest in the same area in successive years. In fresh water habitats Barrow's Goldeneye will forage for aquatic insects, crustaceans, some plant food, small fishes, and fish eggs. Management practices calling for the removal of standing dead trees are detrimental to this species and practices degrading aquatic habitats (i.e. pollution and development of wetlands) in the vicinity of nests will negatively impact the species.

### **BLACK SWIFT (*Cypseloides niger*) G4 S3B**

Recorded from Hanging Lake and Rifle Falls State Park PCAs. Status: Forest Service Sensitive Species; no state status. Description: this swift is blackish overall, with a long slightly forked tail. Threats are unknown, but too little is known about the species to call it secure. Black Swifts could be called Colorado's most eccentric bird because of their penchant for nesting on rock faces in the coldest, dampest spots they can find. Because of the secluded and inaccessible placement of their nests studying these birds is difficult and much remains unknown about their distribution and habits (Stiles and Negret 1994). Globally this bird is widespread occupying greater than 1,000,000 sq. miles of the Americas. Winter range is poorly known; however, northern populations like those in Colorado may winter in South America (Stiles and Negret 1994). There are four breeding colonies of Black Swifts in Garfield County at Hanging Lake, No Name Creek, Rifle Falls State Park and Resurgence Cave. All of these colonies were active in 2000 with from 1 to 9 nesting pairs per colony. Black Swifts are colonial birds that nest behind or next to waterfalls and wet cliffs (Michael 1927, Knorr 1961, Foerster and Collins 1990). Nests are built in dark inaccessible sites with an unobstructed flight path (Knorr and Knorr 1990), and nest site persistence and tenacity is almost absolute (Knorr and Knorr 1990). The nest itself is a cup-like structure of mud, mosses and algae and in Colorado most nests are located on sheer cliff faces with waterfalls pouring down close to the nesting colony (Boyle 1998). Only one offspring is produced in a given year and hatchlings are fed all summer long, fledging in September. Although calculation of population size is difficult because of colony inaccessibility, it is estimated that over 200 nesting pairs occur in Colorado representing between 10% and 20% of the total nesting population of this species (Boyle 1998). This makes Colorado's population an important component of this bird's total population. Black swifts are tolerant of human disturbance as demonstrated by the pair at Rifle Falls State Park, but flowing falls and moist caves are a necessity for Colorado's nesting swifts. Practices that divert stream flows should be regulated to prevent complete loss of water flow at nesting falls and caves, and subsequent abandonment of breeding sites.

### **BOREAL OWL (*Aegolius funereus*) G5 S2**

Recorded from the following PCAs: Trappers Lake, Northwater Creek and East Fork Parachute Creek. Status: Forest Service Sensitive Species; no state status. Description: black facial border, chocolate streaking of underparts, and pale bill. Threats are primarily forest harvesting. The quiet of the Colorado high country is often disrupted by the call of this bird. The owl's clear, six to eight syllable, calls are often heard in subalpine forest above 9000 feet. This intriguing owl has inspired internet web pages on how to find Boreal Owls (Pulliam 1995). Boreal Owls are moderately widespread to widespread (10,000 to over 1,000,000 sq. miles) in North America; the wide range and apparently large numbers seem to make this species secure. There are 31 records

of nesting Boreal Owls in Colorado (Ryder 1998) with three records in Garfield County. These three records are scattered across the Roan Plateau and into the Flat Tops Wilderness Area and represent reports from throughout the 1990s. There are two additional non-breeding records from the Flat Tops at Skinny Fish Lake from 1993 and near Crater Lake from this survey. In Colorado these year round residents prefer dense coniferous forest of Engelmann spruce and subalpine fir above 9000 feet, most commonly in proximity to open grassy situations (AOU 1983), but lodgepole pine and aspen can be occupied. These owls roost in dense cover by day, in cool microsites in summer and frequently change roosting sites. The indirect effects of forest harvesting are a major threat to this species. Harvesting may reduce primary prey populations, remove forest structure used for foraging and eliminate nesting cavities (Hayward and Hayward 1993). Boreal Owls, however, are not very threatened range-wide and are not known to have difficulty with non-destructive intrusion. Large home ranges and low population densities require that preserves exceed 1000 sq. km of suitable habitat (Hayward 1989). Forests should be managed for both maintenance of snags and maintenance of aspen groves with large diameter trees. Uneven-age timber management may be compatible, but clear-cuts are not considered suitable habitat for foraging (Hayward 1989). Stewardship needs include furnishing nesting cavities and forest structure necessary for foraging in the long-term. Nest boxes are used extensively for mitigation but must be maintained over several hundred years before natural cavities become available (Hayward and Hayward 1993).

#### **BOREAL TOAD SOUTHERN ROCKY MOUNTAIN POPULATION (*Bufo boreas* pop. 1) G4T1Q S1**

Recorded from the following PCAs: Trappers Lake, The Meadows and North Fork Derby Creek. Status: Federal Candidate for Listing; State Endangered. Description: the skin is warty, parotoid glands are oval, cranial crests are absent or indistinct and there usually is a light strip along the middle of the back. A single adult boreal toad was observed in the wetlands along North Fork Derby Creek in 2000. There were approximately 206 historic localities for the Boreal Toad in Colorado. Presently, only three to four healthy populations exist in Colorado, composed of less than 20 high priority breeding occurrences. There are a total of 55 known breeding sites in the state. None of these breeding sites are from Garfield County and there are only 5 historical records, all from the Flat Tops, in the county. Populations have declined precipitately or disappeared over the past 20 years and continue to decline. The largest breeding population in Colorado is at Rocky Mountain National Park (RMNP) and it has declined from over 200 adults in 1998 to less than 10 individuals today. The reasons for the decline are unknown, however, the chytrid fungus, a fungal skin infection has recently been implicated in present declines. Of the three largest breeding populations in Colorado (Chaffee County, Henderson Mine-Clear Creek County, and RMNP), the populations at Henderson Mine and RMNP are infected with the fungus (Brad Lambert pers. comm.).

#### **COLORADO RIVER CUTTHROAT TROUT (*Oncorhynchus clarki pleuriticus*) G4T3 S3**

Recorded from the following PCAs: Northwater Creek, East Parachute Creek, Parachute Creek, Butler Creek, Main Elk Creek, Trappers Lake and Mitchell Creek at Storm King Mountain. Status: Forest Service and BLM Sensitive Species, State Special Concern. Description: this trout has bright red sides and a bright red stripe on each side of lower jaw. Threats include

hybridization, competition from nonnative trout, habitat alteration/fragmentation, overgrazing, logging, mining effluents, whirling disease and water diversion for irrigation. This subspecies is the only trout native to the upper Colorado River basin. Its native range extends southward to the Escalante River on the west and San Juan drainage on the east sides of the basin, including the Green, Yampa, Gunnison, Dolores, San Juan rivers, and their tributaries (CDOW 1986, Proebstel 1994, Young et al. 1996). Its current distribution includes remnant populations in Colorado, Wyoming, and Utah. Historically cutthroats inhabited most clear water streams and rivers of western Colorado (Behnke 1992), but now remain only in smaller order streams and a few high elevation lakes of the mountainous country. Presently there are approximately 42 populations in Colorado judged to be genetically pure (A category) (Proebstel 1994). Of these 42 populations one occurs within the survey area at Mitchell Creek at Storm King Mountain. There are seven additional populations in Garfield County with a B+ purity rating and another three populations with records dating prior to 1992 and considered historical. One additional large intermingled population of cutthroat trout occurs in Trappers, Northwater and the upper reaches of East Middle Fork Parachute Creek. New genetic measurements suggest that percent introgression with rainbow trout in this population is extremely low or absent suggesting a highly pure genetic strain of cutthroat trout. The primary reasons for conservation concern at the global and state levels are long-term trend prognoses and threats. Populations continue to decline in many streams (Young et al. 1996); hybridization between this subspecies and non-native trout species poses the greatest threat to the elimination of pure populations. Due to hybridization only 26% of the remaining populations of this trout are considered genetically pure (Young et al. 1996). Competition with non-native trout species and exotic fish diseases (e.g. whirling disease) also pose threats. Other concerns include interference with recolonization by established populations of non-native salmonids, and habitat alteration/fragmentation from overgrazing by livestock, logging, toxic effluents from mining and water diversion for irrigation (Spahr et al. 1991, Behnke 1992, Young 1995). This fish is susceptible to overharvest if angling is unrestricted. Management strategies include construction of fish barriers to prevent interbreeding with other trout, rehabilitation of both streambanks and water quality by controlling access of livestock to streamsides, elimination of non-native trout through chemical treatment and transplanting genetically pure cutthroat into rehabilitated habitat (Spahr et al. 1991). Colorado has instituted restrictive angling regulations (Young 1995).

#### **COLUMBIAN SHARP-TAILED GROUSE (*Tympanuchus phasianellus columbianus*)** **G4T3 S2**

This species was recorded from Anvil Points Rim PCA. Status: Forest Service and BLM Sensitive Species; no state status. Description: this grouse has barred underparts with a pointed tail and yellowish eye combs. The range of the Columbian Sharp-tailed Grouse extends across much of the upper Great Basin and Columbian Plateau (National Geographic Society 1987). Sharp-tails have declined greatly and now occupy less than 10% of their historic range. In general sharp-tails select big sagebrush communities that are least modified by livestock grazing (Saab and Marks 1992). Deciduous shrubs such as serviceberry in Colorado are critical for winter food and escape cover (see Saab and Marks 1992). A female with chicks was observed in big sagebrush-serviceberry community on the Roan Plateau in 1996. No sharptails were observed at this site during this survey, but the habitat is of high quality and populations of sharp-tails probably still occupy the site. Bunchgrasses and perennial forbs are important components of nesting and brood-rearing habitat (Saab and Marks 1992). There are at least 15



occurrences of the Columbian Sharp-tailed Grouse in the northwestern corner of the state (Andrews and Righter 1992). Monitoring data suggest that this subspecies may have once occurred in as many as 22 Colorado counties, but currently occurs in only five (Giesen and Braun 1993, Colorado Bird Observatory 1997). Loss of habitat and fragmentation due to rangeland conversion, herbicide treatment, mineral exploration and urban development may affect the continued viability of this subspecies in Colorado (Giesen and Braun 1993). For these reasons, the Columbian Sharp-tailed Grouse is globally vulnerable (T3) and imperiled in Colorado (S3).

#### **FERRUGINOUS HAWK (*Buteo regalis*) G4 S3B, S4N**

The Ferruginous Hawk was not recorded from any of the PCAs of Garfield County. Status: Forest Service and BLM Sensitive Species; State Special Concern. Description: rust back, paler head and a white tail washed with pale rust. The Ferruginous Hawk is widespread and relatively common in the appropriate habitat. The hawk prefers open country grasslands, shrublands, and deserts of North America (Bechard and Schmutz 1995). It winters in the southern U.S. and the northern interior parts of Mexico (Bechard and Schmutz 1995). Now rare in many parts of its range (Ehrlich et al. 1988), populations were stable in Colorado between 1979 and 1992 (Bechard and Schmutz 1995). The Breeding Bird Survey indicates a large increase within the continent and a stable population within Colorado (Mike Carter pers. comm.). About 1,200 birds winter in Colorado (Johnsgard 1990), comprising about twenty percent of the total winter population in the U.S. (Andrews and Righter 1992). Andrews and Righter (1992) reported about 150 nest sites in Colorado, primarily on the eastern plains. A rare breeding pair was documented on the west end of Garfield County in Garvey Canyon. This hawk is sensitive to disturbance during the breeding season (Bechard et al. 1990) and there are reports of nest abandonment due to human disturbance (Bechard et al. 1990). Local population declines are attributed to the effects of cultivation, grazing, poisoning small mammals, mining and fire in nesting habitats (Bechard and Schmutz 1995). Colorado's breeding population of Ferruginous Hawks is considered vulnerable (S3B) based on human reduction of the primary winter prey base (prairie dog colonies), small population size, and human encroachment into available habitat. Conversion of grasslands to intensive cultivation has reduced the amount of preferred habitat that is available and has been implicated in the population decline of the species in some areas (Faanes and Lingle 1995). Keys to management including providing suitable nest sites, protecting active nest areas from disturbance, and improving habitat for prey. Isolated trees and stringers should be protected from livestock in nesting habitat. Prescribed burning may increase habitat suitability in shrub-dominated areas, while practices that increase exotic plant species number or dominance should be discouraged. Nest sites should not be disturbed from 15 March to 15 July (Schmutz 1995) and public areas near nests should be closed to recreation during the breeding season (Lardy 1980). Grazing can provide benefits by reducing vegetative cover and making prey more visible (Gilmer 1986). Kantrud and Kologiski (1982) found highest densities of Ferruginous Hawks in heavily grazed areas in the northern Great Plains.

**FLANNELMOUTH SUCKER (*Catostomus latipinnis*) G3G4 S3**

Recorded from the Rifle Stretch Colorado River PCA. Status: BLM Sensitive Species; no state status. Description: this is an elongated sucker with overhanging ventral mouth and a thick upper lip; in clear water it has a greenish-blue-gray back fading to a yellow belly. Threats include alteration of the hydrologic and thermal characteristics of river habitats, blocked migration routes due to dam construction, hybridization with other *Catostomus* species and predation and competition by non-native fish species (Arizona Game and Fish Department 1995, 1996). The flannelmouth sucker is moderately widespread (10,000-1,000,000 sq. miles) and occurs throughout the Colorado River Basin, from southwestern Wyoming to southern Arizona. It is more widespread in the upper basin than the lower basin and declining in at least some areas. In Colorado this fish is found in the large rivers of western Colorado and in the study site it occupies the Colorado River from Rifle, Colorado downstream to the Mesa County and beyond. This species has disappeared from some water systems like the Gunnison River above Blue Mesa where it was displaced by the nonnative species white and longnosed suckers (Woodling 1985). Flannelmouth suckers hybridize with the humpback, white and longnosed suckers (Sigler and Miller 1963, cited by Oliver 1997). Elevated sediments, channelization, modified flow regimes, stream dewatering and contaminants have also contributed to reduced populations. This fish may be fairly resistant to nondestructive intrusion (W. Fertig pers. comm. 1997). Protection of this fish in Colorado requires prohibiting introduction of nonnative species to waters with stable populations of flannelmouth suckers and returning natural flow characteristics to the major rivers it now occupies.

**GRAY VIREO (*Vireo vicinior*) G4 S2B, SZN**

Recorded from the Middle Rifle Creek PCA. Status: no federal or state status. Description: this passerine is gray above, white below, has a gray eye ring, dull white lores and brownish wings with 2 faint bars. Threats are primarily destruction of piñon-juniper woodlands. Gray Vireos occupy some of the hottest, driest, and most inhospitable habitats in Colorado filling the surrounding landscape with the sweetest melody any vireo can sing (Bent 1950). The Gray Vireo is a migrant that breeds in southwestern North America and winters in western Mexico. Colorado includes the northeastern portion of its breeding range (National Geographic Society 1987). The Gray Vireo is characterized as an uncommon and very local summer resident in Colorado (Andrews and Righter 1992). A coarse estimate of this species' abundance is between 3,000 and 10,000 individuals. There are 56 records of Gray Vireos from at least 16 Colorado counties (Andrews and Righter 1992) with 19 confirmed breeding records (Kingery 1998). There are two occurrences of Gray Vireos in Garfield County, one from 1987 and the other updated during this survey and first documented in 1996. Historical management of piñon-juniper habitat may have negatively impacted the ecological integrity of piñon-juniper stands over large areas (Ron Lambeth, pers. comm.), and consequently may impact the Gray Vireo. The occurrence of wildfire may exacerbate the problem of weedy invasion into this bird's habitat. Although considered globally secure, few breeding occurrences, lack of knowledge on population status and limited range within the state are factors contributing to the S2B rank for breeding populations in Colorado. Considered of High Priority on AOU's 1996 WatchList (Carter et al. 1996).



Figure 41. American Peregrine Falcon



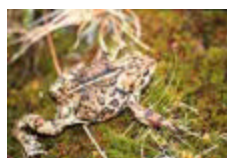
Figure 42. Boreal Owl



Figure 43. Bald Eagle



Figure 44. Boreal Toad



Top: tadpoles  
Bottom: adult



Figure 45. Barrow's Goldeneye



Figure 46. Colorado River cutthroat



Figure 47. Columbian Sharp-tailed Grouse



Figure 48. Black Swift

### **GREAT BASIN SPADEFOOT (*Spea intermontana*) G5 S3**

Recorded from the Rifle Stretch Colorado River and Parachute Creek PCAs. Status: BLM Sensitive Species; State Special Concern. Description: the pupil is vertically elongate in bright light with a glandular lump directly between the eyes. The Great Basin spadefoot, as its name implies, is endemic to the Great Basin. Colorado defines the southeastern edge of this species' range (Stebbins 1985). There are 10 to 20 locations totaling 3,000 to 10,000 individuals in four western Colorado counties north of the Uncompahgre Plateau. There are four historical records of Great Basin spadefoots in Garfield County, most dating from the turn of the century and one from 1972. There is a more recent record (1996) at Ripley Gulch in the Parachute Creek drainage. This species is considered vulnerable (S3) because of its small range in Colorado and the limited number of occurrences.

### **GREATER SANDHILL CRANE (*Grus canadensis tabida*) G5T4 S2B, S4N**

This species is recorded from the Rifle Stretch Colorado River PCA. Status: Forest Service Sensitive Species; State Threatened. Description: the adult is gray overall with dull red skin on the crown and lores. The Greater Sandhill Crane winters in southern North America and Central America and breeds in northern North America (National Geographic Society 1987). Sandhill Cranes are abundant spring and fall migrants in the San Luis Valley and occasional to irregular migrants along river valleys of the eastern plains, and valleys and parklands of the western mountains of Colorado (Andrews and Righter 1992). Renner et al. (1991) reported 50 known breeding occurrences and approximately 118 recorded nest sites. In the San Luis Valley, peak migration counts may be as high as 17,000 individuals. Non-breeders very rarely summer in the San Luis Valley (Andrews and Righter 1992). The Breeding Bird Survey indicates a large continental increase (>3% per year) for Sandhill Cranes (Mike Carter pers. comm.), but does not distinguish the Greater subspecies (*G. c. tabida*). A pair of Greater Sandhill Cranes was observed along the Colorado River (Rifle Stretch Colorado River PCA) in appropriate breeding habitat in 1997, but breeding has never been confirmed here. The draining and subsequent vegetative encroachment on preferred mud flats and sandbar habitats in river and meadow systems along migratory routes is a key conservation concern for this species in Colorado (Renner et al. 1991). Availability of spilled grains in adjacent agricultural areas is an additional conservation consideration for this species in Colorado. Breeding populations of this species in Colorado are ranked S2B because of the restricted range and relatively low numbers of breeding occurrences. The Colorado Division of Wildlife monitors nesting activity of this species.

### **KIT FOX (*Vulpes macrotis*) G4 S1**

This species has been documented at the Prairie and South Canyons PCA. Status: no federal status; State Endangered. Description: a small dainty fox with relatively larger appearing ears. The kit fox occurs across the American southwest into north central Mexico. Colorado represents the eastern edge of the kit fox's continental range. This species is known from a restricted range in the Colorado River Basin and the southwest corner of the state (Fitzgerald et al. 1994). The species was likely never common or widespread in Colorado. The kit fox is a secretive species and may be difficult to detect, but it is likely that numbers are small. A verified specimen of a road-killed kit fox was taken from the Colorado National Monument in 1998, and

a small colony is currently being studied in the vicinity of Delta, Colorado (Fitzgerald et al. 1994). Surveys have not been conducted over large areas of its range, but CDOW and the University of Northern Colorado are presently investigating this species' distribution and status (Fitzgerald et al. 1994). Kit fox primarily inhabit open desert, shrubby or shrub-grass habitat and usually feed on the most abundant nocturnal rodent or lagomorph in the area (e.g. *Dipodomys* spp., *Lepus* spp.). Observations of kit foxes have occurred sporadically in appropriate habitat in western Garfield County over the past 20 years, but recurrent breeding populations have never been verified. No kit fox were observed during this survey. Agricultural conversion and urban encroachment into low elevation native habitats, trapping, shooting, poisoning, and coyote predation according to O'Farrell (1987) and O'Neal et al. (1986) (in Fitzgerald et al. 1994), are all factors thought to have negative impacts on kit fox populations. The kit fox is apparently secure globally (G4), but critically imperiled (S1) in Colorado due to its extremely narrow range and lack of recent observations.

### **LONGNOSE LEOPARD LIZARD (*Gambelia wislizenii*) G5 S1**

This Species was recorded at the Mitchell Road PCA during this survey. Status: no federal or state status. Description: in adults the dorsum is light brownish-gray with numerous-gray spots (light lines across back fade with age). The longnose leopard lizard ranges across the Great Basin and throughout the southwestern U.S. from Idaho south to northern Mexico, including all of Baja California (Stebbins 1985). Colorado occupies the eastern margin of the range. This species occurs only in Garfield, Mesa, and Montezuma counties (Hammerson 1999). There are 26 localities (CNHP 1997) known in Colorado (Hammerson et al. 1991). There are four records of longnose leopard lizards in the CNHP database dating from the early 1960s and 80s in extreme southwestern Garfield County. An adult was also observed in this same area near Mitchell Road during this survey. The apparent habitat includes greasewood and sagebrush stands containing low plants on deep sandy soils and especially areas with abundant rodent burrows (Hammerson 1999). There are no quantitative estimates of abundance or trends, however, repeated searches at occupied sites have revealed low numbers and suggested declines (Geoff Hammerson pers. comm.). They are carnivorous, feeding mainly on insects, but will also eat lizards, small rodents, and some plant material (Stebbins 1985). Although habitat is common, much of it shows reduced suitability due to cheatgrass invasion. There is little information on the viability of known occurrences (Hammerson 1999). Due to the apparently low numbers, limited Colorado range, and threats from expansion of cheatgrass, the species is considered state-imperiled (S1).

### **LYNX (*Lynx canadensis*) G5 S1**

Not recorded in any PCA, but has the potential to occur throughout the Flat Tops Wilderness Area. Status: considered for listing, Forest Service Sensitive, State Endangered. Description: this is a large carnivorous feline averaging 13 kilograms in weight, with distinctive facial hair tufts below each cheek. Lynx are widespread (greater than 1,000,000 sq. miles) and range widely in northern North America. Declines have occurred in some populations, but lynx are apparently still widespread and relatively abundant in most of their historic range, though population data are lacking for many areas. Habitat loss/fragmentation and susceptibility to overharvest are the major concerns. USFWS (Federal Register, 26 August 1994) found that

federal listing of the North American population may be warranted and initiated a formal status review. USFWS (Federal Register, 27 May 1997) determined that listing of the contiguous U.S. population is warranted but precluded by other higher priority actions. Lynx are permanent animals that range over large areas. In Colorado, fewer than 50 records have been documented, most of which are historical. An ongoing recovery program has released lynx in the San Juan Mountains of Colorado over the last two years (1999, 2000). A lynx was sighted in 1998 at Dome Peak near the Flat Tops Wilderness Area in the White River National Forest. Lynx are considered globally secure (G5) but critically imperiled (S1) in Colorado due to an extremely small population size, few occurrences, and significant threats (e.g. habitat fragmentation, increased backcountry access by humans, and habitat conversion). Hunting of lynx has not been allowed in Colorado since 1971 (CDOW draft 1997). Threats include loss of habitat due to suppression of forest fires, intensive logging, development, increased human access via logging roads, past overharvest and possible displacement by bobcat and coyote. Protection of large, continuous blocks of public land with minimal development or roads providing vehicular access will be critical for survival of reintroduced lynx (Ruggiero 1994). Management providing spruce-fir stands that support populations of snowshoe hares should also benefit lynx reintroduction (Ruggiero 1994).

#### **MIDGET FADED RATTLESNAKE (*Crotalus viridis concolor*) G5T4 S3?**

There are historical occurrences of this snake dating to the 1970s at the Divide Creek and Parachute Creek PCAs. Status: BLM Sensitive Species, State Special Concern. Description: 23-27 dorsal scale rows,  $\geq 13$  scale rows at mid-tail, upper cream colored/yellowish, and rarely exceeds 26". Threats are primarily indiscriminate killing by humans. This subspecies ranges from southern Wyoming and eastern Utah south to the Four Corners area (Stebbins 1985). The Colorado range occurs from Moffat County south to Montrose County (Hammerson 1999). Colorado is at the eastern margin of the subspecies' range. In Colorado, it occurs in west central Colorado in Mesa, Delta, Garfield, Montrose, and San Miguel counties. Besides the previously mentioned historical records there are two records from the mid-1990s, one from Hubbard Mesa north of Rifle and one in the canyon of the Colorado River between Rifle and Parachute. The midget faded rattlesnake is found within most habitats in the range (Hammerson 1999). There are approximately 40 localities documented from Colorado (Hammerson 1999) with many others likely to be found. Threats to this snake are generally low, but many individual populations are highly threatened from human encroachment near urban areas. Most humans, who often go out of their way to destroy individuals or dens when discovered (Hammerson 1999), revile rattlesnakes. Historical alteration and current residential expansion in the Grand Valley create threats to rattlesnake populations. Also, there is possible intergradation with *C. v. viridis* in northwestern and southwestern Colorado (Lauren Livo pers. comm., Hammerson 1999). This subspecies is considered vulnerable (S3) largely because of threats from human destruction. There are no rangewide estimates available, however, midget faded rattlesnakes are visibly common in much of west central Colorado (Chris Pague pers. obs.). Trends are difficult to estimate across the state. It is likely that the species was severely depleted with the near eradication of large prairie dog towns on the plains. The rapid population growth of Colorado is most likely negatively impacting this subspecies where it occurs.





Figure 49. Ferruginous Hawk



Figure 50. Greater Sandhill Crane



Figure 51. Flannelmouth sucker



Figure 52. Kit fox



Figure 53. Gray Vireo



Figure 54. Great Basin Spadefoot



Figure 55. Longnose leopard lizard



Figure 56. Lynx

**MOUNTAIN WHITEFISH (*Prosopium williamsoni*) G5 S3**

This fish occurs in the Colorado River at the Rifle Stretch Colorado River PCA. Status: no federal or state status. Description: this fish possesses an adipose fin and an axillary process, and is long, slender and nearly cylindrical. Silvery overall, it is dark brownish to olive or greenish to blue gray above, with scales that often have dark borders and ventral and pectoral fins that may have an amber shade in adults. This species ranges from Canada's Northwest Territories, south into the northwestern U.S., south to Nevada, Utah and Colorado (Page and Burr 1991). Colorado is at the southeastern periphery of the species' range. In Colorado this species is known from relatively few occurrences on the western slope in the Yampa and White rivers, but is considered common in Lodore Canyon on the Green River (Kevin Bestgen pers. comm.). Mountain Whitefish have been found in the Colorado River between Rifle and Debeque Canyon, but this is marginal whitefish habitat and it amounted to about 5% of the total fish caught during electroshocking surveys in 1994 and 1995. They prefer cold mountain lakes (to depths of at least 10 m) and fast, clear or silty streams with large pools. Stream populations spawn in riffles over gravel and small rubble. Lake populations move into tributaries to spawn or seek gravel shallows in lake. Eggs stick to bottom substrate and nests are not constructed. Whitefish are bottom-oriented predators (Moyle 1976), but will occasionally feed at the surface (Sigler and Sigler 1987). Whitefish actively feed on aquatic and terrestrial insects, some fish eggs and occasionally on fishes. There are no quantitative data that indicate the species trends, however, there is no evidence of declines (Kevin Bestgen pers. comm.). The mountain whitefish is considered vulnerable (S3) in Colorado because of its limited range and relatively few documented occurrences.

**NORTHERN GOSHAWK (*Accipiter gentilis*) G5 S3B**

Recorded from the following PCAs: Deep Creek, Four Mile Creek at Sunlight and Main Elk Creek. Status: Forest Service and BLM Sensitive Species; no state status. Description: broad white eye stripe separates dark crown from blue-gray back, underparts white with gray barring. Threats include logging, management for young-structured forests, and forest fragmentation. The Northern Goshawk is a widespread species (greater than 1,000,000 sq. miles) found year-round throughout most of Canada, Alaska, western and northeastern U.S., as well as into Mexico (Squires and Reynolds 1997). It winters south to the northern Great Plains states and the eastern edge of the Rocky Mountains (Squires and Reynolds 1997). The Northern Goshawk is found throughout the state of Colorado, above 7500 feet (Andrews and Righter 1992). In winter, the Northern Goshawk may occur more broadly than during the breeding season. This secretive bird is difficult to census, but its habitat is extensive. Northern Goshawks are a rare to uncommon resident in the foothills and mountains (Andrews and Righter 1992). In Colorado there are estimated to be less than 100 occurrences, most of which are historical. Nevertheless, there have been 62 nest sites reported from Colorado's national forests. Abundance for this species, as a very rough estimate, is approximately 1,000 to 3,000 individuals in Colorado. A total of eight Goshawk nests have been identified in the White River National Forest, Flat Top Wilderness-Routt National Forest and on BLM land in the eastern half of Garfield County. In the 1990s nesting activity has been identified at eight of these nests most recently at two nests in 1998. There are few data on trends, but forest fragmentation and development appear to have caused some declines. Timber harvest is considered a possible threat to nesting populations (Reynolds et al. 1992). Breeding Bird Survey results exhibit a non-significant downward trend for the



continent (Colorado Bird Observatory 1997). Forest fragmentation and development, small estimated population, and lack of detailed knowledge are factors that contribute to this species rank of vulnerable within the state (S3B). Protection needs are still being debated among experts. Critical habitat needs better definition for the various parts of the range before protection needs can be clearly detailed. However, in general, protection of large, mature to old-growth forest tracts should be beneficial. Stewardship requires that in suitable habitat, unnatural forest fragmentation should be avoided.

#### **NORTHERN LEOPARD FROG (*Rana pipiens*) G5 S3**

This frog has been documented from the Rifle Stretch Colorado River PCA. Legal Status: Forest Service and BLM Sensitive Species; State Special Concern. Description: this is a green or brownish frog, with oval or round dark dorsal spots, a white stripe on its upper jaw, and a white or cream colored underside. Threats include habitat loss, commercial overexploitation, and competition/predation by bullfrogs. This frog has a large range throughout much of the U.S. and southern Canada. It is still common in many areas and in a diverse array of pristine and disturbed habitats; populations have declined in some areas due to habitat loss and degradation, overexploitation, interactions with non-native species, and unknown causes, but the overall range remains essentially undiminished. Most locational records in Colorado are below 11,000 feet elevation (CDOW 1994). This species inhabits many aquatic and wetland habitats (Hammerson 1999). There are 15 records from the late 1990s of northern leopard frogs spread throughout Garfield County, including four at the Rifle Stretch Colorado River PCA. Apparent trends for this frog are puzzling. This species has become scarce in many areas of Colorado where it was formerly abundant (Hammerson 1999, Corn 1994) and has been extirpated from several sites (Lauren Livo pers. com.). However, the species has returned to some areas that previously suffered substantial declines (Steve Corn pers. comm.). Reasons for population declines are not known but appear to be complex. Bullfrogs have been suggested as causing declines, but declines and local extinctions have occurred in areas where bullfrogs are not present (Hammerson 1999, Livo 1994). While still common, conservation concern for the northern leopard frog stems from the declining trends and poorly defined, but apparent threats. There are estimated to be less than 100 occurrences in Colorado, most of which are historical. Population in the state is estimated to be between 3,000 and 10,000 individuals. Trends for this species are unclear, although local trends are variable, and the overall population in Colorado appears to be declining. Decline in the Rocky Mountains (Corn et al. 1989) is not due to acidification of breeding habitats (Corn and Vertucci 1992). Laboratory results suggests that there may be an interaction between crowding, temperature, and mortality from bacterial infection (e.g., red-leg disease).

#### **PALE LUMP-NOSE BAT (*Corynorhinus townsendii pallescens*) G4T4 S2**

Recorded from the following PCAs: Rifle Falls State Park, Main Elk Creek West and Deep Creek. Status: BLM Sensitive Species; no state status. Description: large ears (30-38mm), brown-grayish hair, with protruding glandular masses between eyes/nostrils. Threats include human disturbance at nursery colony or hibernacula. *Corynorhinus townsendii*, is a widespread (greater than 1,000,000 sq. miles) and evidently secure species that occurs in lower elevation piñon-juniper woodlands, semi-desert shrublands and montane forests of the western United

States south into Mexico. Colorado represents the edge of this species' range (Fitzgerald et al. 1994, Armstrong et al. 1994). Individuals of this subspecies are non-migratory and winter in roost colonies, and in summer, males tend to roost as individuals in rock crevices and on walls, separate from the nursery colony (Fitzgerald et al. 1994). Because winter mortality is a leading factor limiting population growth, conservation actions should include limiting disturbance of abandoned mines and cave sites used for hibernacula by using grates to limit human access (Armstrong et al. 1994, Fitzgerald et al. 1994). Mine closures may cause a decrease in population as well (Kirk Navo pers. comm., Armstrong et al. 1994). This species is considered imperiled in Colorado (S2) because of the low numbers of individuals encountered for a colonial species, low population size and high threats. There are approximately 20 non-historical occurrences in Colorado. Several locations have dozens to hundreds of individuals (Armstrong et al. 1994). There are four occurrences of pale lump-nose bats in Garfield County from the late 1990s including observations at the Teakee Mine on Main Elk Creek West, a mine near Rifle Falls State Park, Groaning Cave and Hubbard Cave. Bats have been documented roosting at all of these sites. Insufficient data exist to describe population trends of this subspecies in Colorado, but historical sites seem to be abandoned or greatly reduced in size (Kirk Navo pers. comm.). This species is moderately threatened range-wide. It is extremely fragile and primary threats include loss of habitat (e.g., reclamation of abandoned mines), vandalism, and increased visitation (spelunking) by humans to maternity roosts and hibernacula. Large clusters or colonies are susceptible to disturbance and have been declining (CDOW 1984). Human access to mines and caves disrupts wintering populations, where disturbance needs to be minimal (Armstrong et al. 1994, Fitzgerald et al. 1994). Proper stewardship requires continuing inventories, via bat surveys, to identify the hibernacula of this species. Protection of natural hibernacula from disturbance is a necessity if this species is to survive in Colorado. Occupied roosts need to be protected from disturbance (May to mid-September for maternity roosts, October-April for hibernacula).

#### **PLATEAU STRIPED WHIPTAIL (*Cnemidophorus velox*) G5 S4**

None of the records for this whiptail occur in any PCA in Garfield County. Status: no federal or state status. Description: this whiptail has a long slender body and tail, with 6-7 light stripes on its back and sides. No threats have been identified for this whiptail. This species is endemic to the Colorado Plateau and occupies southern Utah, western Colorado, northern Arizona, and northern New Mexico; from elevations of about 4,500 to 8,000 feet (Stebbins 1985). Of interest is that plateau striped whiptails are a nearly all-female species and eggs develop without being fertilized by male sperm, a process called parthenogenesis. There are at least 30 occurrences known, and based on the distribution of habitat, likely to be many more (Pague 1996). A plateau striped whiptail was observed at Demaree Canyon during this survey and seven whiptails were observed in the Colorado River Canyon on Webster Mesa, below Anvil Points in 1996. Plateau striped whiptails are common in appropriate habitat, however, quantitative estimates of population size are not available. Although quantitative trend data are not available, there are no indications that this species is other than stable in western Colorado. Many occurrences are considered protected on public lands, largely those managed by the BLM. There are no known threats to this species in Colorado. Plateau striped whiptails inhabit piñon-juniper woodland, open chaparral, oak woodland, lower elevations of ponderosa pine and fir forests and lowland riparian woodlands (Stebbins 1985, Hammerson 1999). Plateau striped whiptails are active from

May to September (hatchlings may be active through mid-October, or later), feeding on a variety of insects (Hammerson 1999).

### **RAZORBACK SUCKER (*Xyrauchen texanus*) G1 S1**

This species occupies the Colorado River including the Rifle Stretch Colorado River PCA. Status: Endangered both in Colorado and Federally. Description: this is a sucker (fish) with a sharp keel on the nape of the neck, that can grow to 91 cm in length. Razorback suckers are confined to the Colorado River system, where a large decline has occurred due mainly to alteration and destruction of habitat by dams and interactions with non-native fishes. Razorbacks were historically widespread and common in warm water reaches of many medium and large-sized streams and rivers of the Colorado River Basin from Wyoming south to Mexico. They were more common in the lower than the upper Colorado River Basin (Behnke and Benson 1980). The Colorado distribution included the lower Yampa, Green, Colorado, Gunnison, Dolores, and San Juan rivers (Tom Nesler pers. comm., Kevin Bestgen pers. comm.). Colorado's populations are in the upper limits of the watershed distribution. The razorback sucker remains in the lower Green, lower Yampa, and occasionally in the Colorado River near Grand Junction (Bestgen 1990). In 1998 and 1999 a total exceeding 50,000 razorback suckers were released into the Upper Colorado River Basin including 25,000 just north of Parachute, Colorado (Bob Burdick pers. comm.). Habitats include slow areas, backwaters and eddies of medium to large rivers. Razorbacks utilize flooded lowlands and lower portions of tributary streams as resting-feeding areas during breeding season (Tyus and Karp 1990). Razorbacks are often associated with sand, mud and rock substrate in areas with sparse aquatic vegetation, where temperatures are moderate to warm (Sigler and Miller 1963). In nonbreeding season, adults are most common in shoreline runs and along mid-channel sand bars, with average water depth of less than 2 m and average velocity of less than 0.5 m/sec (Tyus and Karp 1989). They are planktonic, plantivorous and benthic feeders consuming algae, crustaceans and aquatic insect larvae. The razorback sucker is considered critically imperiled at the global (G1) and state levels (S1). A number of problems confront razorbacks including habitat change (e.g., high winter flows, reduced high spring flows, altered river temperatures and reduced flooding resulting primarily from dam construction), competition and especially predation on larvae and juveniles by introduced fishes (USFWS 1990), paucity of spawning adults and hybridization with other suckers (Tyus and Karp 1990, Minckley et al. 1991). See USFWS (1990) for many details on habitat changes that have affected this species. Primary factors justifying the ranks include a greatly reduced range, very low number of breeding occurrences, and the fisheries management problems previously listed.

### **ROUNDTAIL CHUB (*Gila robusta*) G2G3 S2**

Recorded from the Rifle Stretch Colorado River PCA. Status: Endangered both in Colorado and Federally. Description: this is a moderately streamlined minnow with silvery shading dorsally to dusky yellow or light green; adults can reach 18 inches in length and 2 pounds in weight. Roundtails have declined significantly in many areas due to habitat alteration and the introduction of exotic species. The roundtail chub is endemic to the Colorado River Basin, occurring in large streams and intermediate sized rivers throughout the basin (Woodling 1985, Page and Burr 1991). In Colorado, this species occurs in the Colorado River and its larger tributaries, including the White, Yampa, Dolores, San Juan, and Gunnison rivers (Woodling

1985). Colorado populations are at the upstream margin of the species' range and comprise the majority of occurrences for this species. It is estimated that there are less than 20 occurrences of this species in Colorado. The roundtail chub occurs in the Colorado River within the study area from Rifle, Colorado downstream to Mesa County and beyond. It was common above Rifle, but now is mainly found in the lower Colorado River Basin below Debeque Canyon. Roundtails represents approximately 10% of total fish occupying the upper Colorado River Basin (Anderson 1997). Threats include low water temperatures attributed to coldwater releases from dams, that possibly affect reproductive patterns (Woodling 1985, Vanicek and Kramer 1969). Interactions of watershed changes, such as reductions in suitable habitat due to impoundment, channel downcutting, substrate sedimentation, water diversion, groundwater pumping and displacement through invasion of non-native predatory and competitive species (Hubbs 1954, Miller 1961, Minckley and Deacon 1968, Meffe 1985). This species is considered vulnerable at the global (G2G3) level and very vulnerable at the state (S2) level because of its restricted range and continued threats to its habitat. The importance in retaining a natural flow regime in southwestern streams has been emphasized repeatedly (e.g., see Meffe and Minckley 1987, Minckley and Meffe 1987). Existing populations should be carefully monitored and protected by eliminating detrimental water and land use practices and exposure to non-native fishes. Large stream areas (in the scale of kilometers) that incorporate diverse habitats (pools, riffles, runs, backwaters, adequate substrate, and current diversity) must be preserved. Proper management requires protection of existing populations not infected by non-native fishes by building fish barriers or enhancing natural barriers. Barrier design should not significantly alter stream flow and the potential impact on natural upstream and downstream movements of native fishes should be assessed; appropriate agencies and the Desert Fishes Recovery Team must approve barrier design. Proper management and maintenance of riparian zones are essential to this native fish.

#### **SAGE GROUSE (*Centrocercus urophasianus*) G5 S4**

A population of Sage Grouse inhabits the Roan Plateau, Skinner Ridge PCA. Status: BLM Sensitive Species, State Special Concern. Description: a very large grouse with a blackish belly and long pointed tail feathers. Threats include habitat loss, fragmentation, degradation of sagelands by development, agriculture and grazing. Sage Grouse range across much of the Colorado and Columbia Plateaus. Colorado is in the southeastern portion of that range (Andrews and Righter 1992). The range and numbers of this species remain high, though there is evidence of significant declines and available habitat has become more fragmented and degraded, in part due to the application of fire and herbicides on sagebrush habitats (Braun et al. 1994). Additionally, piñon-juniper forests encroaching upon sagebrush parks due to long-term fire suppression in those forests may be a significant factor influencing the decline (Ron Lambeth pers. comm.). This species because of its broad distribution is considered secure globally (G5), and it is apparently secure (S4) in the state, occupying much of northwestern Colorado. The range of this species is now restricted due to habitat loss resulting from sagebrush eradication, grazing of livestock, agriculture and land development. Populations have declined in some areas, apparently in response to widespread treatment (chaining, spraying and burning) of sagebrush-dominated rangeland to benefit livestock production (see Ritchie et al. 1994). Use of organophosphorus insecticides on agricultural lands adjacent to sagebrush resulted in grouse die-offs in southeastern Idaho (Blus 1989). Existing populations have become smaller and more fragmented. The Bureau of Land Management has proposed purchase of private lands and

CNHP supports that land purchase. Protection of identified seasonal habitats (wintering, breeding, nesting and brooding) are a must for continued existence of this species in Colorado.

**SAGE SPARROW (*Amphispiza belli*) G5 S3B, SZN S2**

Recorded from the Cow Ridge and Prairie and South Canyons PCAs. No legal status.

Description: a sparrow with a gray-brown head, white eye ring, white lore spot or eyebrow, back is buffy brown with dusky streaks, and the underparts are white, with a central dark spot.

Threats are primarily the loss of sagebrush shrubland habitat. This wide spread sparrow (greater than 1,000,000 sq. miles) has a large range in the western U.S. and Mexico and is fairly common and stable in many areas, with local declines. The breeding range for the Sage Sparrow extends primarily across the Great Basin and onto the Columbia Plateau, but the species is also a permanent resident west over the Sierras and onto the California coastline (National Geographic Society 1987). Sage Sparrows occur locally in the lower elevation sagebrush steppes of western Colorado (Andrews and Righter 1992, Ron Lambeth pers. comm.). There are fewer than 100 occurrences of this species in Colorado. There are at least 12 occurrences in Mesa County and perhaps more than 50 in Moffat county (Ron Lambeth pers. comm.). There are four records of Sage Sparrows dating to the late 1980s from western Garfield County including the Cow Ridge PCA, Dry Canyon Wash and East Salt Creek. There is an additional record from the Prairie and South Canyon PCA from 1994 and a group of Sage Sparrows were observed during this survey in the vicinity of Mount Logan. There are no data indicating declines or increases of this species in Colorado and its population appears to be stable. This species occurs only locally (surprisingly), despite the abundance of available habitat (Andrews and Righter 1992), which may suggest that it selects for particular habitat features as yet unknown to us. Breeding populations of Sage Sparrows are ranked S3B within the state because of a loss in sagebrush shrubland habitat occurring throughout its range and the species' relatively low numbers.



Figure 57. Mountain whitefish



Figure 58. Plateau striped whiptail



Figure 59. Northern Goshawk



Figure 60. Roundtail chub

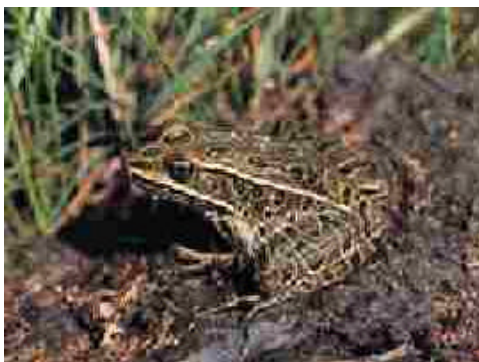


Figure 61. Northern leopard frog



Figure 62. Sage Grouse



Figure 63. Pale lump-nose bat



Figure 64. Sage Sparrow

#### **SPOTTED BAT (*Euderma maculatum*) G4 S2**

A spotted bat was documented on BLM land in the Deep Creek PCA at Lasunder Cave. Status: Forest Service and BLM Sensitive Species; no state status. Description: this bat has huge pink ears, a blackish dorsum with white shoulders and rump. There is insufficient information to adequately define threats. This moderately widespread (10,000-1,000,000 sq. miles) western North America bat may be more common than formerly believed, but abundance, population trend and threats are essentially unknown. The spotted bat occurs in ponderosa pine woodlands, piñon-juniper woodlands and open semi-desert shrublands of the southwestern United States and Mexico. The elevation range of this species is broad, from below sea level up to 10,600 feet (Fitzgerald et al. 1994). Colorado represents the eastern edge of the spotted bat's range (Fitzgerald et al. 1994). Although this species is considered extremely rare in the state, new methods of identifying bats by their echolocatory calls may increase the number of records documented for this species along the western slope (Navo et al. 1992). No breeding records exist in Colorado and there are insufficient data to determine population trends, however, with increased survey efforts, more spotted bats will probably be identified (Kirk Navo pers. comm.). This species has been found to roost in crevices on cliff faces, but the winter status of the spotted bat is poorly understood (Armstrong et al. 1994). The spotted bat is ranked as imperiled in Colorado (S2) primarily because of the small number of occurrences, assumed small population size and its restricted state range. There are fewer than 20 occurrences of this species in Colorado, and it is known in Colorado from only a few individuals. The observation at Lasunder Cave is from 1987 and this species has not been recorded there since. Population trends are not known for Colorado and due to the lack of sufficient information, only speculations can be made about threats. Habitat destruction, such as construction of dams that inundate high cliffs and canyon walls, possibly is a threat (Snow 1974) and the use of pesticides also may be detrimental.

#### **THEANO ALPINE (*Erebia theano*) G4 S3**

This species is documented at the Trappers Lake PCA in Garfield County. Status: no federal or state status. Description: the theano alpine is 1.25-1.5 in. in length, dark brown in color with a submarginal row of red spots across both wings. There are no clear threats to the theano alpine. This butterfly is widespread occupying greater than 1,000,000 sq. miles of North America, but it is a local arctic species, also occurring in the alpine of the Rocky Mountains. Because of its widespread but local distribution, some groups are quite isolated. There are widely scattered colonies of the theano alpine in the Rockies as far south as the San Juan range of southern Colorado. Approximately 14 colonies are reported from six Colorado counties including Hinsdale, Boulder, Clear Creek, San Miguel, Gilpin and Garfield. In Garfield County a theano alpine colony was documented in 1996 near Wall Lake in the Flat Tops Wilderness Area. Although we surveyed historical locations of this species in Garfield County none were observed. The theano alpine inhabits small marshes or wet meadows in alpine zone; also, taiga and grassy openings in pine forests. Host plants are from the family Poaceae. This relatively permanent and resistant species is unthreatened on a range-wide basis, although it may be threatened in minor portions of its range; particularly from grazing pressures of sheep in alpine zones and subsequent reduction in distribution of host plants.

#### **TREE LIZARD (*Urosaurus ornatus*) G5 S4**

This species is not known from any of the established PCAs. Status: no federal or state status. Description: this lizard is identified by dark crossbars on its back, back scales of irregular sizes, a skin fold across the throat, the blue belly patch on the sides of males and the male's blue throat. This species occurs from southwestern Wyoming to Texas and into Mexico and occupies habitat that is relatively inaccessible to humans. Tree lizards are found from the desert to lower edge of spruce-fir zone. The western slope has many documented occurrences. No threats have been identified for this species and it is considered protected in an abundance of public lands. There are more than 50 known localities (Hammerson 1999) with numerous others expected to occur in Colorado. Tree lizards are probably more numerous than records in Colorado indicate, they are not as numerous as the fence lizard and sagebrush lizard. Tree lizards are found in 11 Colorado counties, comprising approximately 20% of the State (Hammerson 1999). A study conducted by CDOW from 1994 to 1996 documented tree lizards at three sites near Rifle, Colorado including Elk Creek, Cottonwood Canyon and the Colorado River Canyon three miles west of Rifle. Trends are not documented, but there are no suggestions of declines and many occurrences are on protected public lands. However, there are several populations that are likely being impacted by sprawling communities such as Grand Junction, Cortez, and Delta.

#### **WESTERN YELLOWBELLY RACER (*Coluber constrictor mormon*) G5T5 S3**

This subspecies of the racer is documented at the Middle Rifle Creek and Parachute Creek PCAs. Status: no federal or state status. Description: adults are plain brown or olive with large eyes and a plain yellow or cream venter. The yellowbelly racer occurs from British Columbia south to southern California and east to Colorado (Stebbins 1985). Colorado is at the southeastern edge of this subspecies' range, where it is known from the counties along Colorado's western edge (Hammerson 1999, Livo et al. 1996). There are no quantitative data on abundance and trends, but anecdotal observations suggest that the western yellowbelly racer is relatively abundant in some places and has been observed over many years in the same areas. This subspecies occurs in Garfield County from approximately New Castle, Colorado to the Utah border. There are ten reported occurrences of the yellowbelly racer in this area dating from 1960 including a 1996 record near New Castle, a 1998 record in Spink Canyon and a 1999 record from the Middle Rifle Creek PCA. The western yellowbelly racer occurs below 5,500 feet in a wide variety of habitats including meadows, prairies, open chaparral, piñon-juniper woodland, riparian woodland, semidesert shrublands, agricultural lands and riparian habitats (Hammerson 1999). They lay their eggs in rock talus or abandoned mammal burrows 5 to 7 cm below the surface (Nussbaum et al. 1983). Yellowbelly racers are carnivores feeding on crickets, grasshoppers, reptiles, frogs and small mammals. Conservation concern stems from threats of road mortality and human residential expansion. More information on the distribution and abundance of this snake would clarify its conservation status. This subspecies is clearly more widespread than current records indicate, and therefore additional occurrences are likely to be found (Geoff Hammerson pers. comm.).

#### **WHITE-FACED IBIS (*Plegadis chihi*) G5 S2B, SZN**

The White-faced Ibis is documented at the Sweetwater Lake PCA in Garfield County. Status: Forest Service and BLM Sensitive Species; no state status. Description: in breeding plumage



this bird has a reddish bill, red eye, all-red legs and a white feathered border around red facial skin. The White-faced Ibis breeds locally in the western half of the U.S. It is a year-round resident in the Gulf-coast region, southern California and Mexico. It winters in coastal and southern Mexico (Ryder and Manry 1994). In Colorado, there are eight confirmed breeding locations (Andrews and Righter 1992). Statewide numbers are unavailable, but approximately 115-150 pairs nest at Monte Vista and Alamosa National Wildlife Refuges (Andrews and Righter 1992). The record at Sweetwater Lake indicates a probable breeding bird observed in 1983, but breeding has never been verified. Breeding Bird Survey data indicate a large population increase (>3% per year) on a continental scale (Mike Carter pers. comm.). Nesting populations and numbers of colonies in North America decreased precipitously in the 1960s and 1970s because of pesticide contamination and loss of habitat. The recovering population is attributable, in part, to improved nesting habitat management in federal and state refuges, increased planting of alfalfa, the banning of DDT and other pesticides, and improved breeding success (Ryder and Manry 1994). Population trends are unclear in Colorado but probably follow the national trend. White-faced Ibis inhabit marshes, swamps, ponds and rivers (AOU 1983) and build nests in low trees, on the ground in bulrushes or reeds, or on floating mats. They feed on crayfishes, frogs, fishes, insects, newts, earthworms and crustaceans (Terres 1980). Habitat deterioration due to wetland degradation, cattle grazing and human encroachment pose threats to this species (Ryder and Manry 1994). The fluctuating level of water at reservoirs where breeding is attempted is another problem. While this species is globally secure (G5), breeding populations in Colorado are imperiled (S2B) based on continued threats to habitat and small numbers of breeding localities.

#### **WHITE-TAILED PRAIRIE DOG (*Cynomys leucurus*) G4 S4**

This species was documented at the Mitchell Road PCA. Status: no federal or state status. Description: white-tailed prairie dogs are distinguished by the presence of a short, white to grayish white tip on the tail and distinctive dark facial markings, consisting of black to dark brown cheek patches that extend to above the eye. The white-tailed prairie dog is widespread and found in abundance in some colonies. They occur from the Bighorn Basin in extreme southern Montana south across central and southwestern Wyoming into western Colorado and northeastern Utah. The range includes nine northwestern Colorado counties comprising less than 10% of the state (Fitzgerald et al. 1994), there are few threats, and population trends are increasing. There are numerous occurrences in northwestern Colorado and thousands of individuals in their Colorado range. Grode and Renner (1986) noted that populations were stable or increasing. Three colonies of white-tailed prairie dogs were identified in western Garfield County during this survey. These colonies occur along Highway 139 just inside Garfield County across the Mesa County line and two colonies in Dry Canyon Wash. White-tailed prairie dogs inhabit xeric sites with mixed stands of shrubs and grasses where they feed on forbs and grasses. There are few noted threats to the species, however, plague and poisoning efforts may, when occurring synchronously, provide a serious threat to large, local populations. The species benefit from management of grasslands to favor native species (Slobodchikoff et al. 1988). Existing colonies should be protected from poisoning. Several acres/colony should be protected. There is a need for current information on distribution, population status, social organization, spacing and habitat relationships.

### **WOLVERINE (*Gulo gulo*) G4 S1**

There are historical records of this species at Rifle Falls State Park, Deep Creek and Trappers Lake PCAs. Status: Forest Service Sensitive Species and State Endangered. Description: the wolverine is a somewhat bearlike mustelid with massive limbs and long, dense, dark brown pelage, paler on the head, with two broad yellowish stripes extending from the shoulders and joining on the rump, with a broad head and short heavy neck. Historically, the wolverine ranged from central Colorado and northeastern Utah across the Rockies into Canada and Alaska (Fitzgerald et al. 1994). In Colorado, recent reports of this species are restricted to the central mountains of the Park and Gore ranges south to the San Juans (Fitzgerald et al. 1994). Colorado mountain habitats represent the extreme southernmost edge of the species historic and present range. There are few recent records of *Gulo gulo* in Colorado; most localities were documented in the nineteenth century. If any wolverines are in Colorado their density is so small that a viable population is not represented, and is not detectable by known census methods (CDOW draft 1997). Recent surveys by the Colorado Division of Wildlife have not found any definitive evidence of an extant population (Fitzgerald et al. 1994, CDOW draft 1997). No other information exists concerning the current status of this species in Colorado. There are five historical records of wolverines from the northeastern portion of Garfield County dating from 1946 to 1989. A backcountry hiker reported a compelling observation of what he thought was a wolverine near Wall Lake in the Flat Tops Wilderness Area in August of 2000. This report is unverified, but probably reliable. Wolverines inhabit large wilderness areas of boreal and mountain forest (primarily coniferous). They are true omnivores feeding on a wide variety of roots, berries, small mammals, birds' eggs, fledgling birds and fish (Hatler 1989). The species remains relatively common worldwide (G4), but is considered critically imperiled (S1) in Colorado. Its state status is due to the critically low number of verifiable locations, lack of verifiable recent records, low population density in any remaining pockets of habitat and habitat fragmentation by roads (Fitzgerald et al. 1994).



Figure 65. Spotted bat



Figure 66. White-faced Ibis



Figure 67. Theano alpine  
(photo © Paul Opler)

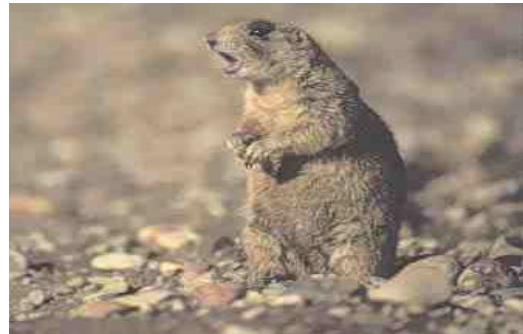


Figure 68. White-tailed prairie dog



Figure 69. Tree lizard



Figure 70. Wolverine. Photo ©  
Jane J. Cox, Natural Exposures, Inc.

## **VI. Threats to Biological diversity**

Threats relevant to a particular site are identified in the Potential Conservation Areas profiles. Major threats applicable to large parts of Garfield County are discussed below.

### **Oil and Gas Development**

Oil and gas development is a major threat to biological diversity in Garfield County, especially the rare plant occurrences. Access roads, well pads, and pipelines can directly disturb the plants, as well as act as conduits for weed invasion. They also fragment habitat, increase runoff and sedimentation of streams, and increase soil erosion. Gas wells are being drilled at a fairly rapid rate. Since 1984, Barrett Resources Corporation has completed 275 wells from Beaver Creek to Parachute (D. Sokal, pers. comm.). The Department of Energy has completed 267 wells on the Roan Plateau and is part owner with Barrett of another 21 wells (D. Sokal pers. comm.). The economic feasibility of further development is probably directly correlated with the price of natural gas. Recently a decision to allow gas well spacing to 20 acres (reported to be the highest density in the world) on 9000 acres of private land, much of it along the Colorado River, was made by the Colorado Oil and Gas Commission. Garfield County opposed that decision, but was unable to avert it. A recent proposal by Barrett Resources to perform seismic exploration for oil and gas in the Rifle area may pose threats from the movement of heavy equipment on a grid over large areas.

### **Livestock Grazing**

Domestic livestock grazing, another traditional industry of Garfield County since the late 1800's, has left a broad and often subtle impact on the landscape. Cattle were grazed on the hills from Rifle to Carbondale, on mesas, such as Battlement Mesa, on the Roan Plateau, and in the high mountains of the Flat Tops and Cline Tops.

Although grazing may be responsible for some impacts to rare plants, many of the rare plants of the county are found on steep shale slopes where cattle seldom venture. A more commonly observed impact is in riparian and wetland areas. Today, many riparian areas in Garfield County are utilized for range land. Lush forests and meadows in the Flat Tops serve as summer pasture for sheep and cattle. In such rugged terrain, livestock tend to concentrate in the valley bottoms and meadows where the terrain is gentler and vegetation is more abundant. At lower elevations, livestock tend to congregate near wetland and riparian areas for shade, lush browse, and access to water. Long-term, improper livestock use of wetland and riparian areas could potentially erode stream banks, cause streams to downcut, lower the water table, alter channel morphology, impair plant regeneration, establish non-native species, shift community structure and composition, degrade water quality, and diminish general riparian and wetland functions (Windell et al., 1986). Depending on grazing practices and local environmental conditions, impacts can be minimal and largely reversible (slight shifts in species composition) to severe and irreversible (extensive gullying, introduction of non-native forage species).

Grazing may also be detrimental to Sage Grouse by reducing nesting cover and decreasing the insect food source for chicks.

### **Residential Development**

Residential development is a localized but increasing threat in Garfield County, especially along the I-70 corridor and along the Roaring Fork River between Carbondale and

Glenwood Springs. Development creates a number of stresses, including habitat loss and fragmentation, introduction of non-native species, fire suppression, and domestic animals (dogs and cats) (Oxley et al., 1974; Coleman and Temple, 1994). Habitat loss to development is considered irreversible and should therefore be channeled to areas with less biological significance. Since development tends to occur adjacent to watercourses, wetland and riparian habitats are highly susceptible to development.

### **Recreation**

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in Garfield County. Different types of recreation (i.e., motorized versus non-motorized activities) typically have different effects on ecosystem processes. ATV's can disrupt migration and breeding patterns, and fragment habitat for native resident species. This activity can also threaten rare plants found in non-forested areas. ATV's have also been identified as a vector for the invasion of non-native plant species. The Hubbard Mesa area northwest of Rifle is heavily used and impacted by ATV use. It contains potential habitat for several rare plants, although they have not been located there. Although ATV impacts in Garfield County are less than in more populated areas, they are increasing. The area around the Grand Junction airport provides an example of the destruction that can result from uncontrolled use.

Non-motorized recreation, mostly hikers but also some mountain biking and rock climbing, presents a different set of problems. Wildlife behavior can be significantly altered by repeat visits of hikers/bicyclists. Alpine areas, mountain lakes, and riparian zones are routes and destinations for many established trails. Thus, impacts to native vegetation (mainly trampling) in these areas could potentially be high.

### **Hydrological Modifications**

River impoundment in the form of lakes and reservoirs and irrigation ditches or canals can affect aquatic dependent plants and animals (Chien, 1985). Annual flooding is a natural ecological process that has been severely altered by the construction of dams, reservoirs, and other water diversions. These actions have altered the normal high peak flows that were once a part of the natural hydrological regime of many large tributaries of the Colorado River, and many of their smaller tributaries. These natural flows are necessary for continued viability of most riparian vegetation. For example, many plants can only reproduce with flooding events, e.g., cottonwood trees (Rood & J.M. Mahoney, 1993). As plant composition changes in response to alterations in the flooding regime, the composition of the aquatic and terrestrial fauna may also change.

In addition to river impoundment, rivers have also been altered by stream bank stabilization projects (i.e., channelization) (Rosgen, 1996). Most streams and rivers are dynamic and inherently move across the land. Stabilizing or channelizing stream banks forces the river to stay in one place and often leads to changes in riparian ecology and more serious destruction downstream. It is also well known that different plant communities require different geomorphologic settings, e.g., point bars are required for some species of willows to regenerate, terraces are required for mature cottonwood/shrubland forests, and old oxbow reaches may eventually provide habitat for many wetland communities. By stabilizing a river, the creation of these geomorphic settings is often eliminated. Thus, the plant communities that require such fluvial processes are no longer able to regenerate or survive. In general, the cumulative effects

from dams, reservoirs, and channelization on plant communities, has caused a gradual shift from diverse multi-aged riparian woodlands to mature single aged forest canopies.

Many wetlands, not associated with fluvial processes, have been altered by irrigation practices, water diversions, and well pumping. The growth of irrigated agriculture in Garfield County inadvertently created many new wetlands in areas where wetlands never existed. For example, seepage from hundreds of miles of unlined canals and earthen ditches and much of the water applied in irrigation contributes to groundwater and surface water runoff. As a result, many areas have developed wetland characteristics where none existed prior to irrigation. Conversely, many historical wetlands, such as seeps and springs, have been lost or altered due to water “development” projects, such as water diversions and impoundments, to create stock ponds. Thus, as the quality and extent of historical wetlands diminished, some of the habitat loss was offset by irrigation-induced wetlands. It is debatable whether the biological diversity significance of an integrated network of river bottom wetlands, sinuous marshy streams, and extensive saline meadows and shrublands can be equated to the dispersed pattern of irrigation-induced wetlands across an agricultural landscape. In addition to providing valuable wildlife habitat, irrigation-induced wetlands may be acting to remove nitrate, pesticides, and sediments from agricultural tail waters before entering major rivers and local aquifers.

### **Coal Mining**

Huge veins of coal deposits are located in the Grand Hogback from Chair Mountain on the Crystal River up through New Castle and all the way to Meeker (Gulliford 1983). The three major areas for coal mines were south of Glenwood Springs, along Coal Ridge at New Castle, and along the Crystal River.

Stresses from mining activities can include habitat loss and fragmentation, water pollution by acid mine drainage and excessive sedimentation of streams. Aquatic systems are the most threatened by these stresses, but wetland and riparian communities can be impacted as well. However, direct impacts from mining appeared to be localized and minimal in Garfield County.

### **Nahcolite Mining**

Nahcolite is mined in Rio Blanco County, and transported to Parachute by pipeline. There is some potential for leakage of hot water from the pipeline, which could threaten the fishery of Parachute Creek.

### **Logging**

Most logging operations require a large network of roads. The impacts from roads can result in threats to biological diversity (see “Roads” below for more detailed discussion). Other logging impacts include loss of wildlife habitat, fragmentation, soil erosion, and lower water quality for aquatic species. The Forest Service monitors logging closely, nonetheless, problems can still occur (e.g., a buffer zone intended to protect a pond with boreal toads was logged in 1998) - (Husung & J. Alves, 1998). Recently, logging of Douglas fir has been conducted by helicopter on the Roan Plateau. The effects of this on the biodiversity of the area have not been determined.

## **Roads**

There is a complex, dense network of roads in many parts of Garfield County due to livestock activities, past timber harvests, and mining operations. Expansion of the existing road network in some areas will detrimentally affect the natural heritage values of the region. Roads are associated with a wide variety of impacts to natural communities, including invasion by non-native plant species, increased depredation and parasitism of bird nests, increased impacts of pets, fragmentation of habitats, erosion, pollution, and road mortality (Noss et al., 1997).

Roads function as conduits, barriers, habitats, sources, and sinks for species and populations of species (Forman, 1995). Road networks crossing landscapes can increase erosion and alter local hydrological regimes. Runoff from roads may impact local vegetation via contribution of heavy metals and sediments. Road networks interrupt horizontal ecological flows, alter landscape spatial pattern, and therefore inhibit important interior species (Forman & L.E. Alexander, 1998).

Effects on wildlife can be attributed to road avoidance (a species avoids crossing a road) and occasionally roadkill. Traffic noise appears to be the most important variable in road avoidance, although visual disturbance, pollutants, and predators moving along a road are alternative hypotheses as to the cause of avoidance (Forman & L.E. Alexander, 1998). Songbirds appear to be sensitive to remarkably low noise levels, even to noise levels similar to that of a library reading room (Reijnen R. et al., 1995).

## **Non-native Species**

Although non-native species are mentioned repeatedly as stresses in the above discussions, because they may be introduced through so many activities they are included here as a general threat as well. Non-native plants or animals can have wide-ranging impacts. Non-native plants can increase dramatically under the right conditions and essentially dominate a previously natural area, e.g., scraped roadsides. (See previous section on weeds for more information on non-native plants.) Invasion of exotic plants can, in turn, generate secondary effects on animals (particularly invertebrates) that depend on native plant species for forage, cover, or propagation. Effects of non-native fishes include competition that can lead to local extinctions of native fishes and hybridization that corrupts the genetic stock of the native fishes. This has been especially true in the case of the Colorado River cutthroat trout. (also whirling disease)

## **Fragmentation and Edge Effects**

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat (i.e., edge of a conifer forest adjacent to a meadow) (Forman & M. Godron, 1986). Edges are often created by naturally occurring processes such as floods, fires, and wind and will recover naturally over time. Edges can also be created by human activities such as roads, timber harvesting, agricultural practices, rangeland, etc. Human induced edges are often dominated by plant species that are adapted to disturbance. As the landscape is increasingly fragmented by large-scale, rapid anthropogenic conversion, these edges become increasingly abundant. The overall reduction of large landscapes jeopardizes the existence of specialist species, may increase non-native species, and limits the mobility of species that require large landscapes or a diversity of landscapes for their survival (i.e., large mammals or migratory waterbirds).

## Oil Shale Mining

At the present time, no oil shale mining is taking place. However, this is a potential threat in the future, if oil prices rise significantly and extraction processes improved enough to make it economically feasible. Much of the privately owned land is held by large oil companies, and would not be subject to the strict environmental review processes required on public lands. Although many people downplay the potential, the fact that the major oil companies are continuing to hold this land suggests that they consider there is potential for future mining. If oil shale mining were to take place, it would be extremely destructive to the natural landscape, requiring dumping of huge amounts of toxic waste, and filling entire drainages. In addition, it would probably require large amounts of water, which would have to be diverted from local streams.

## VII. Conservation Strategies

Conservation strategies can be classified as three major types:

- 1.) **Land protection** can be accomplished through acquisition, conservation easements, land exchanges, long term leases, purchase of mineral or grazing rights, or government regulation;
- 2.) **Management** of the land can be influenced so that significant resources are protected; and
- 3.) **Public education** about the significant ecological values of the county will engender support for land use decisions that protect these values.

The first necessary step, identification of the significant elements of biological diversity in the county, and their locations, has been taken with this survey. The next step is to use this information to conserve these elements and sites. Specific protection and management needs are addressed under the descriptions of individual PCAs. However, some general recommendations for conservation of biological diversity in Garfield County are given here:

1. **Develop and implement a plan for protecting the Proposed Conservation Areas profiled in this report, with most attention directed toward sites with biological diversity rank (B-rank) B1, B2 and B3.** The sites in this report provide a basic framework for implementing a comprehensive conservation program. The B1, B2 and B3 sites, because they have global significance, should receive priority attention. The sum of all the sites in this report represents the area CNHP recommends for protection to ensure that our natural heritage is not lost as the population and associated development increase. Consider purchasing development rights or outright purchase from willing owners of land for significant sites that are in need of protection. Support local organizations, such as land conservancies, in purchasing or acquiring conservation easements for protection of biological diversity or open space. Explore opportunities to form partnerships to access federal funding for conservation projects. Continue to promote cooperation among local entities to preserve the county's biological diversity.
2. **Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether activities do or do not adversely affect elements of biological diversity.** All of the areas presented contain natural heritage elements of state or global significance. Also, consider the potential natural heritage values of all other sites for which land use decisions are made, using this report as a guide for values to be considered. Insist on careful



assessments of potential damages, including weed invasion and fragmentation. It's easier to avoid disturbing an area than to try to control weed invasion later.

Certain land use activities in or near a site may affect the element(s) present there. Wetland and riparian areas are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large change. As proposed land use changes within Garfield County are considered, they should be compared to the maps presented herein. If a proposed project has the potential to impact a site, planning personnel should contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. The Colorado Natural Heritage Program and Colorado Division of Wildlife routinely conduct environmental reviews statewide and should be considered as valuable resources. To contact CNHP's Environmental Review Coordinator call 970-491-7331.

### **3. Recognize the importance of all of our natural communities and lands at all elevations.**

Although much effort in the past has been directed at protecting the most scenic, high elevation areas, the lower elevations, such as the sagebrush and piñon-juniper zones have received less attention. While the specific sites identified here contain the known locations of significant elements of natural diversity, protection of large areas in each vegetation type, especially where these are connected, will help to ensure that we do not lose species that have not yet been identified. Work to protect large blocks of land in each of the major vegetation types in the county. Do not fragment large natural areas unnecessarily. Although large migrating animals like deer and elk are not tracked by CNHP as rare species, they are a part of our natural diversity, and their needs for winter range and protected corridors to food and water should be taken into consideration. Fragmentation of the landscape also affects smaller animals and plants, opening more edge habitats and introducing exotic species. Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with a house on each 35 acres. Work with developers early in the planning process to educate them about the benefits of retaining natural areas. Locate trails and roads to minimize impacts on native plants and animals. See Forman and Alexander (1998) for an excellent review of the literature on the ecological effects of roads. See the booklet published by the State Trails Program (Colorado Department of Natural Resources 1998) for suggestions regarding planning trails with minimum impacts to wildlife.

### **4. Develop and implement comprehensive programs to address loss of wetlands.**

In conjunction with the information contained in this report, information regarding the degree and trend of loss for all wetland types (e.g., salt meadows, emergent marshes, riparian forests, seeps/springs, etc.) should be sought and utilized to design and implement a comprehensive approach to the management and protection of Garfield county wetlands. Such an effort could provide a blueprint for wetland conservation in Garfield County. Encourage and support statewide wetland protection efforts. County governments are encouraged to support research efforts on wetlands. Countywide education of the importance of wetlands could be implemented through the county extension service or other local agencies. Cultivate communication and cooperation with landowners regarding protection of wetlands in Garfield County.

**5. Increase efforts to protect biological diversity, promote cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations and increase public awareness of the benefits of protecting significant natural areas.** Involve all stakeholders in land use planning. The long-term protection of natural diversity in Garfield County will be facilitated with the cooperation of many private landowners, government agencies, and non-government organizations. Efforts to provide stronger ties among federal, state, local, and private interests involved in the protection or management of natural lands will increase the chance of success. Expand public and staff awareness of Garfield County's natural heritage and its need for protection by providing community education, and forums where protection of our natural heritage is discussed.

**6. Promote judicious management of the biological diversity resources that exist within Garfield County, recognizing that delineation of potential conservation areas does not by itself guarantee protection of the plants, animals, and plant communities.** Development of a site specific conservation plan is a necessary component of the long-term protection of a Potential Conservation Area. Because some of the most serious impacts to Garfield County's ecosystems are at a large scale (altered hydrology, residential encroachment, and non-native species invasion), considering each area in the context of its surroundings is critical. Several organizations and agencies are available for consultation in the development of conservation plans, including the Colorado Natural Heritage Program, the Colorado Division of Wildlife, the Natural Resources Conservation Service, and various academic institutions. With the rate of population growth in Colorado, rare and imperiled species will continue to decline if not given appropriate protection. Increasing the public's knowledge of the remaining significant areas will build support for the initiatives necessary to protect them, and allow proactive planning. Encourage good management by supporting incentives to landowners for improvements such as fencing riparian areas, weed control, or wildlife habitat restoration projects.

**7. Stay informed and involved in public land management decisions.** Many of the sites identified here are on public land that may be protected from development, but not from incompatible uses. Even ownership is not always secure, since the federal agencies may engage in land exchanges. Encourage protection by special designation such as Areas of Critical Environmental Concern, Research Natural Areas, Wilderness, and Special Management Areas for the most biologically significant sites on public lands.

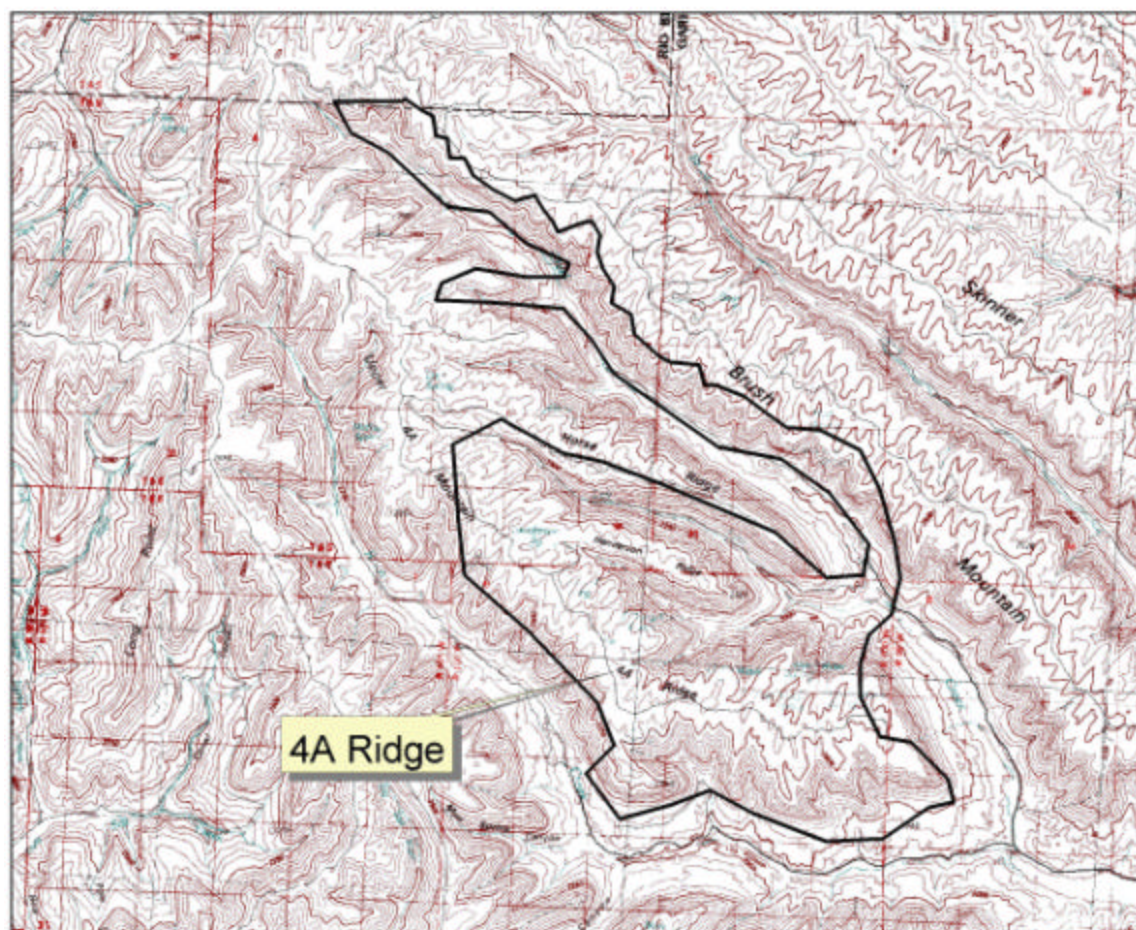
**8. Continue inventories where necessary, including inventories for species that cannot be surveyed adequately in one field season and inventories on lands that CNHP could not access in 2000.** Not all targeted inventory areas can be field surveyed in one year due to either lack of access, phenology of species, or time constraints. Because some species are ephemeral or migratory, completing an inventory in one field season is often difficult. Despite the best efforts during one field season, it is likely that some elements that are present were not documented during the survey and other important sites have not been identified in this report.

**9. Continue to take a proactive approach to weed control in the county.** Give adequate support, in funding and staff, to the county Weed Management offices for weed control.

Recognize that weeds affect both agriculture and native plant communities. Discourage the introduction and/or sale of non-native species that are known to significantly impact natural areas. These include, but are not limited to, tamarisk, Russian olive, purple loosestrife, wild chamomile, and non-native fish species. Natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. Encourage the use of native species for revegetation and landscaping efforts. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of ways. The Colorado Natural Areas Program has published a book entitled Native Plant Revegetation Guide for Colorado that describes appropriate species to be used for revegetation. This resource is available on the World Wide Web at [http://elbert.state.co.us/cnap/Revegetation\\_Guide/Reveg\\_index.html](http://elbert.state.co.us/cnap/Revegetation_Guide/Reveg_index.html).

# 4A Ridge

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: iah

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Grand Junction, 39108-A1  
Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## 4A Ridge Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P3** Moderate urgency. Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Approximately thirty miles north of Grand Junction, Colorado. Seven miles south of the Rio Blanco county line and 27 miles east of the Utah border.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Henderson Ridge, Desert Gulch, Brushy Point, Razorback Ridge, Calf Canyon. T4S R100W S32; T5S R99W S19,20,28-34; T5S R100W S3-5, 9-15, 24-27, 34-36; T6S R99W S18, 19; T6S R100W S1-17, 21-24

**Size:** 16,907 acres

**Elevation:** 6,400 to 8,700 feet

**General Description:** The 4A Ridge PCA occupies the top and steep shale slopes of 4A Ridge, Horse Ridge, Henderson Ridge, Brush Mountain, and Bear Point, along with the riparian area of the Left Fork of Carr Creek.

The site contains a mosaic of several habitats that form a repeating pattern throughout the Roan Plateau. South facing slopes with barren scree of the Green River formation support several rare plants that are endemic to this habitat. North facing slopes, while geologically similar, retain more moisture and support heavier vegetation. The riparian complex includes the stream in the valley bottoms and tributary drainages that often begin at springs.

The steep south facing slopes are essentially barren, but in some places support a sparse cover of mountain shrubs, grasses and forbs, and scattered Douglas fir (*Pseudotsuga menziesii*) and Engelmann spruce (*Picea engelmannii*). Associated plant species in this habitat include Gambel's oak (*Quercus gambelii*), rock spirea (*Holodiscus dumosus*), mat penstemon (*Penstemon caespitosus*), pincushion (*Chaenactis douglasii*), Utah serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos rotundifolius*), Indian rice grass (*Oryzopsis hymenoides*) and Colorado bedstraw (*Galium coloradense*). Utah fescue (*Argillochloa dasyclada*) was found on the less steep areas (17% slopes), while the sun-loving meadowrue (*Thalictrum heliophilum*) and Piceance bladderpod (*Lesquerella parviflora*) were located on the very steep (44%) slopes.

Brush Mountain is a northwest-southeast trending ridge between Carr Creek on the southwest and Brush Creek on the northeast. A dirt road runs along the top of the ridge through a sagebrush-snowberry shrubland which is grazed by cattle and has several

stock ponds. The habitat for three rare plants is found along the upper part of the cliffs on the southeast side of the ridge, on steep barren shale slopes of the Green River formation. This part of the mountain is too steep for cattle, and is undisturbed except for natural erosion. The sparse vegetation on the shale slopes includes scattered Douglas fir, Cainville thistle (*Cirsium calcareum*), mat penstemon (*Penstemon caespitosus*), Colorado bedstraw (*Galium coloradense*), rock spirea (*Holodiscus dumosus*), Oregon grape (*Mahonia repens*), and snowberry (*Symphoricarpos rotundifolius*).

Several springs emerge at the top of unnamed side-drainages. These springs, many of which have been developed for livestock use, eventually drain into Bear Gulch and Left Fork Carr Creek. The hanging garden sullivantia (*Sullivantia hapemanni* var. *purpusii*) occupies crevices of several of these calcareous seeps. Oil shale columbine (*Aquilegia barnebyi*) was associated with the sullivantia at some of these seeps. Below Bear Point, a tributary of Carr Creek enters a narrow canyon, with seeping vertical walls and ledges of thin layered shale that support a luxurious growth of the globally vulnerable hanging garden sullivantia (*Sullivantia hapemanni* var. *purpusii*). The moist canyon bottom has a diverse assemblage of plants, including chiming bells (*Mertensia ciliata*), Colorado columbine (*Aquilegia coerulea*), sweet cicely (*Osmorhiza depauperata*), butterweed groundsel (*Senecio serra*), whitestem gooseberry (*Ribes inerme*), baneberry (*Actaea rubra*), little ricegrass (*Oryzopsis micrantha*), smallwing sedge (*Carex microptera*), willow herb (*Epilobium hornemannii*), and stinging nettles (*Urtica gracilis*), along with a rich assortment of liverworts and mosses. The cool, north-facing hillside above the stream is forested with Douglas fir and subalpine fir, while the south facing slope is sparsely vegetated shale of the Green River formation. Piceance bladderpod (*Lesquerella parviflora*) and sun-loving meadowrue (*Thalictrum heliophilum*) are found on the steep, dry, south-facing slopes. These hillsides have scattered Douglas fir, and a plant species composition that is typical of the shale slopes in the area, including rock spirea (*Holodiscus dumosus*), Colorado bedstraw (*Galium coloradense*), and Indian rice grass (*Oryzopsis hymenoides*).

The site contains the narrow riparian area of Left Fork Carr Creek, which flows within a wide valley. The riparian area is dense with narrowleaf cottonwood (*Populus angustifolia*), Douglas fir, skunkbrush (*Rhus trilobata*), chokecherry (*Prunus virginiana*), and hawthorn (*Crataegus rivularis*). Understory species include Oregon grape (*Mahonia repens*) and sweet cicely (*Osmorhiza depauperata*). Hydrological processes are mostly intact but development of springs has likely increased erosion, altered plant species composition, and altered flow along the springbrooks.

**Biodiversity comments:** This PCA supports seventeen occurrences of five rare plant species, including one excellent (A ranked) and three good (B ranked) occurrences of Piceance bladderpod, a globally imperiled (G2S2) plant. Three other plants that are endemic to the Green River shale, Arapien stickleaf, sun loving meadowrue and Utah fescue, are found on the steep shale slopes in the site. Hanging garden sullivantia occupies at least four seeps that feed the headwaters of Carr Creek.

The Piceance bladderpod occurrences consisted of over 4,000 estimated individuals. Piceance Bladderpod is a Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation.

Natural Heritage element occurrences at the 4A Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3			BLM	A
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3			BLM	B
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3			BLM	B
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3			BLM	B
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3			BLM	C
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S3			BLM	B
<i>Thalictrum heliophilum</i>	Sun loving meadowrue	G3	S3				A
<i>Thalictrum heliophilum</i>	Sun loving meadowrue	G3	S3				A
<i>Thalictrum heliophilum</i>	Sun loving meadowrue	G3	S3				B
<i>Thalictrum heliophilum</i>	Sun loving meadowrue	G3	S3				B
<i>Thalictrum heliophilum</i>	Sun loving meadowrue	G3	S3				B
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				C
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				E
<i>Sullivantia hapemannii</i> ssp. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3				E
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3				E
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3				E
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3				E
<b>Plant Communities</b>							
<i>Populus angustifolia/Rhus trilobata</i>	Narrowleaf cottonwood/skunk brush riparian forest	G3	S3				A

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.



Arapien stickleaf is known from two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado, where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

Hanging garden sullivantia grows on moist cliff faces (hanging gardens). The species is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals.

This site also harbors one of the best occurrences of the globally vulnerable narrowleaf cottonwood/skunkbrush riparian forest that was observed in Garfield county. There are relatively few disturbances to this occurrence and although narrow in width, it is almost 2 continuous miles in length.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the rare plants that occur on the steep shale slopes of 4A Ridge and Henderson Ridge. Apparently unoccupied but similar habitat between the occurrences is included to allow for movement or expansion of the populations over time as landslides open up new sites, and existing sites become more heavily vegetated. The site boundaries also include the Left Fork of Carr Creek. The area important to maintain this high quality riparian area encompasses the springs and small side drainages on the adjacent slopes, and overlaps the habitat of the rare shale endemic plants. This upland area, encompassing a major part of the hydrological input to the creek, is critical to the natural hydrological processes, such as periodic flooding and subsequent dynamic changes in plant community distribution, which are vital to the viability of this riparian system.

**Protection Rank Comments:** This PCA is located on both BLM and private lands. No threats to the rare plants were noted during the survey. However, future activities such as oil shale or natural gas extraction could impact the plants. Development on BLM would require an Environmental Analysis (EA), at which time presence of BLM sensitive species, including Piceance bladderpod and Arapien stickleaf, would be addressed. Development is restricted by no surface occupancy (NSO) stipulations on steep slopes of over 40%, which would apply to many of the rare plant sites. Modifications to locations of proposed developments can often be made to protect rare plant locations. The private land has no such protection.

BLM's long range plans include a public access road in Corral Canyon (USDI 1987), although this does not appear to be imminent. An Environmental Assessment would be required, and should take into account the locations of the riparian plant community and the hanging garden sullivantia.



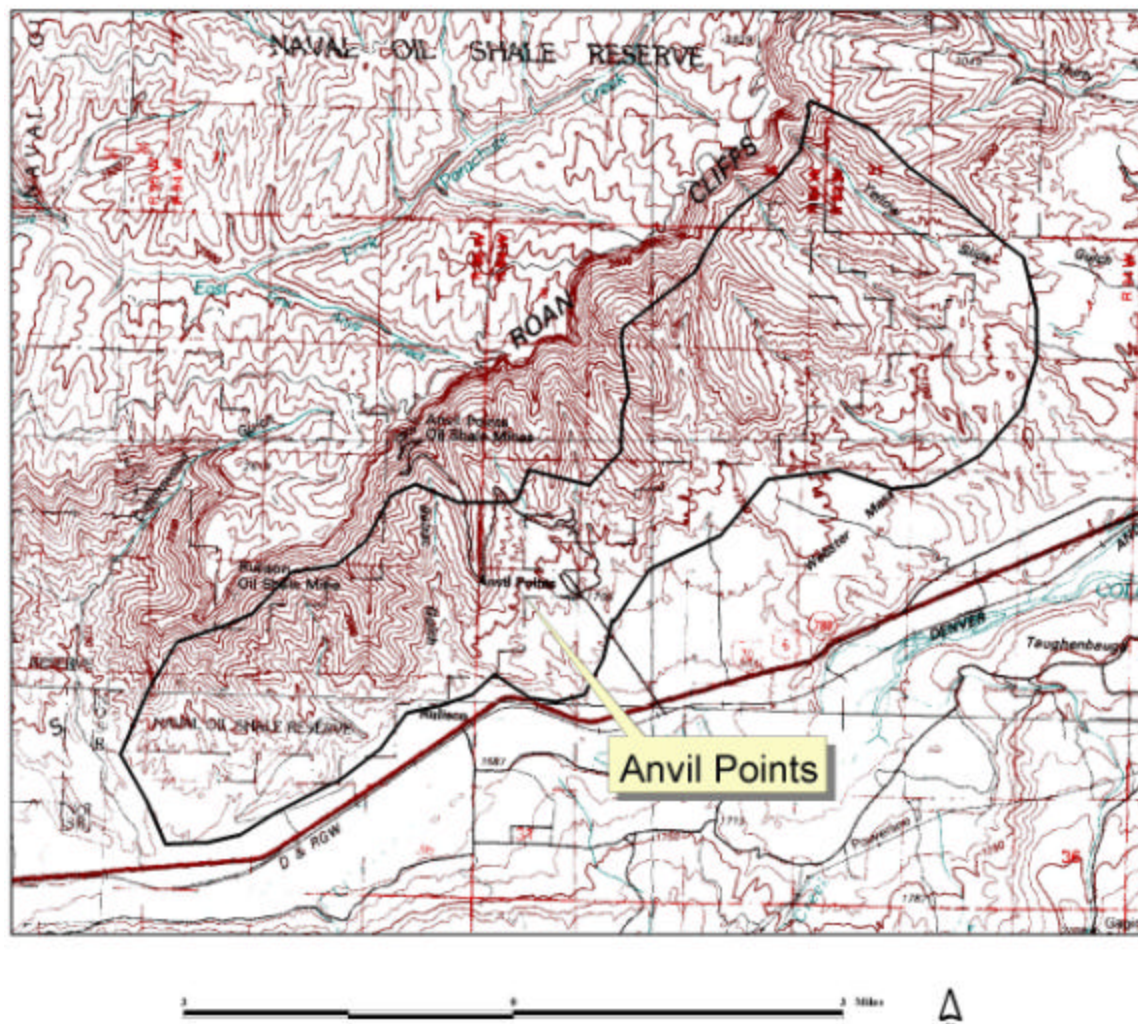
**Management Rank Comments:** The rare plant locations in this PCA are probably too steep for cattle, and therefore not subject to grazing impacts. Few exotic species are adapted to the rare plant habitat, and none were observed. No current management needs are known.



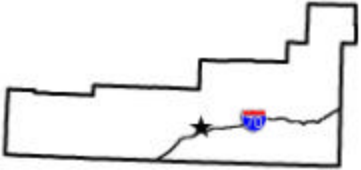
There is a road that traverses its way up Left Fork Carr Creek on the adjacent hillside. No impacts from this road were observed in the riparian area. Potential erosion and spread of non-native species should be monitored along this road corridor. Developed springs have greatly altered the composition and structure of wetland vegetation near these areas. The density and frequency at which cattle use the springs has caused excessive erosion to these areas. Restoration of these springs should be considered.

An undocumented report (Lambeth, pers. comm.) of Colorado River cutthroat trout in pools in the upper reaches of Left Fork Carr Creek should be investigated, and if high purity trout are found, measures to protect the cutthroat from contamination by downstream brook trout should be considered.

# Anvil Points

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangles*</p> <p>Carbondale, 39107-A1          Glenwood Springs, 39107-E1          Grand Junction, 39108-A1          Douglas Pass, 39108-E1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--

## Anvil Points Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Anvil Points is located 6 air miles northwest of Rifle, Colorado, north of the Colorado River, below the Roan Cliffs.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Anvil Points, Rifle, Rulison. T5S R94W S36; T6S R94W S2, 4, 5, 8, 15, 17-20; T6S R95W S13, 22, 24-28, 33-35.

**Size:** 11,707 acres

**Elevation:** 5,280 to 9,000 feet

**General Description:** The Anvil Points PCA consists of south and southeast facing sides of the Roan Plateau between the rim and the alluvial flats of the Colorado River.

The DeBeque milkvetch and Wetherill milkvetch are found on the lower, more gentle hillsides of the Wasatch formation, with sparse piñon and juniper. They often inhabit the sides of dry washes in fine textured soils. Associated species in this habitat include sticky rabbitbrush (*Chrysothamnus viscidiflorus*), spiny hopsage (*Atriplex brandegei*), snakeweed (*Gutierrezia sarothrae*), mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), rock goldenrod (*Petradoria pumilis*), and the grasses galleta (*Hilaria jamesii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Indian rice grass (*Oryzopsis hymenoides*). The major non-native species is cheatgrass (*Bromus tectorum*).

Most of this PCA is located in the Naval Oil Shale Reserve (NOSR 3), formerly owned by the Department of Defense, and transferred to BLM ownership in 1997. A gated administrative access road runs from the bottom to the mines at the base of the cliffs.

Natural Heritage element occurrences at the Anvil Points PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plants</b>					
<i>Astragalus debequaeus</i>	DeBeque milkvetch	G2	S2	BLM	B
<i>Astragalus debequaeus</i>	DeBeque milkvetch	G2	S2	BLM	B
<i>Astragalus debequaeus</i>	DeBeque milkvetch	G2	S2	BLM	C
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		A
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		C
<b>Plant Communities</b>					
<i>Quercus gambellii</i> / <i>Cercocarpus montanus</i> / <i>Carex geyeri</i>	Mixed mountain shrubland	G3	S3		C
<i>Pinus edulis</i> / <i>Cercocarpus montanus</i>	Mesic western slope piñon-juniper woodlands	G5	S4		E
<b>Reptiles</b>					
<i>Coluber constrictor mormon</i>	Western yellowbelly racer	G5T5	S3		H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** Two rare plants are found in this PCA. There are two good (B ranked) occurrences of the globally imperiled (G2S2) DeBeque milkvetch, a species known only from Colorado, mostly from a small area around the town of DeBeque, and in this location between Parachute and Rifle. The total range of the species is about 300 square miles, and there are 15 populations with 44 sub-populations currently known. This species is restricted to a very specific geologic formation, the Atwell Gulch Member of the Wasatch Formation, at 5,100 to 6,400 feet elevation (Welsh 1993). This site represents the easternmost occurrences of the species. The three populations in this PCA are separated by about 20 miles from the DeBeque populations.

Two occurrences, one excellent (A ranked) and one fair (C ranked), of the globally vulnerable (G3S3) Wetherill milkvetch were found in the PCA. Wetherill milkvetch is known from seven western Colorado counties and Utah. There are thirty-eight known occurrences, with an estimated total of 9000 individuals.

Two plant communities have been documented within the site boundaries. There is a fair (C ranked) example of the mixed mountain shrubland dominated by Gambel's oak, a globally vulnerable (G3) but locally common community. There is also an unranked (E) occurrence of the common mesic western slope piñon juniper woodland.

The subspecies *mormon* of the western yellowbelly racer (*Coluber constrictor*) is known from counties along Colorado's western edge (Livo *et al.* 1996, Hammerson 1999). There are 30 known occurrences in Colorado totaling over 1,000 individuals. Conservation concern stems from threats associated with road mortality and human residential expansion. There are no quantitative data on abundance and trends of the racer, and more information on the distribution and abundance of this snake would clarify its conservation status.

**Boundary Justification:** The boundary is drawn to encompass the habitat occupied by DeBeque milkvetch and Wetherill milkvetch, on the lower slopes of the Roan Plateau in the vicinity of Anvil Points. The PCA is located primarily on the Wasatch Formation, and is adjacent to the Anvil Points Rim PCA, which includes occurrences of a different set of rare plants that grow on the Green River Formation higher up on the cliffs.

**Protection Rank Comments:** Ownership of the land and oil and gas rights were transferred from the U. S. Department of Energy to BLM in 1997. The status of oil shale extraction rights is unclear; however it is not expected that oil shale mining will take place in the foreseeable future, unless the price of oil is substantially higher and extraction techniques improved to make it economically viable. Meanwhile, oil and gas development is the major threat to the rare plant occurrences. Access roads, well pads, and pipelines can directly disturb the plants, as well as act as conduits for weed invasion. Part of the site, known as the “production area” has been leased for oil and gas development. BLM’s Resource Management Plan Amendment (USDI 1999) calls for Controlled Surface Occupancy in known locations of BLM sensitive species such as the DeBeque milkvetch. BLM will complete additional inventories on ten acre blocks around proposed wells and along proposed new roads. Site designs may be altered to avoid the areas occupied by the plants. These designs should also consider the protection of adjacent potential habitat that will be available for the movement of the rare plant populations over time.

Part of the area not leased has been recommended as wilderness by the Colorado Wilderness Coalition. Included in the Roan Plateau areas recommended are about 1753 acres of the 5193 acre Southeast Cliff Unit that overlap this PCA. This area was studied in a Roadless Review and Wilderness Character Inventory in 2000, and found to meet wilderness criteria including size, roadlessness, and providing outstanding opportunities for solitude. If these areas are approved in the Resource Management Plan, they would become Wilderness Study Areas and be managed as wilderness until formally declared as wilderness by Congress.

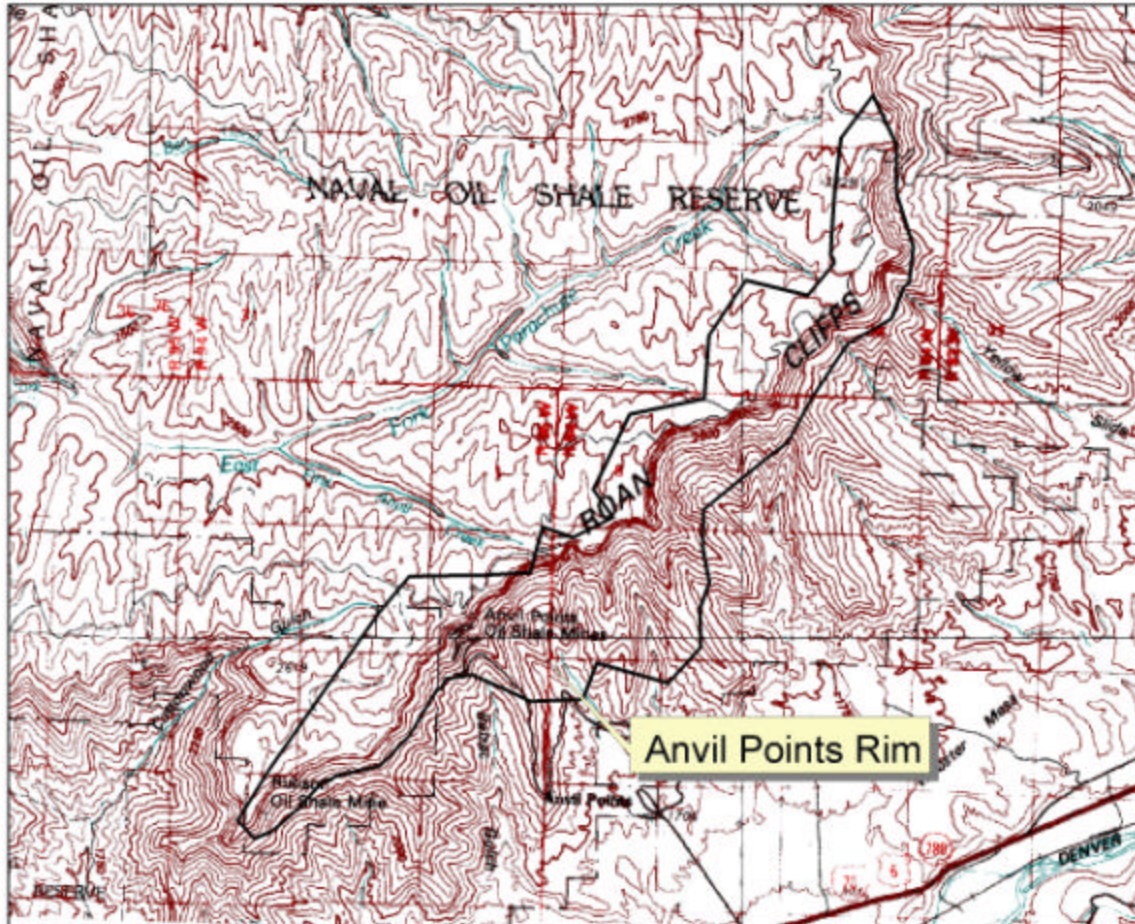
Although most of the site is within the former Naval Oil Shale Reserve, part of it, including at least one sub-population of the DeBeque milkvetch, is on private land that was recently approved for gas well spacing of a well for every 20 acres, the highest density in the world.

**Management Rank Comments:** A new Resource Management Plan for the former NOSR lands is being developed by BLM, and is expected to be completed in 2002. This should address oil and gas leasing, grazing, OHV use and other management issues. Currently, public use of the area is minimal, as access is difficult. The road that runs through the site to the mines at the base of the cliffs has a locked gate, access from the top is prevented by cliffs, and there is private land blocking access from the bottom.



# Anvil Points Rim

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Douglas Pass, 39108-E1  
Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Anvil Points Rim Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Anvil Points Rim is located five air miles northwest of Rifle, Colorado, on top of the Roan Cliffs in central Garfield County.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Anvil Points.  
T5S R94W Sections 24, 25, 34-36; T6S R94W Sections 4-7; T6S R95W Sections 1, 11, 12.

**Size:** 2,100 acres

**Elevation:** 8,600 to 9,300 feet

**General Description:** The Anvil Points Rim PCA is at the southeastern edge of the Roan Plateau and the Piceance Basin. The Rim sits at an elevation of about 9000 feet atop some three and half miles of southeast-facing cliffs that plummet toward the Colorado River, 4000 feet below. These dramatic cliffs are home to nesting Peregrine Falcons and Golden Eagles.

The PCA is characterized by rolling grasslands positioned at the interface of two ecoregions, Utah High Plateaus and Rocky Mountains (Bailey 1994). It is situated between two very different and distinct landscapes. To the east are 200-400 foot sheer cliffs. To the west is a more gentle landscape of rolling hills dominated by mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), snowberry (*Symphoricarpos rotundifolius*), and aspen forests (*Populus tremuloides*). Along parts of this site and just above the Book Cliffs are shale barren slopes, a narrow interface between the grasslands and the cliffs. The steep upper slopes of Green River shale are very sparsely vegetated with a mixture of shrubs such as snowberry, chokecherry and Gambel's oak. Douglas fir and aspen occupy the upper drainages. The surface is composed of flat fragments of very unstable light gray shale. These slopes provide habitat for the Parachute penstemon (*Penstemon debilis*), Arapien stickleaf (*Nuttallia argillosa*), and Utah fescue (*Argillochloa dasyclada*) ---all narrowly restricted oil-shale endemic plants that are adapted to the challenging environment..

The *Populus tremuloides*/*Acer glabrum* (quaking aspen/Rocky Mountain maple) forest occurs on a hillside where groundwater seepage has created moist soil conditions. There are fewer than 10 documented locations of this aspen forest association in the central and south-central mountain regions of Colorado.

Natural Heritage elements at the Anvil Points Rim PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Plants</b>							
<i>Penstemon debilis</i> **	<b>Parachute penstemon</b>	G1	S1	C			C
<i>Penstemon debilis</i>	<b>Parachute penstemon</b>	G1	S1	C			C
<i>Nuttallia argillosa</i>	<b>Arapien stickleaf</b>	G3	S2			BLM	A
<i>Nuttallia argillosa</i>	<b>Arapien stickleaf</b>	G3	S3			BLM	A
<i>Nuttallia argillosa</i>	<b>Arapien stickleaf</b>	G3	S3			BLM	A
<i>Argilochloa dasyclada</i>	<b>Utah fescue</b>	G3	S3				A
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				B
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				C
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				E
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				E
<i>Iliamna grandiflora</i>	Large flower globemallow	G3?Q	S1				C
<i>Monardella odoratissima</i>	Mountain wild mint	G4G5	S2				C
<b>Plant communities</b>							
<i>Pseudoroegneria spicata</i>	<b>Western slope grasslands</b>	G2?	S2?				B
<i>Pseudoroegneria spicata</i> - <i>Poa secunda</i>	Montane grasslands	G4	S1				B
<i>Leymus cinereus</i>	Western slope grasslands	G4	S1S2				B
<b>Birds</b>							
<i>Tympanuchus phasianellus columbianus</i>	Columbian sharp-tailed grouse	G4T3	S2				A
<i>Falco peregrinus anatum</i>	American peregrine falcon	G4T3	S2B,SZN	LE-PDL			A

\*EO=Element Occurrence

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

### Biodiversity Comments:

The Anvil Points Rim PCA harbors ten elements of concern, including several oil shale endemic plants, plant communities and excellent (A ranked) occurrences of two rare bird subspecies.

Most notable of the plants is the Parachute penstemon, known from only 5 sites (approximately 15 total acres) in the world. The two occurrences of the Parachute



penstemon in this PCA are the easternmost, while the three other known occurrences lie about 12 miles to the southwest in the Mt. Callahan and Mt. Logan Road PCAs. Despite vigorous surveys in 2000, no additional populations of the penstemon have been located. Although this PCA supports only a small population of the species, it is very important to protect this site, since it is disjunct from the other populations.

The PCA also has three excellent (A ranked) occurrences of Arapien stickleaf, a globally vulnerable (G3S3) plant found only on shale barrens of the Green River formation and four occurrences of Utah fescue, another globally vulnerable plant that is specifically adapted to the oil shale environment.

Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

Four occurrences of Utah fescue fall within the PCA. Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

Large-flower globemallow is considered to be a Colorado endemic species. There were previously only 12 small occurrences of this species in the state, two in Garfield County, and others in Ouray, Routt, Pitkin and Montezuma counties. Three new occurrences were found in Garfield County during this survey, bringing the total to five in the county, and 15 in the state.

The montane grasslands (*Pseudoroegneria spicata* ssp. *inermis*) of this site have been found in only a few places. Baker (1984) believes high quality occurrences of this plant association are very hard to find in Colorado, primarily due to heavy grazing pressures. The Anvil Points Rim site has a good example (B-ranked) of this type. This mosaic of grassland and adjacent open sagebrush habitat provides important hunting grounds for the Long-eared Owl and the Northern Harrier as well as the Bald Eagle and American Peregrine Falcon.

The grassy knoll of Gardner Peak provides an important hilltop rendezvous site for mating butterfly populations of Baird's swallowtail and the Green-winged hairstreak, and may also prove to be an important lek site for the state-rare Columbian sharp-tailed grouse (K. Giesen pers. comm.).

There are at least 15 occurrences of the Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) in the northwestern corner of Colorado (Andrews and Righter 1992). Monitoring data suggest that this subspecies may have once occurred in as many as 22 Colorado counties, but currently occurs in only five (Giesen and Braun 1993; Colorado Bird Observatory 1997). Loss of habitat and fragmentation due to rangeland conversion and urban development may affect the continued viability of this subspecies in Colorado (Giesen and Braun 1993). For these reasons, the Columbian Sharp-tailed Grouse is vulnerable globally (T3) and in Colorado (S3).

There are estimated to be fewer than 300 individual Peregrine falcons breeding in Colorado (CNHP 2000). The nest in this PCA was active in 2000. Human disturbance of nests by recreational rock climbers, illegal capture by falconers, and uncertain breeding status across the state are factors considered important in the conservation of this state imperiled (S2B) species in Colorado.

**Boundary Justification:** The PCA boundary follows natural features, encompassing all of the rim grassland communities, the cliff and adjacent slope. The boundary is intended to represent the area needed to protect the occurrences of the elements of concern and the ecological processes affecting these elements. It includes the cliffsides that provide important nesting habitat for Peregrine Falcons.

The most significant natural processes are believed to be precipitation, wind, and herbivory. Buffers to the site are narrow and generally occur naturally as steep slopes along the eastern edge and the shrublands on the western boundary. This boundary takes in the nesting area of the falcons and eagles, but does not include all of their hunting territory. Additional information may alter the proposed conservation boundaries.

**Protection Rank Comments:** The PCA, previously owned by the Department of Energy (DOE) as part of the Naval Oil Shale Reserve, was transferred to the BLM in 1997. The potential for oil shale development exists, but at this time is not an economically viable option. However, if the price of oil increases significantly and extraction methods are improved enough to make oil shale mining economical or deemed critical to the national interest, mining could resume, and would be extremely destructive to the natural habitat. The threat may not be imminent, but is still present in the long term.

Oil and gas development is a more immediate potential threat to the rare plant occurrences, if the area is determined to be open for leasing when the new Resource Management Plan is completed. Access roads, well pads, and pipelines can directly disturb the plants, as well as act as conduits for weed invasion. Part of the site, known as the “production area” has already been leased for oil and gas development, as required under the terms of the transfer to BLM. BLM’s Resource Management Plan Amendment (USDI 1999) for this area calls for No Surface Occupancy (NSO) in areas known to contain species that are federally listed, such as the Peregrine Falcon, or candidates for listing such as the Parachute penstemon. Controlled Surface Use (CSU) is stipulated in known locations of BLM sensitive species such as the Arapien stickleaf (USDI 1999). BLM will complete environmental assessments for each new well or group of wells, including inventories on ten acre blocks around proposed wells and along proposed new roads. Site designs may be altered, or directional drilling from another well site employed, to avoid direct disturbance to the areas occupied by the plants.

Part of this PCA has been recommended as wilderness by the Colorado Wilderness Coalition. Included in the Roan Plateau areas recommended are about 1596 acres of the 5193 acre Southeast Cliff Unit that overlap this PCA. This area was considered in a Roadless Review and Wilderness Character Inventory in 2000, and found to meet wilderness criteria including size, roadlessness, and providing outstanding opportunities for solitude or primitive recreation. If these areas are approved for wilderness designation in the Resource Management Plan, they would become Wilderness Study Areas and be managed as wilderness until formally designated by Congress. One of the two populations of Parachute penstemon in this PCA falls within the proposed wilderness area.

If wilderness designation is not approved in the RMP, then alternative protective measures could include designation as an Area of Critical Environmental Concern

(ACEC), or Research Natural Area (RNA), which would require a separate management plan. In any case, the RMP should consider the biological significance of this site, and ensure that the Parachute penstemon and other significant species listed above are adequately protected.

**Management Rank Comments:** The Roan Plateau in general has a long history of 100 years or more of heavy use by livestock, but the Anvil Points Rim site itself is a fair distance from any reliable water source, and therefore may not have experienced any strong impacts from such historical use. The current management regime is adequate, but must continue over the years to come in order to help ensure the continued integrity of the site. A partial fence has been erected above the *Penstemon debilis* site to protect it from trampling by hang glider enthusiasts who have used the area as a launching pad.

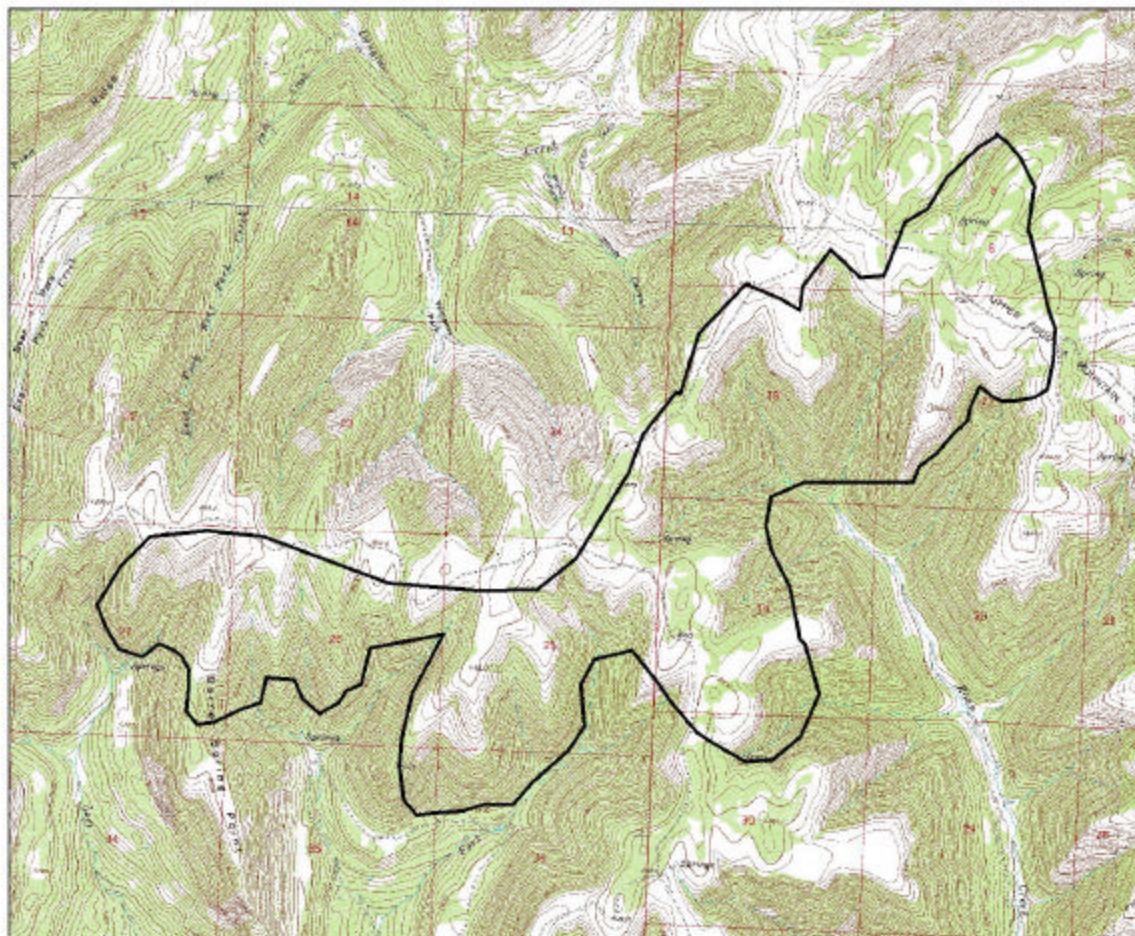
Cattle and sheep grazing remain the primary land-use activity on the site. A grazing management plan should incorporate a separate, special management plan for this critical site. Grazing should remain light and no water enhancement projects should occur within this site.

Until the site was transferred to BLM, travel above the cliffs was unrestricted, and many extraneous roads were created. Currently, there is a temporary travel order that limits motorized travel to existing roads only. Travel management issues will be covered in the new Resource Management Plan, now in progress, and expected to be completed in 2002. We recommend that the plan stipulate that unnecessary roads be closed and road travel limited to primary roads. Roads fragment the habitat, and are the most common vector for the introduction of exotic plant species that could degrade this site.

Continued existence of Peregrine Falcons in Colorado depends upon protection of traditional nesting sites like the one found at this PCA. Keeping this nest site free of human intrusions during nesting season (February to August) would ensure persistent annual use of this traditional peregrine eyrie.

# Barrel Spring Point

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Calf Canyon, 39108-E6  
Brushy Point, 39108-F6

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Barrel Spring Point Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Barrel Spring Point is located approximately 35 miles north of Grand Junction, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Calf Canyon and Brushy Point. T5S R100W Sections 7, 8, 17-19, 30; T5S R101W Sections 24-27, 35, 36.

**Size:** 2,866 acres

**Elevation:** 7,600 to 8,922 feet

**General Description:** The Barrel Spring Point PCA occupies a high ridge along the divide separating the Colorado River (Roan Creek and East Salt Creek) and White River drainages, east of Douglas Pass. A road traverses the ridge along the northern part of the PCA, following the divide. The level ridge top and vegetated slopes have a mosaic of sagebrush shrublands and aspen forests. The land drops off to the south in steep barren slopes of Green River shale that provide habitat for the Piceance bladderpod. Total vegetation in these shale barrens is only about 10%, and includes plants that are typical in similar sites throughout Garfield County, such as snowberry, (*Symphoricarpos rotundifolius*), rock spirea (*Holodiscus dumosus*), chokecherry (*Prunus virginiana*), Colorado bedstraw (*Galium coloradense*), woods rose (*Rosa woodsii*), mat penstemon (*Penstemon caespitosus*), and Oregon grape (*Mahonia repens*). The Piceance bladderpod was found in abundance on the loose scree in several sub-populations.

The area has several springs, at least two of which harbor the hanging garden sullivantia. One of these springs, on Upper 4A Mountain, leads to a beautiful water slide over dark gray shale, overhung with dripping cliffs that are covered with thousands of sullivantia plants and ferns. The opposite bank with deeper soils has a luxuriant growth of oil shale columbine (*Aquilegia barnebyi*).

This rare plant location was first located in 1987, and revisited in 2000. The habitat was found to be intact, although many of the Piceance bladderpod plants were very small and not flowering, perhaps because of drought.

Natural Heritage element occurrences at the Barrel Spring Point PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b><i>Lesquerella parviflora</i></b>	<b>Piceance bladderpod</b>	<b>G2G3</b>	<b>S2S3</b>	<b>BLM</b>	<b>A</b>
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3	BLM	C
<i>Sullivantia hapemannii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3		A
<i>Sullivantia hapemannii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA supports one of the best known populations of the globally imperiled (G2S2) Piceance bladderpod, a Colorado endemic plant, known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation. This excellent (A ranked) occurrence is comprised of at least eight sub-populations. Another smaller population, ranked C, was located on Upper 4A Mountain in 2000. The PCA also includes an excellent (A) and an unranked (E) occurrence of hanging garden sullivantia, a globally vulnerable subspecies. Hanging garden sullivantia is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals (NatureServe 2000).

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the Piceance bladderpod and the hanging garden sullivantia. It includes the south facing barren scree slopes and the road cut where the Piceance bladderpod is located. Adjacent unoccupied steep slopes are included to allow for shifting of the population as new landslides develop and existing sites become more heavily vegetated. The PCA also includes the springs where the hanging garden sullivantia was found.

**Protection Rank Comments:** The majority of this PCA is on BLM land, with some private land extending into the site in the northeast portion. The Piceance bladderpod occurrences and one of the hanging garden sullivantia occurrences were on BLM land. As long as the primary use of the land is grazing, there is probably no threat to the rare plants, as cattle seldom venture onto the steep shale slopes. If oil and gas development were to take place, the rare plants at this site could be impacted. Piceance bladderpod is listed as a sensitive species by BLM, and as such will be considered in an Environmental Analysis that would be required before any new developments were approved. In addition, their location on steep slopes, which carry No Surface Occupancy (NSO) stipulations should protect them from direct disturbance (USDI 1987). Although private land does not carry the same restrictions, it is probably not practical to drill on the steep shale slopes. However, roads and pipelines are sometimes built on steep slopes such as these.

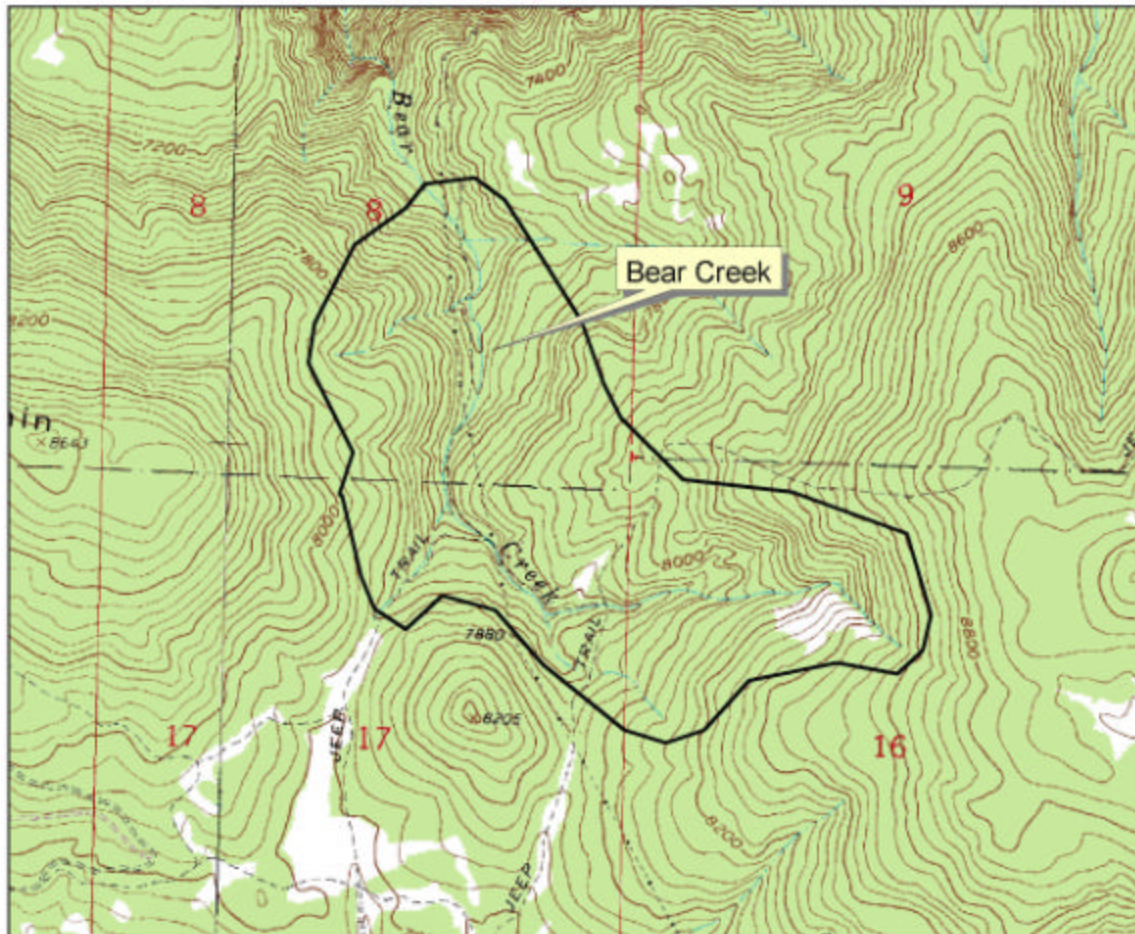
**Management Rank Comments:** The spring feeding the excellent sullivantia occurrence is being used for domestic water which is trucked from there to the ranch. This does not




appear to be affecting the occurrence at this time; however, further water development or access road improvement could have an impact. The shale barrens where the Piceance bladderpod is found probably requires no management, as it is too steep and there is too little forage for cattle. Although a road passes through the site, the plants were growing on the artificially barren scree of the road cut, as well as on the naturally eroding slopes below.



# Bear Creek at Glenwood Canyon

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Glenwood Springs, 39107-E3          Shoshone, 39107-E2</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--



## Bear Creek at Glenwood Canyon Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Bear Creek at Glenwood Canyon is located approximately 4 miles east of Glenwood Springs, CO in Glenwood Canyon. The site is within the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Shoshone. T6S R88W Sections 8, 16, and 17.

**Size:** 393 acres

**Elevation:** 7,700 to 8,700 feet

**General Description:** Bear Creek is a short tributary of the Colorado River that begins at an elevation of 8800 feet and drops to 6000 feet at its confluence with the Colorado River across a distance of approximately 2 miles. The riparian community is dense and species rich. Thinleaf alder (*Alnus incana*), red-osier dogwood (*Cornus sericea*), and a diversity of forbs dominate the middle portion of the creek. On a north-facing slope, about 1/3 of the distance from the headwaters to the Colorado River, is a slope wetland forest dominated by aspen (*Populus tremuloides*) and Rocky Mountain maple (*Acer glabrum*). Behind an old berm, which was probably constructed to create a cattle pond, is a marsh dominated by a variety of sedges (*Carex* spp.), rushes (*Juncus* spp.), cattail (*Typha* sp.), and watercress (*Nasturtium officinale*).

Natural Heritage element occurrences at the Bear Creek at Glenwood Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<b><i>Populus tremuloide/Acer glabrum</i>**</b>	<b>Montane riparian forest</b>	<b>G2</b>	<b>S1/S2</b>				<b>C</b>
<i>Alnus incana/Cornus sericea</i>	Thinleaf alder/red-osier dogwood riparian shrubland	G3G4	S3				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The site supports a fair (C-ranked) occurrence of the globally imperiled (G2/S1S2) aspen/Rocky Mountain maple (*Populus tremuloides/Acer glabrum*) riparian forest. It also supports a good (B-ranked) occurrence of the state rare (G3G4/S3) thinleaf alder/red-osier dogwood (*Alnus incana/Cornus sericea*) riparian shrubland.

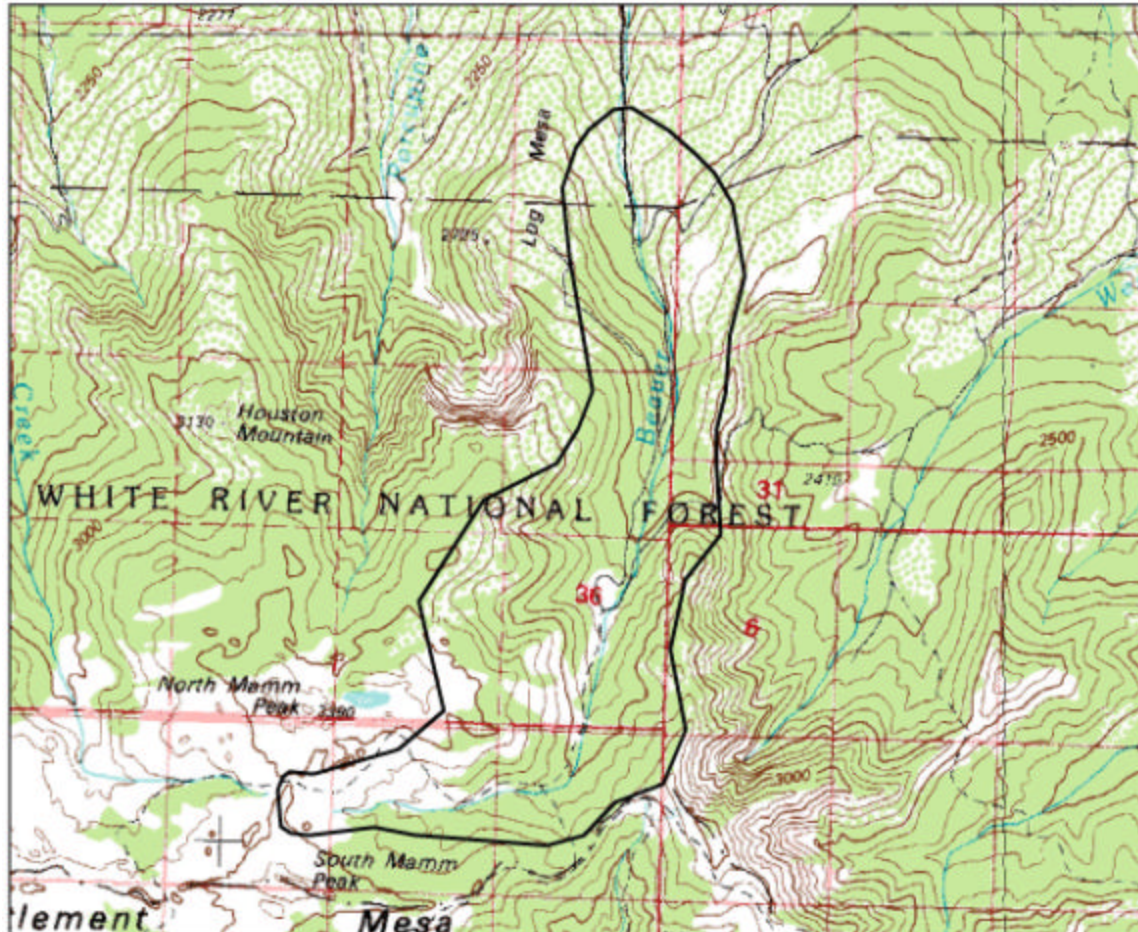
**Boundary Justification:** The boundary encompasses the riparian and wetland areas and surrounding upstream slopes to ensure that hydrological processes remain intact. These processes are necessary for the viability of the elements and maintenance of ecological functions such as a dynamic distribution of aquatic and terrestrial habitat.




**Protection Rank Comments:** The site is currently managed by the White River National Forest and does not have special protection status.

**Management Rank Comments:** This area is a popular spot for mountain biking but direct impacts to the elements appear to be minimal at this time. In addition to disrupting natural hydrological flow along Bear Creek, the old berm may pose an erosion threat.

# Beaver Creek at Battlement Mesa

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30 x 60 Minute Quadrangle*</p> <p>Carbondale, 39107-A1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--

## Beaver Creek at Battlement Mesa Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Beaver Creek is located approximately 4 miles southwest of Rifle, CO along County Road 317.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: North Mamm Peak. T7S R94W Sections 13, 24, 25, and 26; T7S R95W Sections 19, 30, and 31; T8S R94W Sections 10, 11, and 12.

**Size:** 3,521 acres

**Elevation:** 7,400 to 10,400 feet

**General Description:** The site spans a wide range in elevation thereby encompassing a variety of riparian plant associations. Thinleaf alder (*Alnus incana*) is persistent along the entire stretch of Beaver Creek that occurs in this site. However, co-dominant species change according to elevation. For example, Colorado blue spruce (*Picea pungens*) occurs with thinleaf alder at higher elevations. Further downstream, aspen (*Populus tremuloides*) becomes the co-dominant species while narrowleaf cottonwood (*Populus angustifolia*) is abundant at lower elevations. Upland slopes are dominated by aspen and Douglas fir (*Pseudotsuga menziesii*) at high elevations and Gambel's oak (*Quercus gambelii*) and juniper (*Juniperus osteosperma*) at lower elevations. Overall species diversity is high, especially in the upstream portion of the site where blue spruce, aspen, thinleaf alder, gooseberry (*Ribes* sp.), mountain willow (*Salix monticola*), and black twinberry (*Lonicera involucrata*) occur with an understory of monkshood (*Aconitum columbianum*), angelica (*Angelica ampla*), baneberry (*Actaea rubra*), marsh bittercress (*Cardamine cordifolia*), twistedstalk (*Streptopus fassettii*), arrow-leaf groundsel (*Senecio triangularis*), quackgrass (*Elytrigia repens*), small-winged sedge (*Carex microptera*), and fowl mannagrass (*Glyceria striata*). American speedwell (*Veronica americana*) and brookgrass (*Catabrosa aquatica*) are common on gravel bars in the stream channel and mosses are common on boulders within the channel.

Hydrological processes are mostly intact upstream. Near the lower end of the site, the riparian corridor constricts resulting in a limited buffer between the road and Beaver Creek. Numerous culverts, homes, horse pastures, and cattle grazing have impacted hydrological processes in the creek by altering/restricting flow, loss of floodplain acreage, and deterioration of the streambank. These threats have also impacted species diversity and vegetation structure (i.e. development and diversity of vegetation canopies) within this stretch of the riparian corridor.

Natural Heritage element occurrences at the Beaver Creek at Battlement Mesa PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Picea pungens</i> / <i>Alnus incana</i>	<b>Montane riparian forest</b>	<b>G3</b>	<b>S3</b>				<b>B</b>
<i>Populus tremuloides</i> / <i>Alnus incana</i>	Montane riparian forest	G3	S3				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains two plant communities that are vulnerable (G3/S3) on a global scale. There is a good (B-ranked) occurrence of the blue spruce/thinleaf alder (*Picea pungens*/*Alnus incana*) montane riparian forest, which is known from Wyoming to New Mexico. There are less than 100 documented occurrences of this community in Colorado. The aspen/thinleaf alder (*Populus tremuloides*/*Alnus incana*) montane riparian forest has only been documented on the western slope in Colorado but is expected in other Rocky Mountain states. A fair (C-ranked) occurrence of this plant community is located at this site.

**Boundary Justification:** The boundary encompasses the floodplain, surrounding slopes, and upstream drainages to ensure continued surface flow, periodic flooding, and space for the creek's fluvial processes to maintain a dynamic distribution of riparian plant communities. These processes are necessary for the viability of the elements and maintenance of ecological functions.

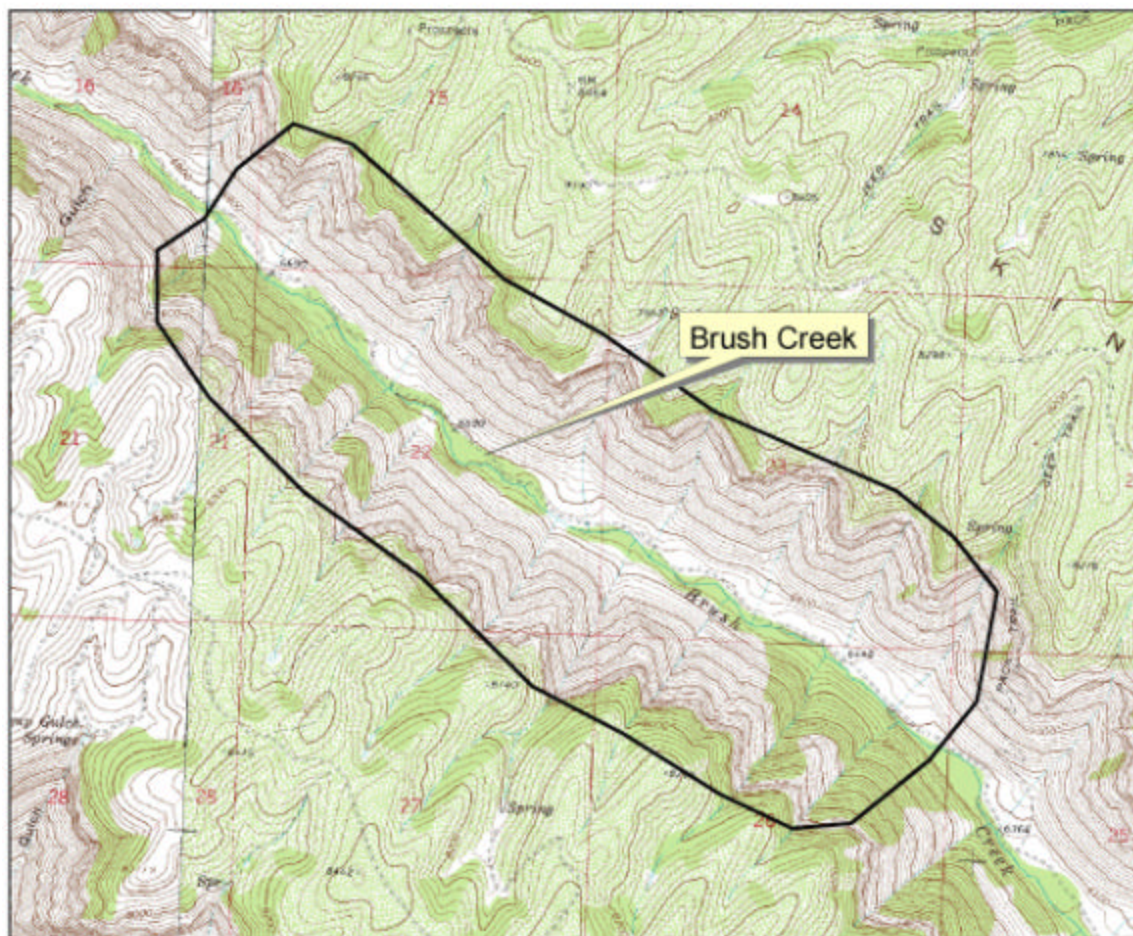
**Protection Rank Comments:** There are numerous homes along this stretch of Beaver Creek and given the proximity to Rifle, this area could be targeted for increased development. In addition, above the first U.S. Forest Service tract (the first tract when heading south on County Road 317), there is a large private inholding. Currently, this area does not appear to be developed but recently, there was a new, large road constructed to this area.

**Management Rank Comments:** As noted above, culverts and development along the floodplain have altered hydrological processes. Cattle and horse grazing along the creek have resulted in deteriorated streambanks and increased erosion in these areas.



# Brush Creek at Skinner Ridge

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Henderson Ridge, 39108-E5  
Desert Gulch, 39108-E4

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Brush Creek at Skinner Ridge Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Brush Creek is located approximately 30 miles north of Grand Junction, CO and 16 miles east of Douglas Pass. The site is located between Skinner Ridge and Brush Mountain.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Desert Gulch and Henderson Ridge. T5S R99W Sections 15, 16, and 21-27.

**Size:** 1400 acres

**Elevation:** 6,400 to 8,000 feet

**General Description:** Brush Creek has formed a steep valley surrounded by mostly barren shale slopes of the Green River formation. Douglas fir (*Pseudotsuga menziesii*) and Utah serviceberry (*Amelanchier utahensis*) occur at the top of the slopes while Utah serviceberry and Gambel's oak (*Quercus gambelii*) occur near the base of the slopes. Box elder (*Acer negundo*) and choke-cherry (*Prunus virginiana*) dominate the overstory in the riparian areas. Richardson's geranium (*Geranium richardsonii*) is fairly abundant in the understory along the creek as are non-native species such as Kentucky bluegrass (*Poa pratensis*), hound's tongue (*Cynoglossum officinale*), and dandelion (*Taraxacum officinale*).

Natural Heritage element occurrences at the Brush Creek at Skinner Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Acer negundo/Prunus virginiana</i>	Montane riparian deciduous forest	G3	S2				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a fair (C-ranked) occurrence of the globally vulnerable (G3/S2) box elder/choke-cherry (*Acer negundo/Prunus virginiana*) montane riparian deciduous forest. This community is highly threatened by stream alterations, heavy recreational use, and heavy grazing.

**Boundary Justification:** The boundary encompasses the narrow riparian area, surrounding slopes, and some upstream drainages to ensure continued surface flow, periodic flooding, and opportunity for the creek's fluvial processes to maintain a dynamic distribution of riparian plant communities. These processes are necessary for the continued viability of the elements and maintenance of ecological functions. However, the entire upstream portion of the watershed was not included in the site boundaries. These areas need to be considered to ensure hydrological processes remain intact.

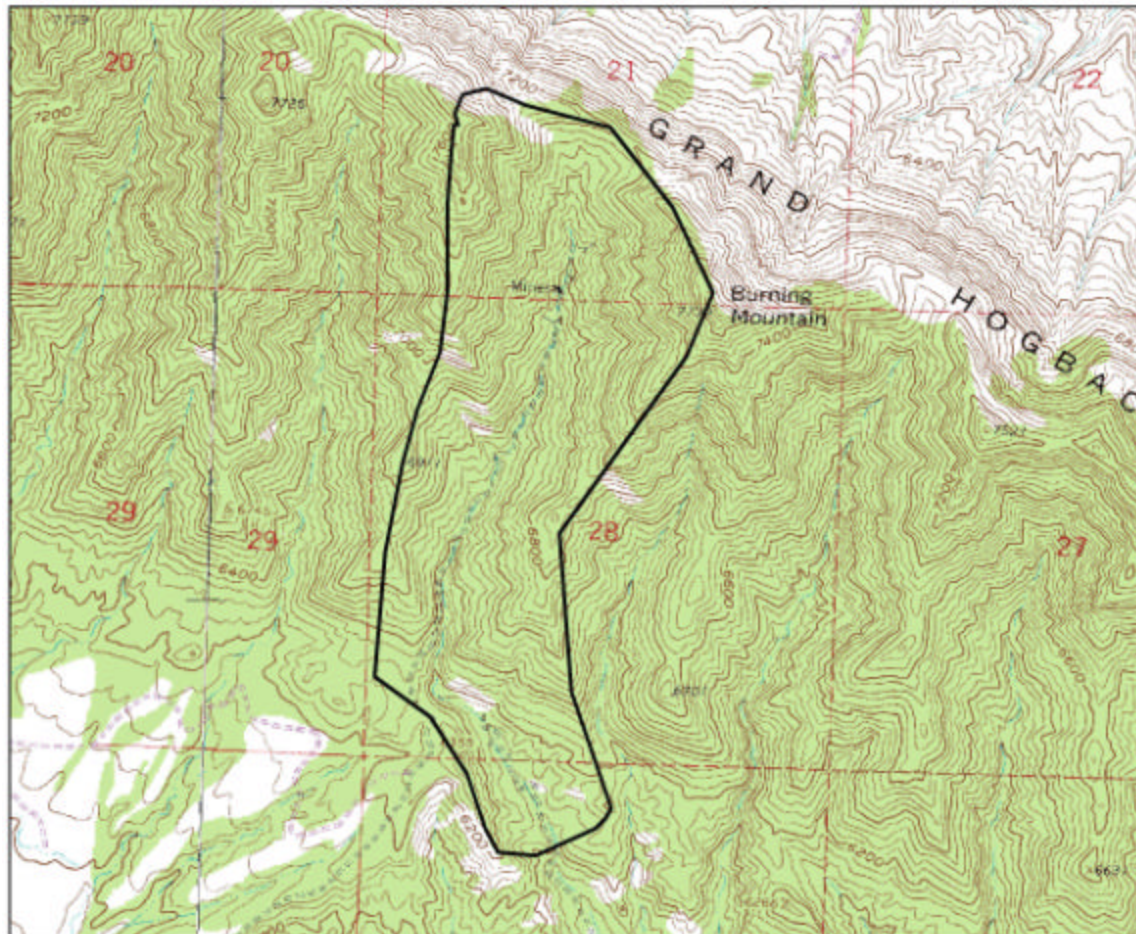
**Protection Rank Comments:** The site is currently under private ownership. If oil shale ever becomes an economical extractable resource, oil shale development could pose a threat to the site.




**Management Rank Comments:** Increased livestock grazing could result in degradation of the elements. There is a road that parallels the creek. Erosion and influx of non-native species from the road corridor are potential threats.



# Burning Mountain

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*          Silt, 39107-E6          New Castle, 39107-E5</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--

## Burning Mountain Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Burning Mountain is located between Silt and New Castle Colorado, along the Grand Hogback.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: New Castle. T5S R91W Sections 21, 28, 33.

**Size:** 418 acres

**Elevation:** 6,100 to 7,730 feet

**General Description:** The Burning Mountain PCA is located on the south side of the Grand Hogback, in the piñon-juniper zone. The southern part of the site is in the Wasatch and Ohio Creek geological formations, while the upper part occupies the Williams Fork formation. A gravel road leads to a mine near the top of the ridge. Wetherill milkvetch was found to be common in the road and in the adjacent wash, as well as more sparsely scattered in the piñon-juniper woodland outside the wash.. The full extent of the population was not determined, and it is likely that it extends to other dry washes along the southern exposure of the hogback in the vicinity. Other species at the site included mountain mahogany (*Cercocarpus montanus*), Mormon tea (*Ephedra viridis*), and Gambel's oak (*Quercus gambelii*). The Wetherill milkvetch population was estimated at 1,000 individuals. About half of the plants were flowering when they were observed in late May. The PCA is located on both private and BLM land.

Natural Heritage element occurrences at the Burning Mountain PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Astragalus wetherillii</i>	<b>Wetherill milkvetch</b>	<b>G3</b>	<b>S3</b>		<b>A</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA supports an excellent (A ranked) occurrence of Wetherill milkvetch, a globally vulnerable (G3S3) plant species known from seven western Colorado counties and Utah. There are thirty-eight known occurrences, with an estimated total of 9000 individuals.

**Boundary Justification:** The PCA boundary includes the occurrence and some additional unsurveyed adjacent potential habitat. However, the full extent of the population of Wetherill milkvetch was not determined. With further surveys, it could be found to extend to the east and west along the south side of the Grand Hogback, and the PCA boundaries could be extended.

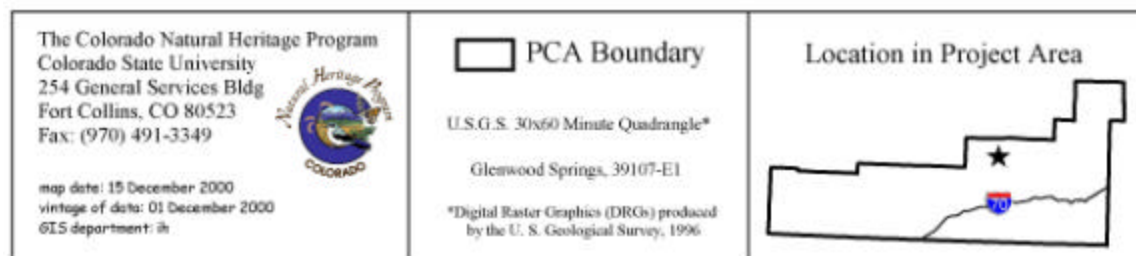
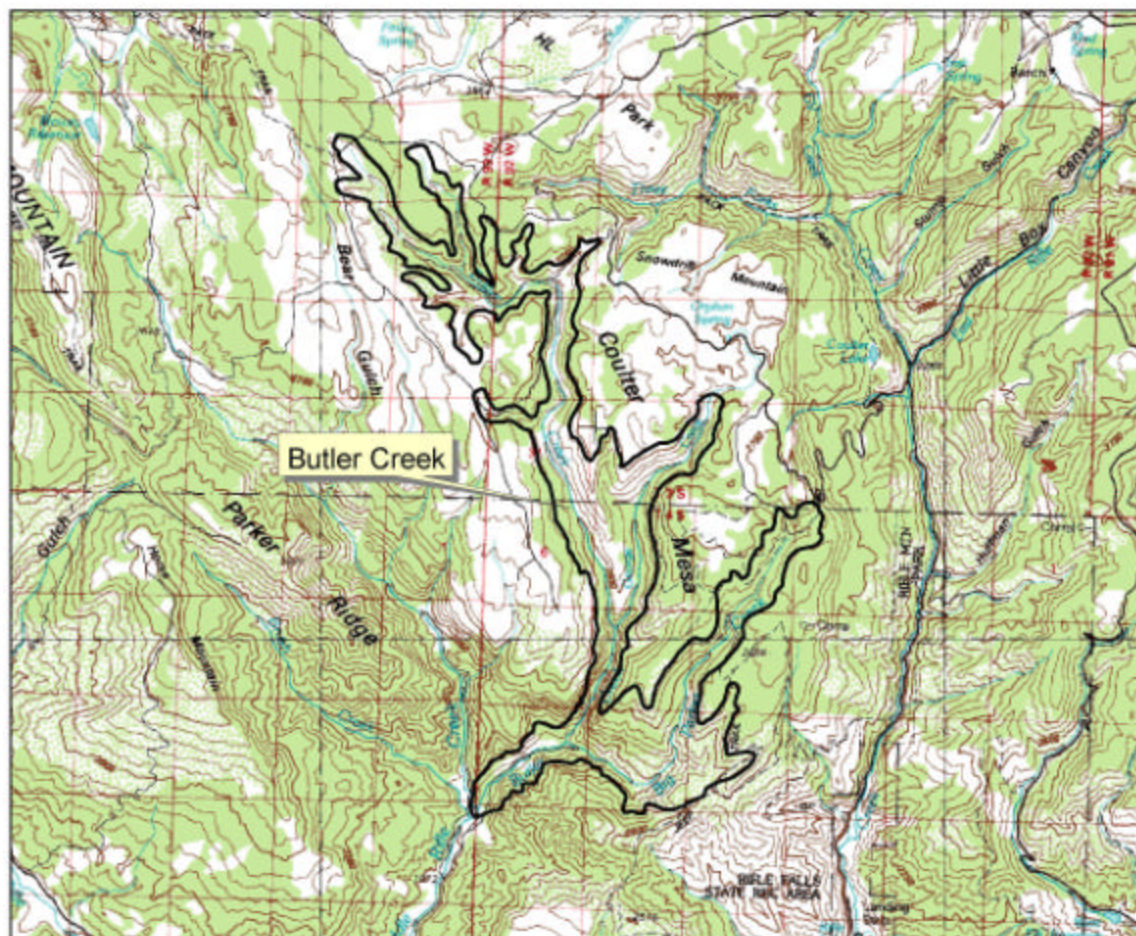
**Protection Rank Comments:** The PCA is located on BLM and private lands. Former mining operations apparently have not negatively affected the Wetherill milkvetch, since it was found growing on the mine tailings, as well as in the road and eroded dry wash.

**Management Rank Comments:** No management needs are known for this site.



# Butler Creek

## Potential Conservation Area



## Butler Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate Biodiversity Significance. The Butler Creek PCA supports a good occurrence of a globally vulnerable subspecies of cutthroat trout.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M2** Current grazing intensity is degrading the riparian communities and compromising survival of the cutthroat trout population.

**Location:** This PCA is located 8.4 miles north of Rifle, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Horse Mountain, Triangle Park, Rifle Falls and Red Elephant. T4S R92W, S3-9, 16-20; T3S R92W, S19, 20, 28, 30-34; T3S R93W, S13, 14, 23-25, 36; T4S R93W, S13, 24.

**Size:** 4,358 acres

**Elevation:** 6,595 to 9,557 feet

### General Description:

The Butler Creek PCA contains three tributaries that ultimately feed Middle Rifle Creek; the most prominent of these tributaries is Butler Creek. George and Parker Creeks, associated tributaries of Butler Creek, are also included within the PCA. The vegetation is characterized by mixed forest with Gambel's oak (*Quercus gambelii*), aspen (*Populus tremuloides*), and spruce-fir (*Picea engelmannii*-*Abies lasiocarpa*). At the headwaters of Butler Creek there are large grass meadows intermixed with big sagebrush (*Artemisia tridentata*) shrubland.

Substratum in the PCA consists of shale, limestone and sandstone of the Pennsylvanian Minturn and Belden formations. There are also sedimentary rocks of the pre-Pennsylvanian Paleozoic Era.

A population of Colorado River cutthroat trout (*Oncorhynchus clarki plueriticus*) occupies the Butler Creek drainage and is isolated from competition and hybridization with introduced nonnative trout by a 75-foot waterfall.

Natural Heritage elements at the Butler Creek site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Oncorhynchus clarki plueriticus</i>	Colorado River cutthroat trout	<b>G4T3</b>	<b>G3</b>		SC	FS/BLM	<b>B</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Butler Creek drainage supports a population of the Colorado River cutthroat trout, a subspecies of trout that is vulnerable on a global scale (G4T3). Cutthroat trout are a sensitive species that are native to the Colorado River Basin, and have recently been in decline. The primary reasons for conservation concern include long-term trend prognoses and threats.

**Boundary Justification:** The planning boundary includes the headwaters and major tributaries of Butler Creek, including George and Parker creeks, and extends to the downstream barrier, the waterfall. A 1000-foot upland buffer is provided to limit direct physical disturbance and local hydrologic alterations. Riparian areas were included because of their importance in maintaining bank stability to protect water quality.

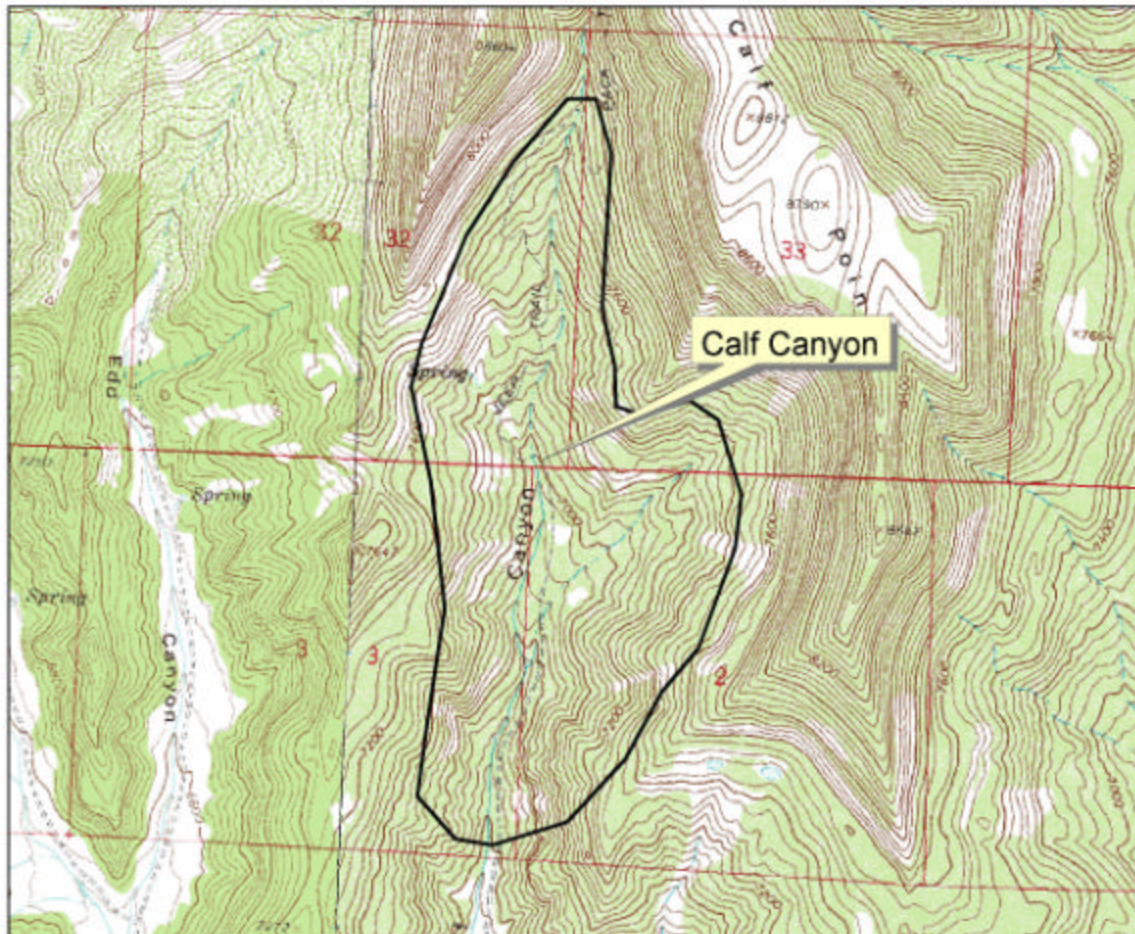
**Protection Rank Comments:** A large portion of this PCA including all of Parker Creek is privately owned. Approximately 50% is White River National Forest land, with the remainder split evenly between BLM land and privately owned land. The presence of the cutthroat trout population justifies special designation for the BLM and Forest Service land and any agreements with private landowners to exclude grazing from the riparian communities along the streams would benefit the cutthroat population.

**Management Rank Comments:** Intense grazing along streamsides has disturbed the riparian communities in all three drainages (Butler, George and Parker), negatively impacting stream quality. The genetic purity of the cutthroat population requires reevaluation due to extensive time since the last assessment (1992). Also, further investigation into the falls location is needed. There is a falls in the low floodplain, but none were observed during this survey farther up the Butler Creek Drainage. Excluding livestock from the streamsides would benefit the riparian communities, and, indirectly, stream quality and the cutthroat population. Thirty percent of the streamside is eroding, compared to 1% in healthy streams, and this creates shallow sediment filled pools, undercut banks with a lack of cover, high water temperatures, and low fish numbers in impacted areas.



# Calf Canyon

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

□ PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*  
Calf Canyon, 39108-E6  
Douglas Pass, 39108-E7

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Calf Canyon Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** Calf Canyon is located approximately 30 miles north of Loma, CO off of Hwy. 139.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Calf Canyon. T5S R101W Sections 32 and 33; T6S R101W Sections 2 and 3.

**Size:** 497 acres

**Elevation:** 6,900 to 7,600 feet

**General Description:** This site occurs in a remote canyon surrounded by steep, 500 foot sandstone and shale cliff faces. There are a few seeps and springs scattered throughout the site. These seeps and springs are crucial to maintaining flow in the creek. At the location in which the elements are found a seep emerges in a small “bowl” of sandstone and shale supporting wetland vegetation. The spring-fed creek supports river birch (*Betula occidentalis*), red-osier dogwood (*Cornus sericea*), Bebb’s willow (*Salix bebbiana*), and aspen (*Populus tremuloides*) with a minimal understory of herbaceous plants due to flood scouring. Douglas fir (*Pseudotsuga menziesii*), Utah serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos rotundifolia*), Gambel’s oak (*Quercus gambelii*), and wild rose (*Rosa woodsii*) are found growing in mesic areas near the creek.

Natural Heritage element occurrences at the Calf Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Betula occidentalis</i> /Mesic forb	Foothills riparian shrubland	<b>G3</b>	<b>S2</b>				<b>B</b>

\*EO Rank is “Element Occurrence” Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S2) river birch/mesic forb (*Betula occidentalis*/Mesic forb) riparian shrubland. This community is well documented throughout the western states but is threatened by development and road construction



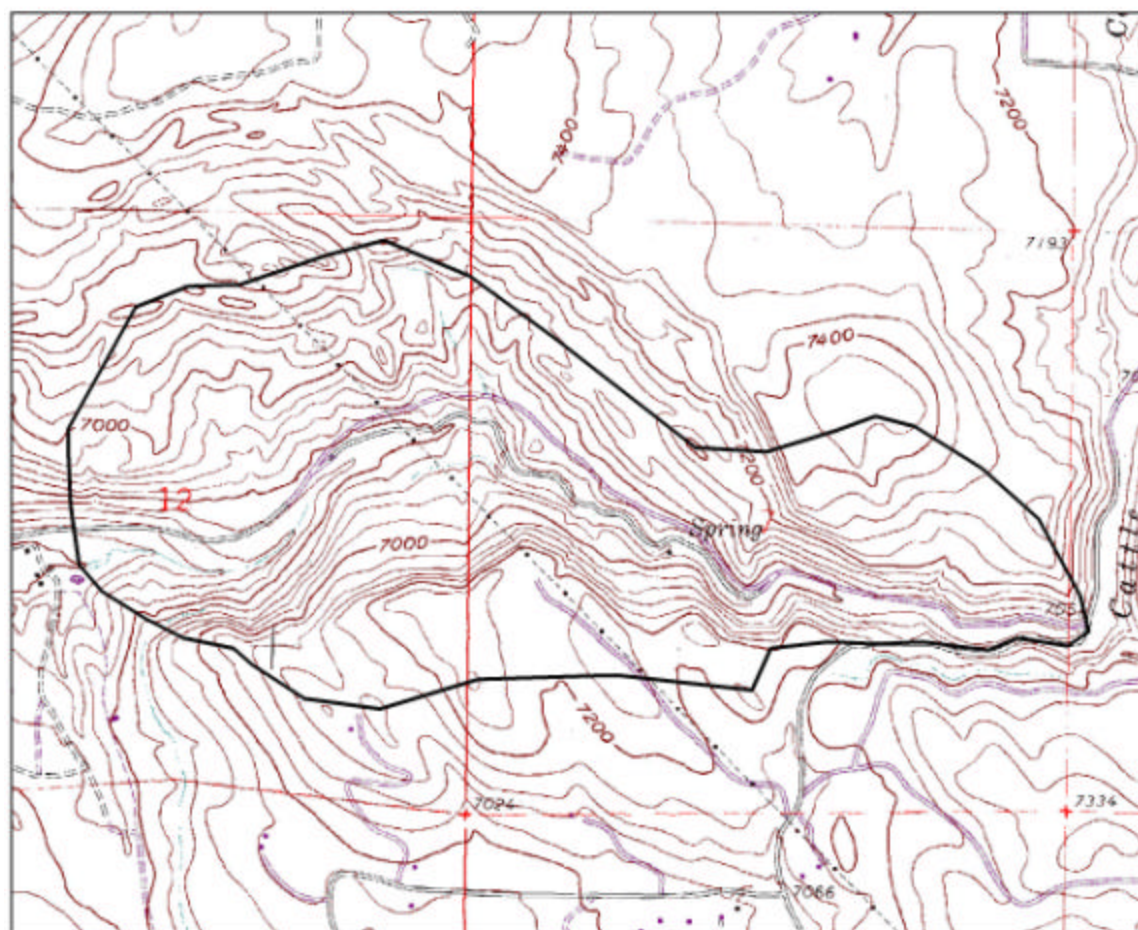
**Boundary Justification:** Surrounding slopes, upstream drainages, and nearby seeps and springs are encompassed in the site boundaries in order to ensure continued hydrological flow and periodic flooding, which are necessary for the continued viability of the elements.

**Protection Rank Comments:** Oil and gas development in this portion of Garfield county is fairly common. There are numerous oil well pads, along with a natural gas pipeline, downstream from this site.

**Management Rank Comments:** There is heavy grazing occurring within the riparian area. Although cattle are rotated in the area, timing and intensity of grazing should be planned in order to maximize plant species diversity and improve vegetation volume/structure. Management of this site should emphasize the shrub component of the riparian vegetation.

# Cattle Creek at Coulter Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Carbondale, 39107-D2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Cattle Creek at Coulter Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

A fair occurrence of a globally vulnerable plant community is found within the PCA.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M1** Management action is required immediately or the element occurrences could be lost or irretrievably degraded within one year.

**Location:** The Cattle Creek at Coulter Creek PCA is located about five miles northeast of Carbondale, Colorado, on north and south-facing slopes of Cattle Creek, west of Spring Park Reservoir.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale. T7S R87W Sections 7, 8; T7S R88W Section 12.

**Size:** 543 acres

**Elevation:** 6,600 to 7,200 feet

**General Description:** This PCA is characterized by Gambel's oak (*Quercus gambelii*) shrublands on the north-facing slopes; piñon-juniper (*Pinus edulis-Juniperus osteosperma*) and sagebrush (*Artemisia tridentata*) communities on south-facing slopes; and a blue spruce-alder (*Picea pungens-Alnus incana*) community in the riparian area. The oak shrubland (*Quercus gambelii-Cercocarpus montanus/Carex geyeri*) is considered to be a globally-vulnerable community type. The blue spruce/dogwood (*Picea pungens/Cornus sericea*) riparian community is considered to be rare in Colorado, and also supports a diversity of other shrubs and trees such as coyote willow (*Salix exigua*), Rocky Mountain willow (*Salix monticola*), chokecherry (*Prunus virginiana*), Douglas fir (*Pseudotsuga menziesii*), and alder (*Alnus incana*). This small area is in good condition overall; however there is a road that follows Cattle Creek and a power line that passes through the western portion of the PCA. The activity along these rights of way is creating erosion and weed problems.

Natural Heritage element occurrences at the Cattle Creek at Coulter Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b><i>Quercus gambelii-Cercocarpus montanus/Carex geyeri</i></b>	<b>Mixed mountain shrublands</b>	<b>G3</b>	<b>S3</b>		<b>C</b>
<i>Picea pungens/Cornus sericea</i>	Montane riparian forest	G4	S2		C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA includes a fair (C ranked) occurrence of a globally-vulnerable (G3S3) mixed mountain shrubland (*Quercus gambelii-Cercocarpus montanus/Carex geyeri*). This community type has been documented from only 33 locations in Colorado. The PCA also includes a fair (C ranked) example of a state-rare (G4S2) montane riparian forest (*Picea pungens/Cornus sericea*), which has only been documented in 21 locations in Colorado, although there may be many more undocumented occurrences.

**Boundary Justification:** This PCA includes the mosaic of community types in which the element occurrences are found. The surrounding high quality habitat is included to protect the occurrences from direct disturbances, such as trampling, and indirect disturbances, such as unnatural erosion. The PCA also provides additional suitable habitat to allow for natural migration of the communities over time. A much larger area should be considered in order to protect the hydrological processes that support the riparian community.

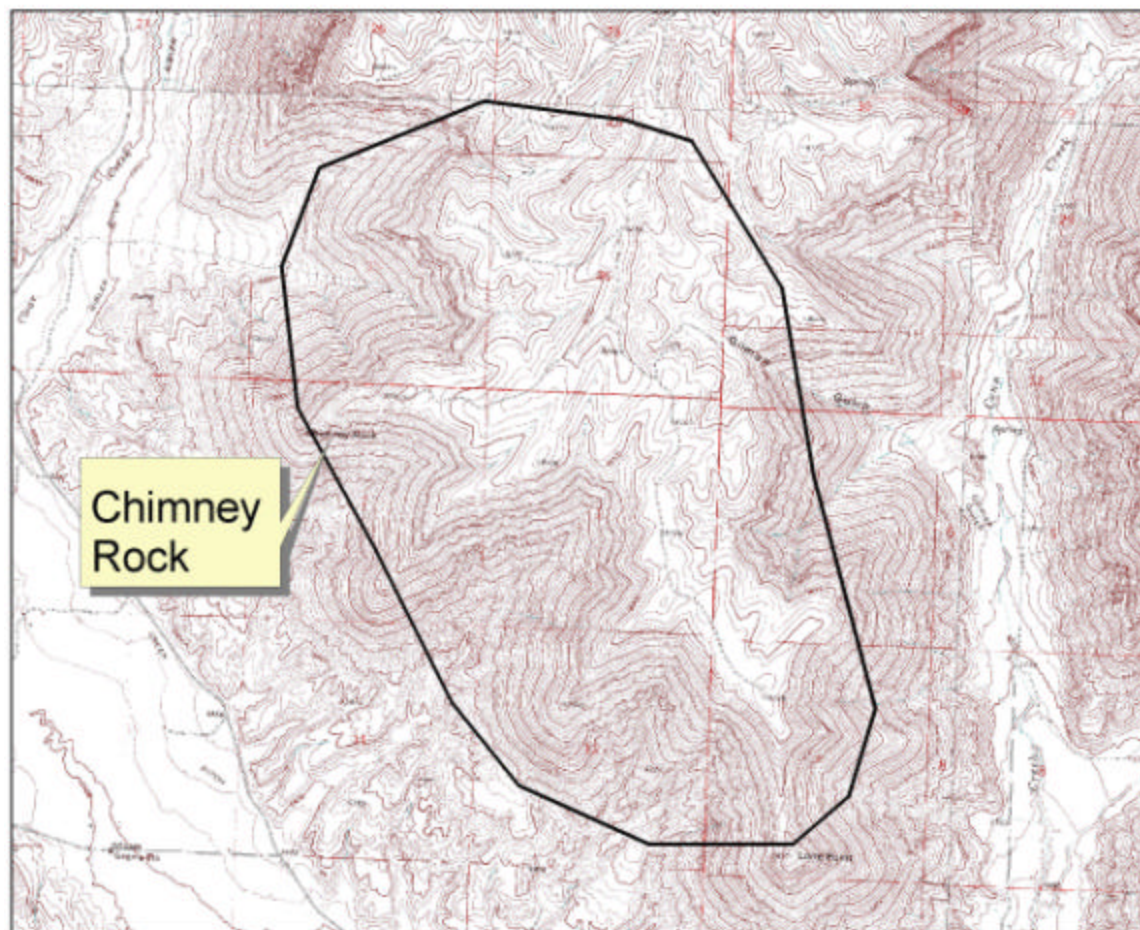
**Protection Rank Comments:** This PCA includes a combination of privately owned lands and lands that are publicly owned and managed by the Bureau of Land Management. Residential and recreational development pressures are high in this area. Any developments may threaten this PCA. Land exchanges between willing private landowners and the BLM should be considered.

**Management Rank Comments:** Management is needed to maintain the quality of the PCA. There is one road that passes through the PCA along Cattle Creek which is causing erosion problems, and runoff sediments are being deposited in the riparian area. The road is also acting as a conduit for weeds, such as yellow sweet clover (*Melilotis officinale*), plumeless thistle (*Carduus acanthoides*), cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola iberica*), mullein (*Verbascum thapsus*), curly dock (*Rumex crispus*), hound's tongue (*Cynoglossum officinale*), and tansy (*Tanacetum vulgare*). One of the best defenses against the spread of these exotic species is to discourage future roads and/or trails in the PCA. Management actions could include the development of a management plan, an exotic plant eradication program, and monitoring the occurrences to detect any changes in their overall quality or condition. Management agreements should be sought with the BLM, private landowners, and the highway department.



# Chimney Rock at Long Point

## Potential Conservation Area



0 0.5 1 Miles



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Red Pinnacle, 39108-D2  
Mount Blaine, 39108-E3  
Circle Dot Guleh, 39108-E2  
Long Point, 39108-D3

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Chimney Rock At Long Point Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Ten miles north-northwest of DeBeque, Colorado. East of Roan Creek, between Conn Creek and Clear Creek..

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Long Point. T7S R98W S1, 11, 12; T7S R97W S6, 7; T6S R98W S25, 26, 35, 36; T6S R97W S30, 31.

**Size:** 3,573 acres

**Elevation:** 6,000 to 8,286 feet

**General Description:** The Chimney Rock at Long Point PCA represents an assortment of plant communities that are found on the Green River shale and Uinta formations in Garfield County. The site includes a mesa top and steep southwest facing slopes above Roan Creek. Although located in the piñon-juniper and mixed forest zones, the steep erodable slopes are more often clothed with sparse grasses and mountain shrubs. The dry lower slopes of the site have desert shrub and grassland communities that are more commonly found at lower elevations. The vegetation was documented in 1983 by a private consulting firm. Although several of the plant communities present in the site are common, one is considered to be globally rare, and three others are considered vulnerable. Good condition grassland or shrub/grass communities are generally uncommon on the western slope, and should be valued when they occur.

At the higher elevations in the PCA, on the Uinta formation, Gambel's oak and Mountain mahogany communities with an understory of elk sedge (*Carex geyeri*) were documented. Other plants found in these communities were serviceberry, sagebrush, snowberry, and Kentucky bluegrass. Moving down onto the Green River shale, grasses become more important. The globally vulnerable cold desert shrublands with the salt desert shrub *Atriplex confertifolia* and native bunch grasses including Indian rice grass, bluebunch wheatgrass, and Salina wildrye were documented here.

Natural Heritage element occurrences at the Chimney Rock at Long Point PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b><i>Atriplex confertifolia/Oryzopsis hymenoides</i></b>	<b>Cold desert shrublands</b>	<b>G2</b>	<b>S2</b>	<b>007</b>	<b>E</b>
<i>Atriplex confertifolia/Pseudoroegneria spicata</i>	Cold desert shrublands	G3	S2S3	005	E
<i>Atriplex confertifolia/Pseudoroegneria spicata</i>	Cold desert shrublands	G3	S2S3	007	E
<i>Quercus gambelii-Cercocarpus montanus/Carex geyeri</i>	Mixed mountain shrublands	G3	S3	008	E
<i>Quercus gambelii-Cercocarpus montanus/Carex geyeri</i>	Mixed mountain shrublands	G3	S3	009	E
<i>Pseudoroegneria spicata-Oryzopsis hymenoides</i>	Western Slope grasslands	G3	SU		E
<i>Cercocarpus montanus/Pseudoroegneria spicata</i>	Mixed mountain shrublands	G4	S3		E
<i>Cercocarpus montanus/Pseudoroegneria spicata</i>	Mixed mountain shrublands	G4	S3		E
<i>Atriplex confertifolia/Leymus salinus</i>	Cold desert shrublands	G4G5	S3		E
<i>Atriplex confertifolia/Leymus salinus</i>	Cold desert shrublands	G4G5	S3		E
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic Western Slope piñon-juniper woodlands	G5	S4		E
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic Western Slope piñon-juniper woodlands	G5	S4		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA contains a diversity of both rare and common plant communities. Cold desert shrublands dominated by shadscale and Indian rice grass is considered to be globally imperiled (G2S2). The PCA was surveyed by a private consultant in 1983, and none of the identified communities were ranked. They are included here as representatives of the plant associations found in the area.

**Boundary Justification:** The boundary was drawn to include a group of both rare and common natural communities. It does not represent the full extent of these communities, but rather the sites that were documented in a 1983 study.

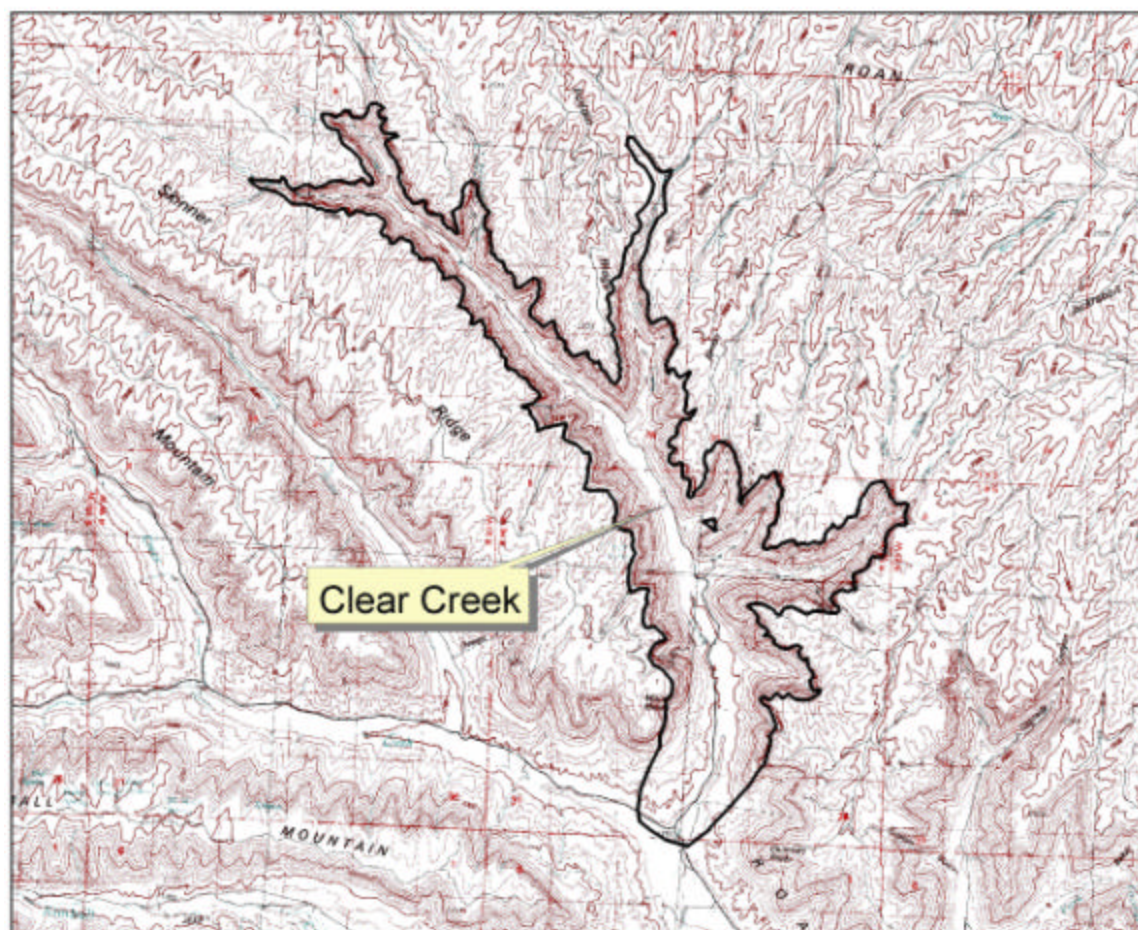
**Protection Rank Comments:** The PCA is located almost entirely on private land, and is likely to be vulnerable to oil and gas developments.




**Management Rank Comments:** No management needs are known.



# Clear Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangles*</p> <p>Grand Junction, 39108-A1          Douglas Pass, 39108-E1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--

## Clear Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P2** This site is mostly privately owned, and subject to oil and gas development.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Roan Plateau, about 15 miles ENE of Parachute, 14 mi. NNE of DeBeque

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Figure Four Spring, Bull Fork, Mount Blaine, Desert Gulch, Long Point. T5S R98W S5-9, 15-18, 21-25, 34-36; T5S R97W S31; T6S R98W S1-6, 9-16, 22, 23, 26-28, 33, 34.

**Size:** 13,563 acres

**Elevation:** 5,513 to 8,000 feet

**General Description:** Clear Creek, a tributary of Roan Creek, is a major drainage of the Roan Plateau, and includes numerous small side drainages. The lower part of the drainage is composed of the Wasatch formation, while the upper part and the steep sides are in the Green River formation, marlstones below and Parachute Creek member above. Significant areas within this large PCA include Red Point, Sheep Gulch, Mud Springs Creek, Camp Gulch, Deer Park Gulch, Scott Gulch, Buck Gulch, Doe Gulch, and Tom's Creek Canyon. The PCA harbors several narrowly endemic plant species that are restricted to the Green River shale on the steep canyonsides, as well as both rare and common plant communities. The canyonsides are for the most part sparsely vegetated. The dry, barren slopes with loose fragments of light gray shale are home to the sun-loving meadowrue, Arapien stickleaf, and Utah fescue. Moist crevices of shale outcrops harbor the hanging garden sullivantia, in association with oil shale columbine (*Aquilegia barnebyi*). Near the headwaters of Tom Creek, an interesting wetland community of water whorlgrass (*Catabrosa aquatica*) and monkeyflower (*Mimulus* sp.) was documented. Associated species included Nebraska sedge (*Carex nebraskensis*) and baltic rush (*Juncus balticus*).

The PCA is almost completely privately owned, primarily by large oil companies. There are a few small BLM parcels included.

Natural Heritage element occurrences at the Clear Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plants</b>					
<b><i>Thalictrum heliophilum</i></b>	<b>Sun-loving Meadowrue</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<b><i>Thalictrum heliophilum</i></b>	<b>Sun-loving Meadowrue</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Thalictrum heliophilum</i>	Sun-loving Meadowrue	G3	S3		B
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2	BLM	B
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2	BLM	B
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Sullivantia hapemannii</i> <i>var. purpusii</i>	Hanging garden sullivantia	G3T3	S3	FS	E
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E
<b>Plant communities</b>					
<i>Atriplex confertifolia/Oryzopsis hymenoides</i>	Cold desert shrublands	G2	S2		E
<i>Atriplex confertifolia/Oryzopsis hymenoides</i>	Cold desert shrublands	G2	S2		E
<i>Populus angustifolia/Rhus trilobata</i>	Narrowleaf cottonwood/Skunkbrush	G3	S3		B
<i>Catabrosa aquatica</i>	Spring wetland	GU	S3		B
<i>Atriplex confertifolia/Pseudoroegneria spicata</i>	Cold desert shrublands	G3	S2S3		E
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic western slope piñon-juniper woodlands	G5	S4		E
<i>Pseudoroegneria spicata - Oryzopsis hymenoides</i>	Western Slope Grasslands	G3	SU		E
<i>Pseudotsuga menziesii/Symphoricarpos rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4		E
<i>Pseudotsuga menziesii/Symphoricarpos rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4		E
<b>Mammals</b>					
<i>Vulpes macrotis</i>	Kit fox				E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Clear Creek PCA has 25 elements of biodiversity documented. Of highest significance are excellent (A ranked) occurrences of the sun loving meadowrue, good (B ranked) occurrences of the Arapien stickleaf, and unranked (E) occurrences of Utah fescue, all globally vulnerable (G3) oil shale endemic species. Moist areas are home to the hanging garden sullivantia and several wetland communities. The PCA also has desert shrub and grassland communities dominated by shadscale (*Atriplex confertifolia*) and Indian rice grass (*Oryzopsis hymenoides*), that are considered to be globally vulnerable (G3S2S3).

The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado are all found on Green River shale on the Roan Plateau in Garfield County.

Hanging garden sullivantia is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals (NatureServe 2000).

Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

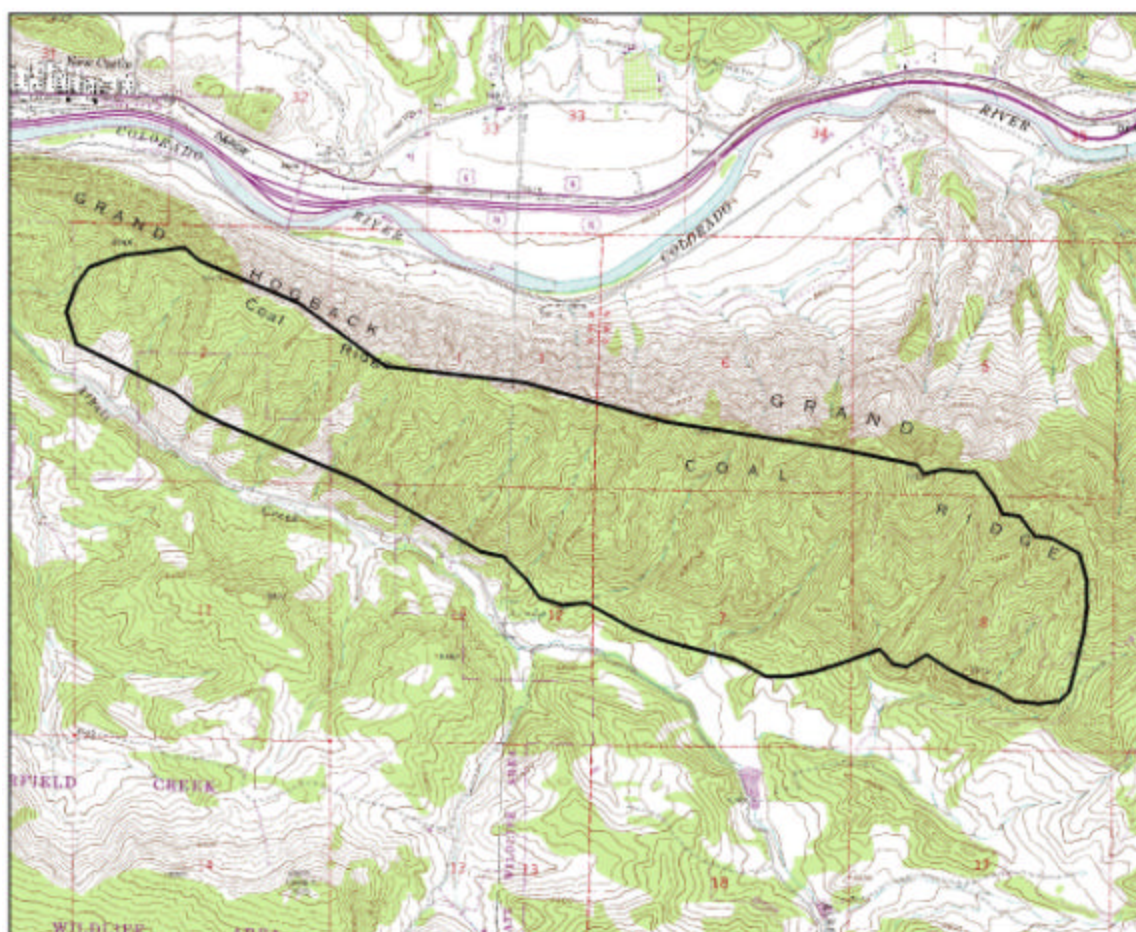
**Boundary Justification:** The boundary is drawn to include Clear Creek and its tributaries, with their the Green River shale canyonsides, to the rim, but does not include the mesa tops. It includes springs at the head of tributaries that support the hanging garden sullivantia. Some unoccupied habitat for the shale endemic plants is included to allow for movement of the plant populations over time, as landslides open up new sites, and existing sites become too heavily vegetated for the targeted species.

**Protection Rank Comments:** The PCA is almost entirely owned by private oil companies. Although not currently economical, future oil shale extraction could seriously impact this significant site.

**Management Rank Comments:** No current management needs are known.



# Coal Ridge Potential Conservation Area



0 1 2 Miles



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lsh

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

New Castle, 39107-E5  
Storm King Mountain, 39107-E4

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Coal Ridge Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** One mile south of New Castle, above Alkali Creek.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: New Castle, Storm King Mountain T6S R91W Sections 1, 2, 12; T6S R90W Sections 5-8.

**Size:** 1,735 acres

**Elevation:** 6,000 to 6,600 feet

**General Description:** Coal Ridge is a steep, rocky ridge, part of the Grand Hogback, above Alkali Creek, a tributary of the Colorado River. The PCA occupies the steep, southwestern side of the ridge. Part of the site is within the Garfield Creek State Wildlife Area. The hillside has a sparse shrub cover, with much eroded bare ground and exposed bedrock of the upper Mesa Verde formation. Soils are thin, light colored and shaley. Common plant species in the site are Gambel's oak (*Quercus gambelii*), squaw apple (*Peraphyllum ramosissimum*), mock orange (*Philadelphus microphyllus*), mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchier utahensis*), Mormon tea (*Ephedra viridis*), Osterhout's penstemon (*Penstemon osterhoutii*), hairy golden aster (*Heterotheca villosa*), mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), common globemallow (*Sphaeralcea coccinea*), snakeweed (*Gutierrezia sarothrae*), and galleta (*Hilaria jamesii*). Wetherill milkvetch (*Astragalus wetherillii*) was found in dry washes and on eroded areas, mostly near the top of the ridge.

### Natural Heritage elements at the Coal Ridge PCA

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Coal Ridge PCA contains a good (B ranked) population of Wetherill milkvetch, a globally vulnerable (G3) plant and Colorado Plateau endemic species. Although the number of individuals seen was small (33), the condition of the site and the landscape context were sufficient to give the occurrence a B, or "good" rank. The species is known from seven western Colorado counties. There are thirty-eight known occurrences, with an estimated total of 9000 individuals.

Another species at the site was notable, although not considered rare. Britton's skullcap (*Scutellaria brittonii*), an attractive member of the mint family, is an eastern slope species, only known previously in western Colorado from two collections near Glenwood Springs in 1897 and 1912 (Weber 1996).

**Boundary Justification:** The boundary is drawn to include the surveyed area where the Wetherill milkvetch is found, and the adjacent similar habitat on the same steep hillside. It does not include the level areas above and below the plant population.

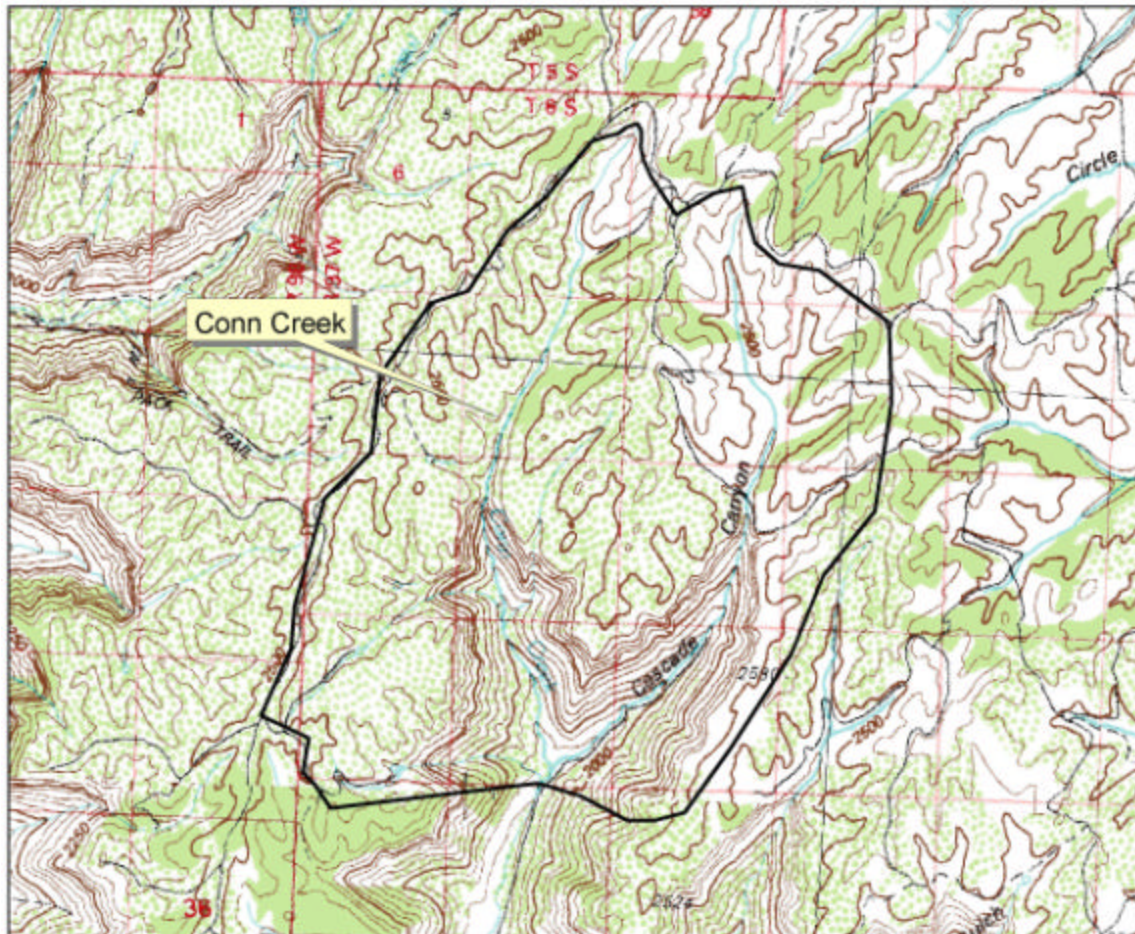
**Protection Rank Comments:** The PCA is located on a combination of private, BLM, and state land in the Garfield Creek State Wildlife Area. The private land is probably not suitable for development due to the steep terrain. However, other uses such as mineral extraction, powerlines or pipelines could impact the plant population.

**Management Rank Comments:** The site appears to be ungrazed, and the erosion on the steep hillside is natural. There are some weeds scattered throughout the site, including cheatgrass (*Bromus tectorum*), yellow sweet clover (*Melilotus officinalis*), hound's tongue (*Cynoglossum officinalis*), Canada thistle (*Cirsium arvense*), and horehound (*Marrubium vulgare*). Weeds are more abundant along the road at the base of the hill, and are seldom found growing close to the rare plants. However, they could become a problem in the future.



# Conn Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Douglas Pass, 39108-E1  
Grand Junction, 39108-A1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Conn Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Eight air miles north of the town of DeBeque, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Circle Dot Gulch, Red Pinnacle, Long Point, Mount Blaine. T6S R97W Sections 3-10, 15-22, 28-30; T6S R98W Sections 24, 25.

**Size:** 6,790 acres

**Elevation:** 6,200 to 8,400 feet

**General Description:** Conn Creek cuts through the Green River formation on the Roan Plateau, forming a small box canyon before joining Roan Creek. Two hundred foot shale cliffs form the walls of the box canyon, and a dramatic waterfall at the head of the canyon plunges more than 100 feet over the Roan Cliffs. Conn Creek is a small perennial stream with a very high gradient (500 feet per mile). The adjacent side slopes are very steep and vegetated with Gambel's oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus*), and Utah serviceberry (*Amelanchier utahensis*) on lower slopes while the upper and northeast-facing slopes near the cliff are forested with Douglas fir. Occasional landslides provide habitat for rare and endemic shale plants.

The riparian zone of Conn Creeek supports a unique low elevation community dominated by box elder maple and choke cherry. It has a very dense, and fairly undisturbed understory of Oregon grape (*Mahonia repens*), skunkbrush (*Rhus trilobata*), serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos rotundifolius*), and twinberry honeysuckle (*Distegia involucrata*).

Three rare plants were found on the shale barrens of the steep side slopes: Arapien stickleaf, sun-loving meadowrue and Utah fescue. All three are oil shale endemics, adapted to the Green River shale. A fourth Colorado endemic, hanging garden sullivantia, was found at a waterfall with a plunge pool and seeping cliffs, associated with oil shale columbine (*Aquilegia barnebyi*).

Natural Heritage element occurrences at the Conn Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plant communities</b>					
<i>Acer negundo/Prunus virginiana</i>	<b>Montane Riparian Deciduous Forest</b>	<b>G3</b>	<b>S2</b>		<b>A</b>
<b>Plants</b>					
<i>Nuttallia argillosa</i>	Arapien Stickleaf	G3	S2	BLM	B
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3		B
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3		E
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging Garden Sullivantia	G3T3	S3	FS	E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** An excellent (A ranked) occurrence of a globally vulnerable (G3S2) riparian community, and good (B ranked) occurrences of four rare shale endemic plants are found within the Conn Creek PCA.

The Arapien stickleaf is an endemic perennial found only on steep and barren shale slopes of the Green River Formation. It is restricted to widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

Utah fescue is one of four species of fescue endemic to the Western U.S. (Welsh *et al.* 1987). Its range is limited to the Green River Formation in Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

Hanging garden sullivantia is more widespread in its distribution, but only grows on moist cliff faces (hanging gardens). The species is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals (NatureServe 2000).

The lower elevation riparian areas support one of the best examples of a narrowly distributed boxelder/chokecherry community. This community was recently described by Kittel and Spackman (1994) and is not known to occur in any other state. Low elevation riparian communities in Colorado are generally in poor condition due to hydrologic changes, heavy grazing, agricultural use, and development. During CNHP's 1994 riparian vegetation study of the Colorado River, this site was found to be exemplary in its low elevation riparian vegetation.

**Boundary Justification:** The site boundaries for Conn Creek include the riparian area and its immediate slopes and cliff from the waterfall to its junction with Cascade Canyon. This boundary includes all element occurrences listed. The more significant elements occur on the shale scree slopes and streamsides of the box canyon. In order to protect these elements, especially the riparian zones, a broader, secondary boundary including the entire watershed should be considered. The watershed approach is especially important if mining activity takes place, since oil shale mining can be highly destructive to the drainages. The boundaries are also mapped to include the Sage Sparrow occurrence and over 30 acres of the surrounding big sagebrush habitat. Sage Sparrows require big sagebrush parks of over 30 acres for nesting (Lambeth 1998).

**Protection Rank Comments:** No protective status is given to this site. Occidental Oil Company owns both Conn and Cascade Canyons. Few roads or trails are within the Conn Creek PCA, although grazing takes place in both the riparian areas and on the slopes. At current oil prices it is not now economical to mine oil shale. If or when the price of oil goes up and technology is improved, the oil companies will probably mine this site.

**Management Rank Comments:** This PCA is generally in pristine condition. The only non-native plant observed was woolly mullein (*Verbascum thapsus*). The only management activity recommended at present is to periodically monitor the site for changes.



# Cow Ridge

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

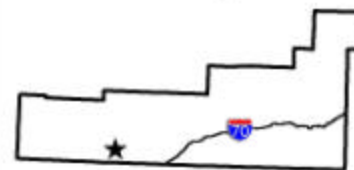
 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Grand Junction, 39108-A1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Cow Ridge Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About ten miles northwest of DeBeque, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Long Point, Middle Dry Fork, The Saddle. T7S R98W Sections: 9,10,14-24, 25-30; T7S R99W Sections: 7-10, 19-36; T7S R100W Sections: 8-25, 29-31; T7S R101W Sections: 25,36; T8S R97W Sections: 6,7; T8S R98W Sections: 1-6, 8-12

**Size:** 14,547 acres

**Elevation:** 6,000 to 8,428 feet

**General Description:** Cow Ridge is the upland between two east-flowing drainages, the North Dry Fork and Kimball Creek. Both flow into Roan Creek. The PCA takes in the south facing slopes of the ridge, above the North Dry Fork. The top of the ridge consists of the Parachute Creek member of the Green River shale. The lower elevations are composed of Green River marlstone, while in the eastern end of the PCA at lower elevations still, the Wasatch and Ohio formations are found. The sparsely vegetated south slopes have much barren exposed shale, and a mixture of piñon, juniper, and mountain shrubs, including Gambel's oak, chokecherry, snowberry, mountain mahogany and serviceberry. There are a few scattered Douglas fir and Ponderosa pine. Other common species in the site are Colorado bedstraw (*Galium coloradense*), evening primrose (*Oenothera cespitosa*), rock spirea (*Holodiscus dumosus*), spearleaf buckwheat (*Eriogonum lonchophyllum*), and thistles. The rare plants are locally abundant in the loose shale in the least vegetated areas.

Natural Heritage element occurrences at the Cow Ridge PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Lesquerella parviflora</i>	Piceance Bladderpod	G2G3	S2S3	BLM	A
<i>Lesquerella parviflora</i>	Piceance Bladderpod	G2G3	S2S3	BLM	A
<i>Lesquerella parviflora</i>	Piceance Bladderpod	G2G3	S2S3	BLM	C
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3		E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** Five occurrences of two globally rare (G2G3) plants are found within this site. Both species are Colorado endemics, found only on the Green River shale. Two of the occurrences of the Piceance bladderpod were rated excellent (A ranked).

The Piceance Bladderpod is a Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County.

Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the Piceance bladderpod at this site. It includes the south facing slopes of Cow Ridge above the North Dry Fork., which support the two rare plant species. Some adjacent suitable habitat that is presently unoccupied is included, to allow for movement of the plant populations over time, as landslides open up new sites, and existing sites become too heavily vegetated for the targeted species.

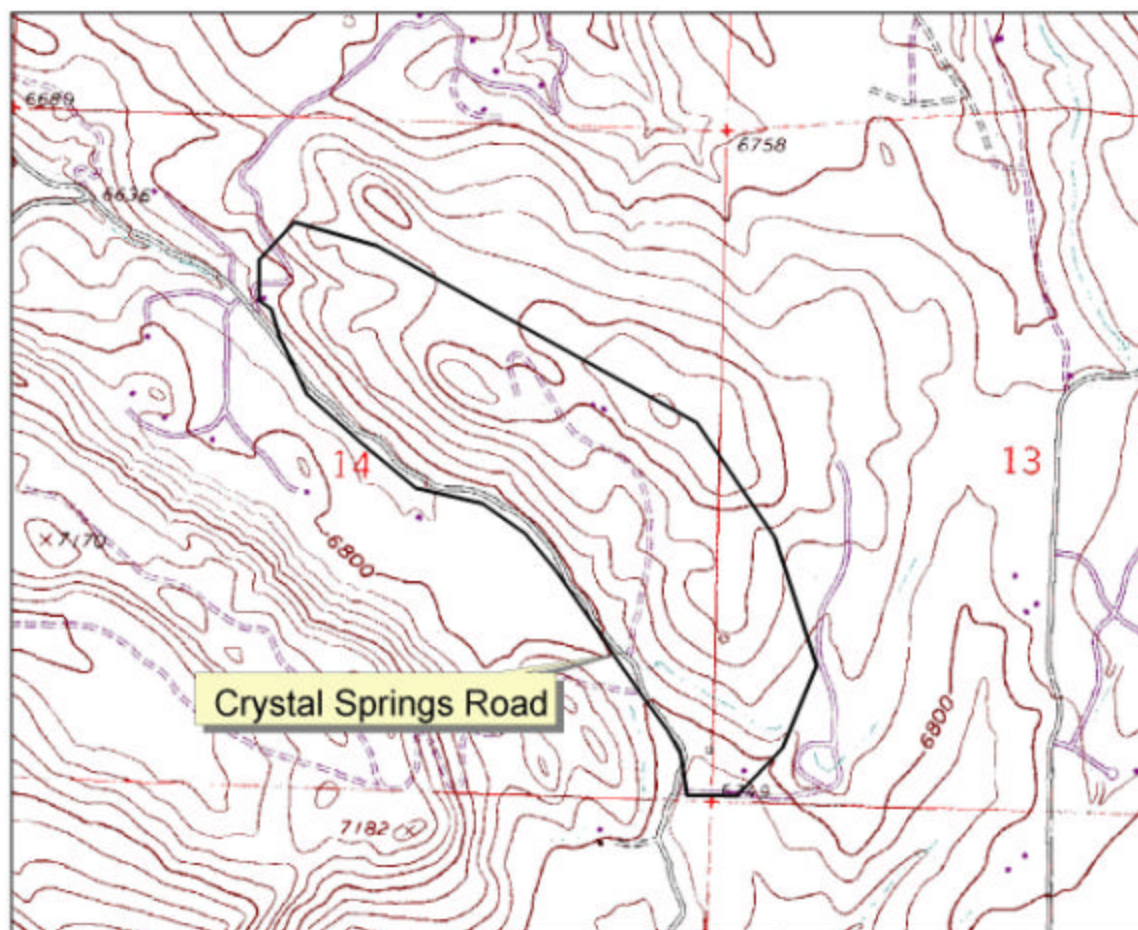
**Protection Rank Comments:** A narrow strip of private land is located along the bottom of the North Dry Fork, while the uplands in the site are public, managed by the Grand Junction Resource Area of the BLM. Future oil and gas development on BLM would require an Environmental Assessment, at which time the Piceance bladderpod, a BLM sensitive species, should be considered and protected from direct disturbance. There is no such protection for the private land.

**Management Rank Comments:** There are no known management needs at present.



# Crystal Springs Road

## Potential Conservation Area



The Colorado Natural Heritage Program  
 Colorado State University  
 254 General Services Bldg  
 Fort Collins, CO 80523  
 Fax: (970) 491-3349



map date: 15 December 2000  
 vintage of data: 01 December 2000  
 GIS department: lah

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*  
 Crystal Springs Road  
 Carbondale, 39107-D2

\*Digital Raster Graphics (DRGs) produced  
 by the U. S. Geological Survey, 1996

Location in Project Area



## Crystal Springs Road Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance

**Protection Urgency Rank: P1** The occurrence is immediately threatened.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** Garfield County. Three miles northeast of the town of Carbondale, Colorado between Cattle Creek and the Roaring Fork River.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale. T7S R88W Sections 13, 14.

**Size:** 445 acres

**Elevation:** 6,520 to 7,000 feet

**General Description:** This PCA includes south-facing rolling hills dominated by piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodlands with sagebrush (*Artemisia tridentata*) shrublands. Harrington beardtongue (*Penstemon harringtonii*), a globally-vulnerable plant species, is found along a road that defines the western boundary of the PCA. Although this species is usually found in sagebrush habitats, this occurrence is documented in a piñon-juniper woodland. The slopes surrounding the PCA are dominated by piñon-juniper and mixed shrublands, interspersed with houses and hay meadows. Approximately 180 acres are included in this PCA.

Natural Heritage element occurrences at the Crystal Springs Road PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	<b>Harrington beardtongue</b>	<b>G3</b>	<b>S3</b>	<b>FS/BLM</b>	<b>C</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA contains a fair (C ranked) occurrence of a globally-vulnerable (G3S3) plant species. Harrington beardtongue (*Penstemon harringtonii*) is restricted to Colorado and is found almost exclusively in sagebrush habitat. This species is only known from approximately 41 locations, most of which are centered around Edwards, in Eagle County. In general, Harrington beardtongue and its habitat are threatened from residential development. These threats, in addition to its restricted range, create an urgency for protection. Harrington beardtongue populations are known to fluctuate in population numbers from year to year. Therefore, this specific location may be a higher priority than the current information reflects. The unusual circumstances of this occurrence, found in piñon-juniper (*Pinus edulis-Juniperus osteosperma*)

woodland, may be explained by its proximity to the road. Anthropogenic factors may contribute to the dispersal and the growing conditions present.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the Harrington beardtongue population. The primary threat to the plants at this location is residential development along the road. The PCA boundary includes the occurrence of Harrington beardtongue and a buffer of approximately 1,000 feet that would provide protection from direct disturbances. Indirect disturbances occurring outside the PCA boundaries, such as unnatural erosion caused from upslope activities or the establishment of exotic species within the PCA, could also negatively impact the plant population.

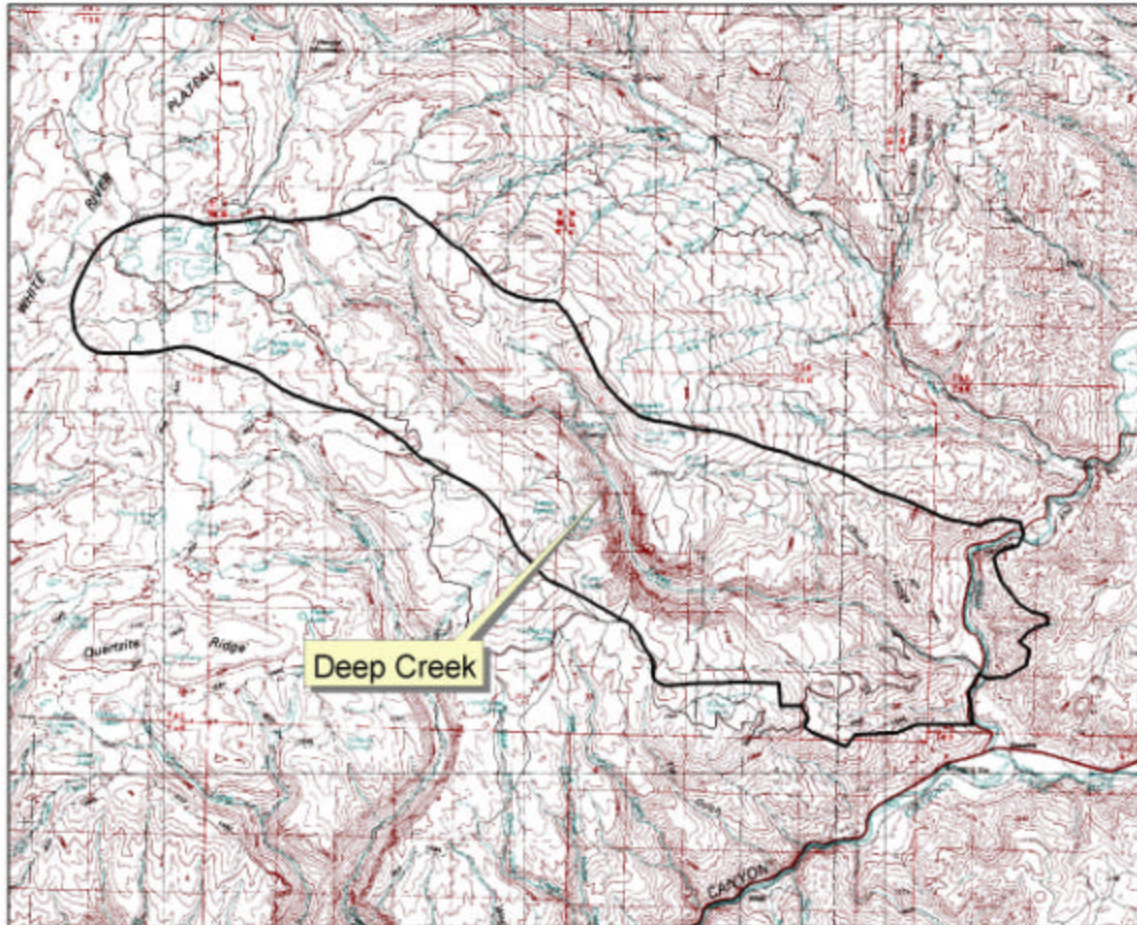
**Protection Rank Comments:** This PCA is privately owned and immediately threatened by residential development. A management plan could be negotiated with willing private landowners. If the road is ever widened some individuals of Harrington beardtongue would be destroyed.




**Management Rank Comments:** Management actions are essential to prevent loss of the Harrington beardtongue. The occurrence should be protected from road maintenance activities and other direct disturbance.



# Deep Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          EIS department: lab</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--

## Deep Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Deep Creek flows east into the Colorado River approximately two miles north of Dotsero, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Dotsero, Broken Rib Creek, Sweetwater Lake, Carbonate and Deep Lake quadrangles. T3S R89W Sections 22-27, 34-36; T3S R88W Sections 19-23, 25-36; T3S R87W Sections 30-32; T4S R88W Sections 1-6, 10-14, 24

**Size:** 30,181 acres

**Elevation:** 6,200 to 10,460 feet

**General Description:** Beginning at Deep Lake (10,460 feet) on the White River Plateau, Deep Creek plunges more than 4,500 feet in 15 miles to join the Colorado River near Dotsero (6,200 feet). Approximately 1 mile from Deep Lake, Deep Creek carves a rugged and remote limestone gorge, forming a dramatic pristine canyon over 2,500 feet deep and 13 miles long. The headwaters of Deep Creek are subalpine forests of aspen, spruce and fir, interspersed with meadows and many small lakes. The high elevation riparian areas consist of Drummond's willow (*Salix drummondiana*) and mesic forbs in the wide areas, changing to spruce and mesic forbs as the canyon narrows. As the creek drops closer to its confluence with the Colorado River, the landscape becomes more arid and vegetation turns toward piñon-juniper and sagebrush on the slopes and cottonwood forests in the canyon bottom. The limestone strata have created ideal conditions for the formation of caves. Over forty known caves are within the canyon walls. These include many of the state's most outstanding caves, including Groaning Cave, Colorado's longest at seven miles; Big A, Disappointment Cave, with the largest opening of any in the state; 20 Pound Tick Cave, still being explored and accessible only with scuba gear; and Fixin' to Die Cave, Colorado's second longest at 3 miles. Deep Creek stands out from neighboring canyons in its ruggedness, remoteness, and pristine condition. Very little human disturbance is within the canyon. Trails are nonexistent and it is only accessible by traversing the creek itself, during low water. Coffee Pot Road, an unpaved forest service road, is atop the plateau and parallels Deep Creek. The road is the major access for Deep, Heart, and Bison lakes in the headwaters of Deep Creek.

Natural Heritage elements at the Deep Creek PCA (Garfield County part).

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank
<b>Plant communities</b>					
<b><i>Salix monticola/ Mesic Forb</i></b>	<b>Montane Riparian Willow Carr</b>	<b>G3</b>	<b>S3</b>		<b>B</b>
<i>Pseudotsuga menziesii/Paxistima myrsinites</i>	Lower Montane Forests	G2G3	S2S3		E
<i>Festuca idahoensis-Festuca thurberi</i>	Montane Grasslands	G3G4	S3S4		E
<i>Pseudotsuga menziesii/Cornus sericea</i>	Lower Montane Riparian Forests	G4	S2		E
<i>Picea pungens/ Cornus sericea</i>	Montane Riparian Forests	G4	S2		E
<i>Cornus sericea</i>	Foothills Riparian Shrub	G4	S3		A
<i>Populus angustifolia/Cornus sericea</i>	Cottonwood Riparian Forest	G4	S3		B
<i>Salix drummondiana/ Mesic Forb</i>	Drummonds Willow/ Mesic Forb	G4	S4		B
<i>Salix drummondiana/ Mesic Forb</i>	Drummonds Willow/ Mesic Forb	G4	S4		BC
<i>Quercus gambelii/ Symphoricarpos rotundifolius</i>	Mixed Mountain Shrublands	G5	S3S4		E
<i>Carex aquatilis</i>	Montane wet meadows	G5	S4		B
<i>Salix drummondiana/ Carex utriculata</i>	Montane willow carr	GU	S3		E
<i>Picea engelmannii/ Cornus sericea</i>	Montane riparian forest	GU	SU		E
<i>Artemisia tridentata</i> ssp. <i>vaseyana/Festuca thurberi</i>	Western slope sagebrush shrublands	GU	S1S2		E
<b>Plants</b>					
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3		B
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3		E
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Showy whitlowgrass	G3?T3Q	S3		E
<b>Mammals</b>					
<i>Gulo gulo</i>	Wolverine	G4	S1	FS	E
<i>Euderma maculata</i>	Spotted bat	G4	S2	FS/BLM	H
<i>Corynorhinus townsendii</i>	Pale lump-nose bat	G4T4	S2	FS/BLM	E
<b>Invertebrates</b>					
<i>Oncopodura subhoffi</i>	A springtail	G3	S?		C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

Recreational use, cattle grazing and logging are all popular activities on the plateau. All these activities may or may not have an effect on the canyon itself. To our

knowledge there is no grazing or logging within the canyon, and very little recreation. Although several nearby drainages, e.g. Grizzly and No Name Creeks, have a similar appearance with similar landscape composition, none is as pristine as Deep Creek. The canyon proper has one of the most intact canyon landscapes found in Colorado.

**Biodiversity Comments:** The Deep Creek PCA has one of the most intact, pristine canyon landscapes found in Colorado. Although rare elements can be found in the canyon, Deep Creek is most impressive because of the integrity of the landscape. Along with a pristine landscape, several state and globally rare elements are found in Deep Creek. The site contains a good (B ranked) occurrence of a plant community which is vulnerable (G3S3) on a global scale. Thirteen other occurrences of natural communities have been identified within the PCA. It also contains two globally vulnerable (G3) plant species, and two state-rare (S2) bats. Another plant, Harrington beardtongue (*Penstemon harringtonii*), is not listed above since it occurs in the Eagle County part of the PCA, but its habitat extends into Garfield County. It is a large showy penstemon found on the piñon pine, juniper, and sagebrush covered slopes of the upper Colorado and Eagle River valleys, mostly in Grand and Eagle counties (Colorado Native Plant Society 1989).

Hanging garden sullivanian is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals (NatureServe 2000).

The low elevation riparian community consisting of narrowleaf cottonwood, red-osier dogwood, with river birch is found from Northern Wyoming to central Colorado (Johnston 1987). Large, near-pristine stands of this community are uncommon on Colorado's west slope (Kittel and Spackman 1994). The B-ranked Deep Creek occurrence, although it is viable and defensible, has several introduced species, thus lowering its rank.

A rare springtail (a cave obligate invertebrate) has been documented at Groaning Cave in this PCA. The springtail occurs at only two other caves, both located in Fremont County, Colorado.

Bald Eagle and Peregrine Falcon occurrences are mapped in the Eagle County portion of the PCA; however, the birds undoubtedly use the area in Garfield County for hunting. Currently there are 20 breeding pairs of Bald Eagles in Colorado, according to the Colorado Bird Observatory (1997). Threats to this species include high pesticide use, poisoning, and poaching (feathers are valuable on the black market). The small breeding population, the numerous threats that exist, and the varying success of nests from year to year, warrant a critically imperiled rank for breeding Bald Eagles in Colorado (S1B). Federally downlisted to threatened (LT), the Bald Eagle is still protected by the Endangered Species Act and the Eagle Protection Act. The Colorado Division of Wildlife lists the Bald Eagle as threatened. There are estimated to be fewer than 300 Peregrine Falcon individuals breeding in Colorado (CNHP 2000). Human disturbance of nests by recreational rock climbers, illegal capture by falconers, and uncertain breeding status across the state are factors considered important in the conservation of this imperiled (S2B) species in Colorado.

The pale lump-nose bat record at this PCA represents a traditional roost. Historical sites of the pale lump-nosed bat in Colorado seem to be abandoned or greatly



reduced in size (Kirk Navo, pers. comm.). This species is considered imperiled in Colorado (S2) because of the low number of individuals encountered for a colonial species, low population size, and high threats.

The spotted bat is ranked as imperiled in Colorado (S2) primarily because of the small number of occurrences, assumed small population size and its restricted state range. There are fewer than 20 occurrences of this species in Colorado, and it is known from only a few individuals.

**Boundary Justification:** The site boundaries for Deep Creek include the entire watershed of Deep Creek. Although the flat and gentle slope areas are not pristine, they form the necessary buffer to protect the roadless, pristine slopes and valley bottom of Deep Creek. The boundary includes the canyon cliffsides that provide important nesting habitat for Peregrine Falcons. The boundary does not contain the entire feeding area of the pale lump-nosed bat, the extent of which is difficult to define.

**Protection Rank Comments:** Most of Deep Creek is federally owned, with the lower part managed by BLM and the upper part by the US Forest Service. The BLM portion is designated an Area of Critical Environmental Concern. The Forest portion has been recommended for designation as a Research Natural Area and for Wild and Scenic River designation. The Wild and Scenic designation is the preferred alternative in the revision to the White River National Forest Plan which is still in progress at this writing.

**Management Rank Comments:** Due to its ruggedness, cattle use only the upper and lower stretches of the PCA. Grazing and logging practices on the plateau should be monitored to assess impacts on the canyon's health. Logging, hunting, grazing, and recreation are the major activities. Nearly all these activities take place on the plateau or gentle slopes. A Forest Service campground is maintained at Deep Lake. Many hunting camps are along Coffee Pot Road and at the small lakes.

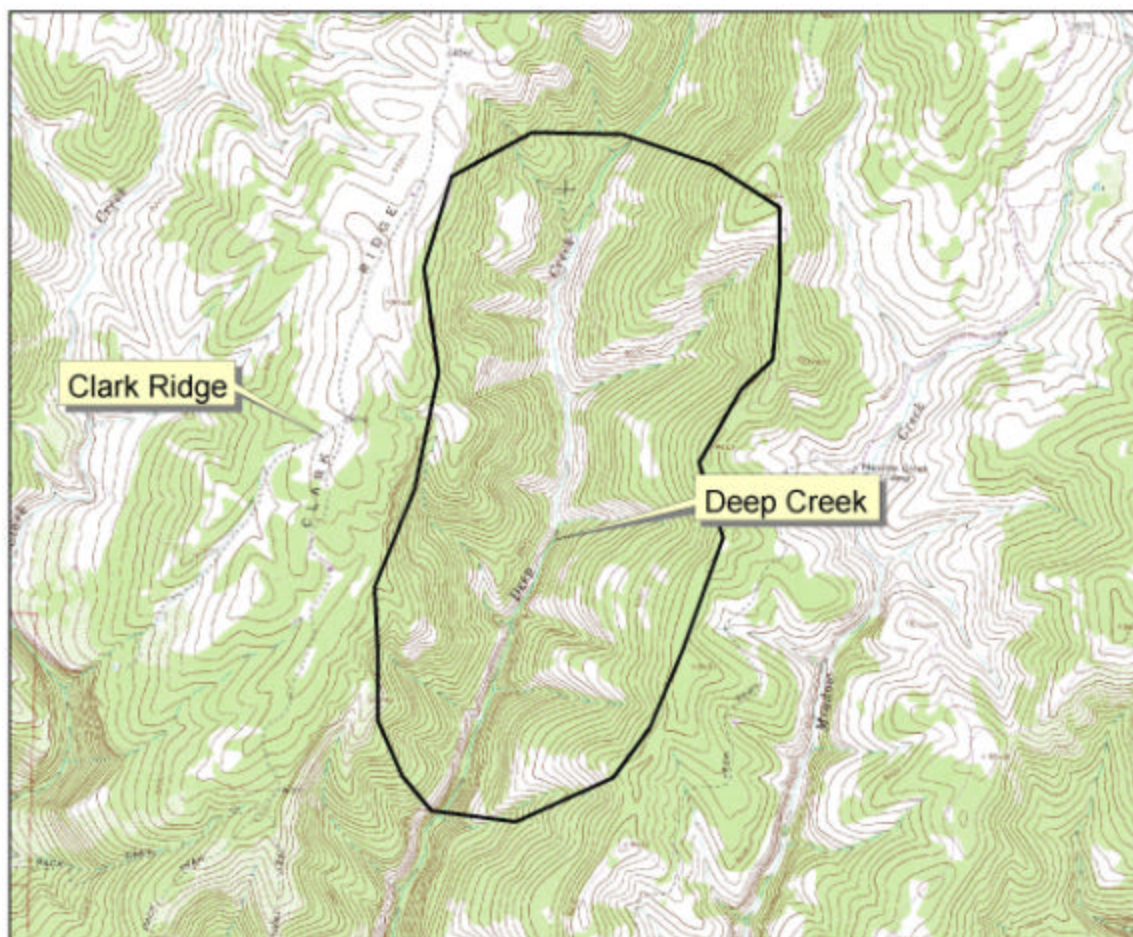
With the enduring popularity of waterfront development, loss of nesting habitat may remain the biggest threat to Bald Eagles. Bald Eagles avoid areas with nearby human activity and development (Buehler *et al.* 1991), so maintaining mature tree stands at this PCA that are near the stream with limited human disturbance would benefit this species.

Continued existence of Peregrine Falcons in Colorado depends upon protection of traditional nesting sites like the one found at this PCA. Keeping this nest site free of human intrusions during nesting season (February to August) would ensure persistent annual use of this traditional peregrine eyrie.

Needs for the survival of the pale lump-nosed bat include protection of occupied roosts from disturbance (May to mid-September for maternity roosts, October-April for hibernacula); and evaluation of occupied caves for gate installation. See White and Seginak (1987) for gate designs for protecting caves. Gates can successfully limit human access and disturbance but, if poorly designed, gates may restrict bat access and result in population decline. Conditions for the bats can be improved by maintaining canopy cover in areas surrounding caverns, rock faces, and other sites used for roosting; retaining large diameter snags and stands of old growth; avoiding heavy equipment and blasting near roosts; and avoiding chemical insecticides.

# Deep Creek at Clark Ridge

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Meadow Creek Lake, 39107-G5

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Deep Creek at Clark Ridge Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** This site occurs within the White River National Forest and is located approximately 13 miles north-northwest of New Castle, CO, near Clark Cabin Spring (which is located on the New Castle-Buford Road).

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Meadow Creek Lake. T3S R91W Sections 14, 15, 22, 23, 26, and 27.

**Size:** 1,749 acres

**Elevation:** 8,600 to 9,600 feet

**General Description:** The creek forms a fairly deep canyon with aspen (*Populus tremuloides*) and Engelmann spruce (*Picea engelmannii*) dominating adjacent slopes. The creek bottom is dominated by mountain willow (*Salix monticola*), planeleaf willow (*S. planifolia*), and beaked sedge (*Carex utriculata*). Overall species diversity is high. The creek is very sinuous and there are numerous beaver ponds located along this stretch of the stream. The area is fairly pristine with very little indication of threats and no non-native species present.

Natural Heritage element occurrences at the Deep Creek at Clark Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix monticola</i> / <i>Carex utriculata</i>	<b>Montane riparian willow carr</b>	<b>G3</b>	<b>S3</b>				<b>A</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports an excellent (A-ranked) occurrence of the globally vulnerable (G3/S3) mountain willow/beaked sedge (*Salix monticola*/*Carex utriculata*) montane riparian willow carr. This association is only known from thirteen locations in Colorado, but an additional ten to twenty more occurrences are expected in the state. Mountain willow appears to be at the center of its distribution in Colorado, where it frequently forms large thickets with few other willow species present. Literature from Utah, Wyoming, Montana, Idaho, Nevada and Oregon indicate that mountain willow loses importance north and west of Colorado, as it mixes with other willow species.

**Boundary Justification:** The boundary encompasses the narrow riparian area, beaver ponds, surrounding slopes, and some upstream drainages to ensure continued surface flow, periodic flooding, and space for the creek's fluvial processes to maintain a dynamic distribution of riparian plant communities. These processes are necessary for the viability of the elements and maintenance of ecological functions. However, the entire upstream portion of the watershed was not included in the site boundaries. Complete consideration of hydrological resources would need to include these upstream areas.

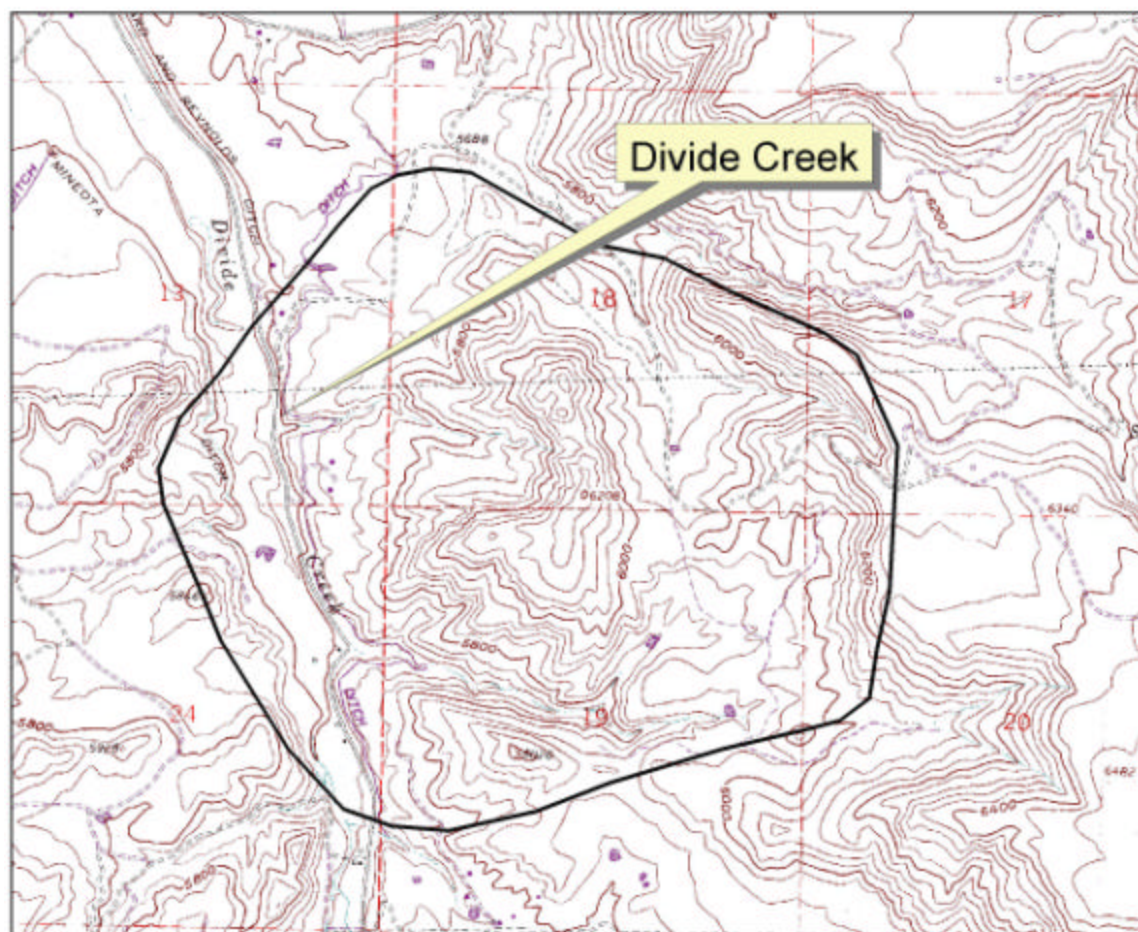
**Protection Rank Comments:** There are no immediate threats to this site. It is currently managed by the United States Forest Service and does not get very much use.

**Management Rank Comments:** Some logging may occur in the headwaters but it is unlikely that this is occurring on a scale that would affect the elements. There is some recreational and hunting use in and around Deep Creek. Cattle and sheep grazing in the area appears to be minimal.



# Divide Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

New Castle, 39107-E5

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Divide Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Just southeast of the town of Silt, Colorado, east of Divide Creek.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: New Castle. T6S R91W Sections: 17-20; T6S R92W Sections: 13, 24

**Size:** 1,265 acres

**Elevation:** 5,800 to 6,200 feet

**General Description:** The Divide Creek PCA includes Divide Creek and uplands to the east. The south facing slopes in the PCA, with clayey and sandy materials derived from the Wasatch Formation, harbor a fair population of about 50 adult plants and many seedlings of Wetherill milkvetch, a globally vulnerable plant. Dominant vegetation in the PCA is piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodland. Midget faded rattlesnakes have been observed in the PCA on rocky hillsides and ledges. According to Division of Wildlife personnel, many have been killed here over the years.

Natural Heritage element occurrences at the Divide Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Astragalus wetherillii</i>	<b>Wetherill Milkvetch</b>	<b>G3</b>	<b>S3</b>		<b>C</b>
<i>Crotalus viridis concolor</i>	midget faded rattlesnake	G5T4	S3?	SC	E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site includes a fair (C ranked) occurrence of the globally vulnerable (G3S3) Wetherill milkvetch, a plant species known only from Utah and seven western Colorado counties. There are thirty-eight known occurrences, with an estimated total of 9,000 individuals.

Colorado is at the eastern margin of the midget faded rattlesnake's range, where it occurs from Moffat south to Montrose counties (Hammerson 1999). There are approximately 40 localities documented from Colorado (Hammerson 1999), and many

individual populations are highly threatened from human encroachment, warranting a vulnerable ranking for this subspecies in Colorado.

**Boundary Justification:** This site includes the rare plant occurrence and some additional adjacent suitable habitat to allow for additional individuals to become established over time. It also takes in habitat for the midget faded rattlesnake found in this area.

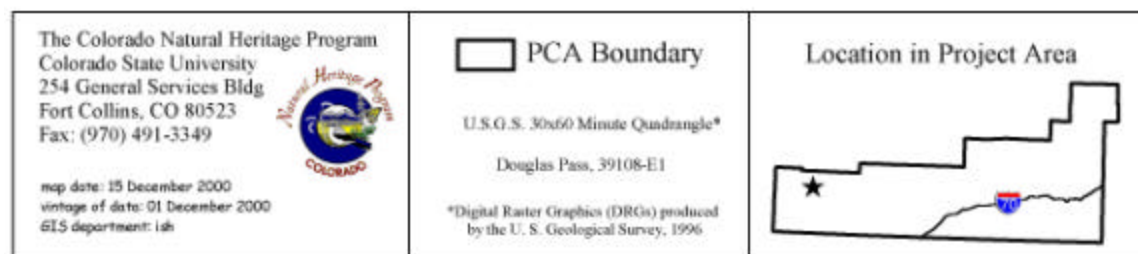
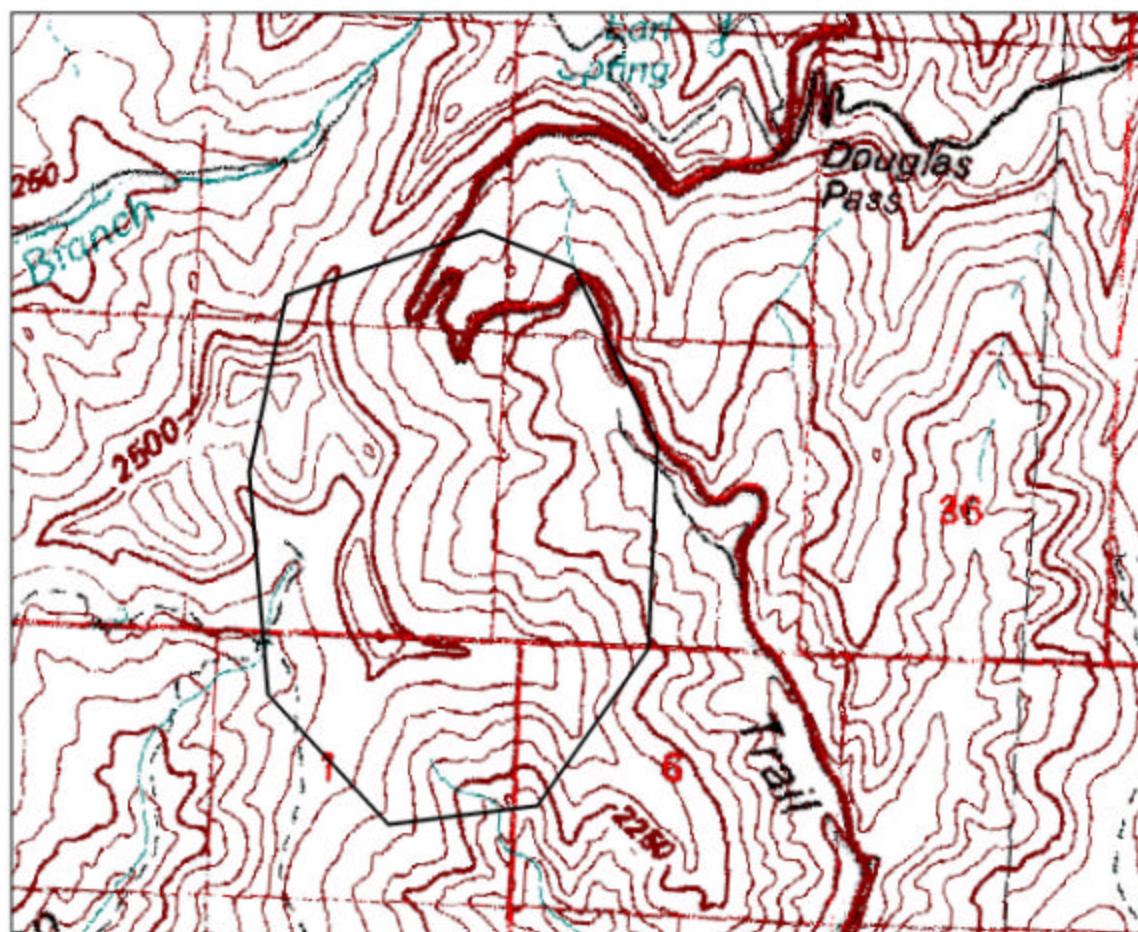
**Protection Rank Comments:** The site is about one third privately owned along Divide Creek, and two-thirds BLM land, located on the upland portion of the site. Although the rare plant occurrence is on public land, the midget faded rattlesnake would be threatened by any residential development and increased traffic.

**Management Rank Comments:** A major concern for the midget faded rattlesnake is long-term persecution by humans. Most rattlesnakes pose no significant threat, and public education is necessary to reduce the number of snakes needlessly killed (Hammerson 1999).



# Douglas Pass

## Potential Conservation Area



## Douglas Pass Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action with regard to exotic species control would help to maintain the current quality of element occurrences.

**Location:** Thirty miles north of Fruita, Colorado, on Lookout Mountain Road, west of Colorado State Highway 139 below Douglas Pass.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Douglas Pass. T5S R102W S26, 27, 34, 35; T6S R103W S1; T6S R102 S6.

**Size:** 1,300 acres

**Elevation:** 7,400 to 8,000 feet

**General Description:** The Douglas Pass PCA encompasses an area east of Highway 139 and south of Douglas Pass, with steep hillsides and numerous springs. The dry hillsides have a cover of Gambel's oak, Utah serviceberry and other mountain shrubs, while the moist areas harbor a luxuriant plant community with Douglas fir, aspen, and Rocky Mountain maple. Along the sides of Lookout Mountain Road is one of the largest populations known of the globally vulnerable large-flowered globemallow, a spectacular plant with bushy growth and large white or pink flowers. There are several ponds developed from springs in the PCA, and there are historic records of northern leopard frogs occupying them, although none were observed during this survey.

Natural Heritage elements at the Douglas Pass PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Iliamna grandiflora</i>	Large-flower globemallow	G3?Q	S1				B
<i>Pseudotsuga menziesii/Acer glabrum</i>	Lower montane forests	G4	S1				B
<i>Rana pipiens</i>	Northern leopard frog	G5	S3				H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Douglas Pass PCA has one of the largest known (B ranked) occurrences of the large flower globemallow, a plant that is very rare in Colorado

(G3?QS1). It also contains a good occurrence of the state rare (G4S1) lower montane forest community dominated by Douglas fir and Rocky Mountain maple.

Large-flower globemallow is considered to be a Colorado endemic species, although there are still some questions as to its taxonomic distinctiveness, as indicated by the ?Q in its rank. There were previously only 12 small occurrences of this species in the state, two in Garfield County, and others in Ouray, Routt, Pitkin and Montezuma counties. Three new occurrences were found in Garfield County during this survey, bringing the total to five in the county, and 15 in the state.

The Douglas fir/Rocky Mountain maple plant association was found to be in good condition (B ranked) in this PCA. There are eight documented occurrences of this plant community in Colorado, including this one, in seven counties. This is the first documented occurrence for Garfield County.

**Boundary Justification:** The boundary is drawn to encompass the documented plant and community occurrences. However, the full extent of the forest community has not been established, and it may extend beyond the PCA boundaries.

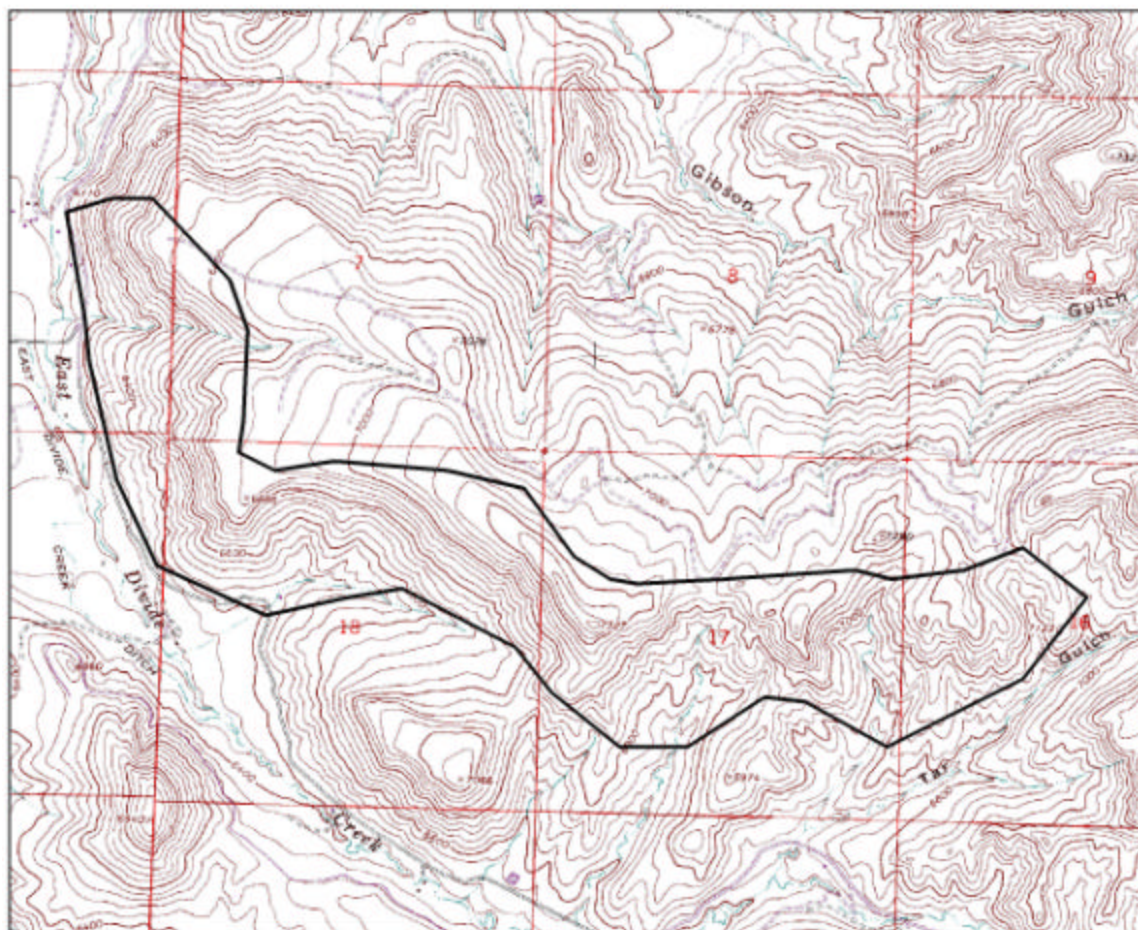
**Protection Rank Comments:** The PCA is located primarily on BLM land, although a small amount of adjacent private land is included. There is no special protection in place for the site. The BLM Resource Management Plan (USDI 1987) emphasizes mineral extraction for this area. Oil and gas development may increase to the west of the site, leading to increased traffic and necessity of road maintenance. However, it is unlikely that new development will take place within the PCA boundaries (Trappett, pers. comm.), since there are restrictions on development because of visual impacts near the highway and because the slopes are unstable.

**Management Rank Comments:** Although the PCA is in generally good condition, the heavily grazed areas around the spring-fed stock ponds are trampled and weedy, with hound's tongue (*Cynoglossum officinalis*), Kentucky bluegrass (*Poa pratensis*), and yellow sweet clover (*Melilotus officinalis*). There is some tamarisk (*Tamarix ramosissima*) in the wet areas. The large-flowered globemallow should probably be protected from direct impacts by road maintenance and weed spraying. However, it appears to prefer roadside habitats, perhaps because of the extra moisture from runoff, and because it seems to need some degree of disturbance. In the most natural sub-populations, which were farthest from the road, there was still a high degree of natural erosion.



# East Divide Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Gibson Gulch, 39107-D5

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## East Divide Creek Potential Conservation Area

**Biodiversity Rank: B3.** High biodiversity significance. The PCA contains a good occurrence of a globally vulnerable plant.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About six miles south of Silt, Colorado, above East Divide Creek.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Gibson Gulch. T7S R92W S12, 13; T7S R91W S7, 16-18.

**Size:** 823 acres

**Elevation:** 6,100 to 7,200 feet

**General Description:** The East Divide Creek PCA occupies a steep, rocky, south and southwest facing hillside with piñon pine and Utah juniper. There is considerable naturally eroded bare soil derived from the Wasatch formation. Wetherill milkvetch is found in dry washes and on barren eroded areas. Other plants in the site include antelope bitterbrush (*Purshia tridentata*), many-lobed groundsel (*Senecio multilobatus*), and roughseed cat's-eye (*Cryptantha flavoculata*).

Natural Heritage elements at the East Divide Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Astragalus wetherillii</i>	<b>Wetherill milkvetch</b>	<b>G3</b>	<b>S3</b>				<b>B</b>
Astragalus wetherillii	Wetherill milkvetch	G3	S3				D

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** This site contains a good (B ranked) occurrence of the globally vulnerable (G3S3) Wetherill milkvetch. Based on a sample count, it is estimated that there are more than 1000 plants in the PCA. When the site was surveyed in May, 2000, about 78% of the plants were flowering, 20% were vegetative, and about 2% were in fruit. Nearby areas with aspects other than south were also surveyed, but did not support the milkvetch. Wetherill milkvetch is known from seven western Colorado counties and Utah. There are thirty-eight known occurrences, with an estimated total of 9,000 individuals.

**Boundary Justification:** The boundary includes both the surveyed location of Wetherill milkvetch, and some additional land to the east with the same aspect, geology and vegetation which was not surveyed, but is expected to also harbor the milkvetch.

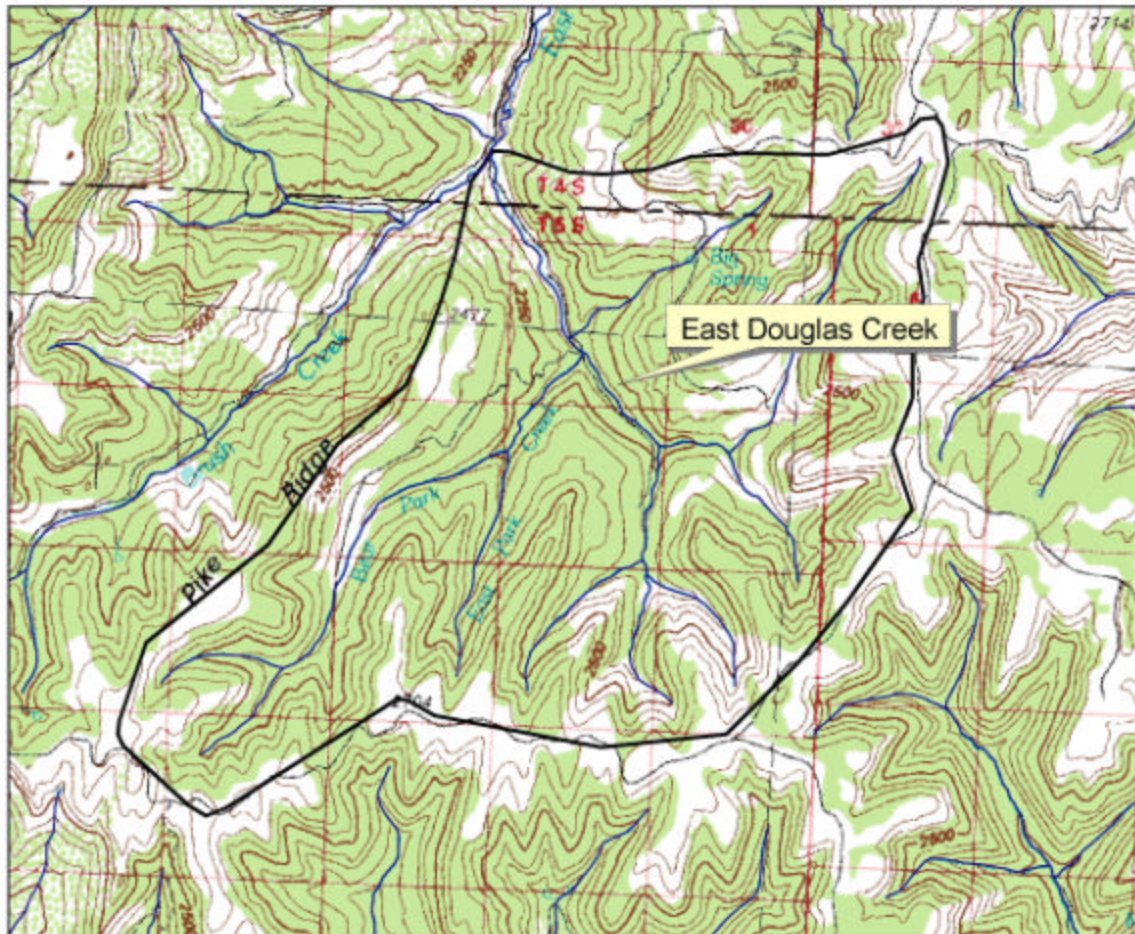
**Protection Rank Comments:** The PCA is primarily located on BLM land, with a small amount of private land included in the southwest part of the site above East Divide Creek.

**Management Rank Comments:** The PCA is undisturbed except for natural erosion. Although there is grazing on the mesa top above the site, the steepness of the terrain and lack of forage would discourage cattle from using the area where the milkvetch grows.



# East Douglas Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

PCA Boundary

U.S.G.S. 30 x 60 Minute Quadrangle\*

Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## East Douglas Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** East Douglas Creek is located approximately 30 miles north of Fruita, CO and 3 miles east of Douglas Pass (on Hwy. 139).

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Brushy Point; Calf Canyon. T4S R100W Section 31; T4S R101 W Sections 34, 35, and 36; T5S R100W Sections 6, 7, and 18; T5S R101W Sections 1, 2, 3, 10-16, and 20-29.

**Size:** 8,073 acres

**Elevation:** 6,900 to 8,800 feet

**General Description:** East Douglas Creek is a narrow, eroding, sinuous stream that is cutting sharply into steep-sided valley walls. Blue spruce (*Picea pungens*) is the dominant species along the creek in the upper portion of the site. Further downstream, river birch (*Betula occidentalis*) becomes co-dominant. Along point bars and in small, saturated backwater areas, horsetail (*Equisetum arvense*), alkali crowfoot (*Halerpestes cymbalaria* subsp. *saximontana*), beaked sedge (*Carex utriculata*), spikerush (*Eleocharis palustris*), wild mint (*Mentha arvense*), and redtop (*Agrostis gigantea*) are common. Narrowleaf cottonwood (*Populus angustifolia*) also occurs in scattered locations along the creek. Adjacent, partially-shaded, upland slopes are dominated by Douglas fir (*Pseudotsuga menziesii*), Utah serviceberry (*Amelanchier utahensis*), and snowberry (*Symphoricarpos oreophilus*) whereas piñon pine (*Pinus edulis*), juniper (*Juniperus osteosperma*), and Gambel's oak (*Quercus gambelii*) dominate drier, higher slopes.

Stream flow in East Douglas Creek is maintained by numerous small seeps and springs scattered throughout the area. These seeps and springs emerge from the Green River shale formation that outcrops throughout most of the site. These areas are dominated by beaked sedge, Nebraska sedge (*Carex nebrascensis*), monkshood (*Aconitum columbianum*), fowl mannagrass (*Glyceria striata*), and alkali crowfoot. There is an unique stand of mature narrowleaf cottonwoods that has established at the base of a large shale cliff, where many small springs were emerging. The stand is linear, extensive, and obviously delineates the locations of the numerous springs. Most of the springs show no signs of recent grazing, whereas riparian areas downstream have been grazed in recent months. The springs are extremely alkaline at their source, having a water pH reading ranging from 8.0 to 8.5. This is extremely high and cattle may purposely stay away from such wet areas due to the high alkalinity. Downstream riparian

areas are not as alkaline, probably due to the spring waters being diluted from various sources such as litter decomposition within the stream channel and reaction with stream sediments and wetland soils.

Although no rare butterflies were observed at this site, the dense herbaceous vegetation associated with the seeps and springs support a large population of butterflies including numerous fritillary and crescents (Family *Nymphalidae*), whites and sulphurs (Family *Pieridae*), skippers (Family *Hesperiidae*), and swallowtails (Family *Papilionidae*).

At the confluence of Bear Park Creek and East Douglas Creek there is a large wet meadow in a park-like setting. Near the downstream end of the meadow there appears to be the remnants of a natural dam that once blocked drainage, in a similar fashion as a beaver dam, in the area. The dam, which may have been the result of a landslide, probably created this wet meadow by slowing and/or blocking stream flow. This resulted in the deposition of many layers of sediments over time. Evidence for this is suggested by the presence of large dead and dying blue spruce trees located throughout the meadow. The distribution pattern of these trees suggests that they originally established along a historical streambank, whose channel is no longer visible due to the accumulation of sediment in this area. It is likely that the fine soils that have accumulated behind the dam retain a locally high water table which may have stressed and killed the spruce trees.

#### Natural Heritage element occurrences at the East Douglas Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Picea pungens/Betula occidentalis</i>	<b>Montane riparian woodland</b>	<b>G2</b>	<b>S2</b>				<b>C</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a fair (C-ranked) occurrence of the globally imperiled (G2/S2) blue spruce/river birch (*Picea pungens/Betula occidentalis*) montane riparian woodland. This plant community appears to mainly occur in foothill canyons of the Colorado Front Range. The occurrence at this site is the only one, thus far, documented on the western slope. This site also harbors some of the most intact and pristine seeps and springs that were observed in western Garfield County during the course of this inventory.

**Boundary Justification:** This site encompasses the headwaters of East Douglas Creek, including Bear Park Creek and East Park Creek and numerous seeps and springs, to ensure that hydrological processes, such as maintenance of stream flow and continued channel meandering, supporting the element are not disrupted.

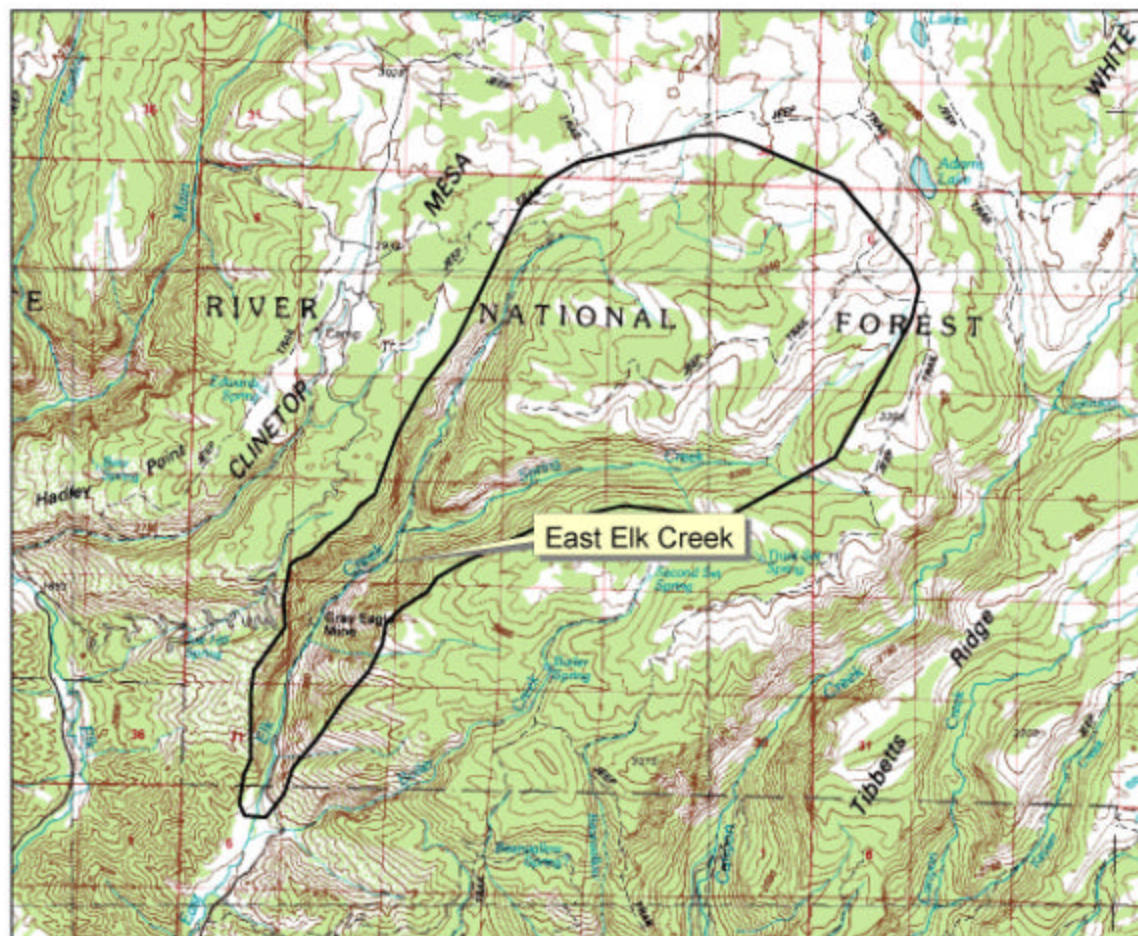
**Protection Rank Comments:** The site is currently managed by the Bureau of Land Management, White River Resource Area, for livestock and hunting use.




**Management Rank Comments:** Much of the lower elevation streams of the White River Basin, such as East Douglas Creek, were heavily grazed from the 1930s into the early

1960s (Kittel 1999). East Douglas Creek was heavily impacted from such activities through excessive bank erosion and invasion of non-native species. Numerous non-native species such as tamarisk (*Tamarix ramosissima*), Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgare*), hound's tongue (*Cynoglossum officinale*), sweetclover (*Melilotus officinale*), and dandelion (*Taraxacum officinale*) were present in the lower portions of East Douglas Creek within this site. East Douglas Creek does seem to be recovering from past management activities but future management should ensure that grazing and populations of non-native species do not further degrade the element.

# East Elk Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program Colorado State University 254 General Services Bldg Fort Collins, CO 80523 Fax: (970) 491-3349</p> <p>map date: 15 December 2000 vintage of data: 01 December 2000 GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30 x 60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--

## East Elk Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** The East Elk Creek site is located approximately 4 ½ miles north of New Castle, CO. The site begins at the end of County Road 241 (the beginning of Forest Road 654).

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Deep Creek Point. T3S R89W Section 31; T3S R90W Sections 34,-36; T4S R89W Sections 6, 7, and 18; T4S R90W Sections 1-4, 9-17, 19-24, and 28-32; T5S R90W Sections 5 and 6.

**Size:** 10,966 acres

**Elevation:** 6,400 to 9,600 feet

**General Description:** East Elk Creek forms a steep narrow canyon through the Leadville limestone and Green River shale formations. Limestone outcrops are prevalent throughout the area and the canyon is aesthetically similar to Glenwood Canyon. Upland slopes are sparsely vegetated due to the steep limestone and shale outcrops but Gambel's oak (*Quercus gambelii*), Utah serviceberry (*Amelanchier utahensis*), juniper (*Juniperus osteosperma*), aspen (*Populus tremuloides*), and Douglas fir (*Pseudotsuga menziesii*) were growing in scattered locations. The riparian area is dominated by a mature overstory of narrowleaf cottonwood (*Populus angustifolia*) and river birch (*Betula occidentalis*) along with scattered blue spruce (*Picea pungens*). Regeneration of narrowleaf cottonwood appears to be occurring on sporadic point bars. Downstream, the riparian community grades into a community dominated by blue spruce and narrowleaf cottonwood with hay meadows and pastures occupying the floodplain. Flooding still occurs along the creek and hydrological process have not been altered. Grazing does not occur within this site, however, downstream there is grazing within the floodplain. There is an abandoned mine (Gray Eagle Mine) upstream, but no impacts to the stream were observed.

Numerous seeps and springs occur along the adjacent hillsides and occasionally within the floodplain. These springs discharge from the Leadville Limestone, which has been shown to be a major local aquifer (Teller 1983). This aquifer is recharged via precipitation, snowmelt, and stream flow and has a general subsurface flow toward the south, west, and northwest away from the White River Uplift (Teller 1983). These springs are very important in maintaining the hydrological regime of this site. The water from these springs has a fairly high pH (~8.1) near the source due to a high calcium

carbonate content. Floodplain springs support stands of river birch with a diverse understory of forbs and graminoids such as interior sedge (*Carex interior*), beaked sedge (*C. utriculata*), field horsetail (*Equisetum arvense*), scouring rush (*Hippochaete hyemalis*), and wild mint (*Mentha arvense*). Springbrooks are dominated by American speedwell (*Veronica americana*), watercress (*Naturtium officinale*), beaked sedge, and the globally vulnerable canyon bog orchid (*Limnorchis ensifolia*; or *Platanthera sparsiflora* var. *ensifolia*), which is also found along the streambanks of East Elk Creek throughout the site. Oil shale columbine (*Aquilegia barneybi*) is the dominant plant near many spring sources. One particular spring is quite unique in that precipitate of calcium carbonate has formed a steep, terraced, seep wetland that is completely dominated by oil shale columbine and various moss species. The terrace probably formed as a result of groundwater, rich in carbon dioxide, discharging to the surface. This results in the release of large quantities of carbon dioxide creating a disequilibrium between carbon dioxide, carbonate ions, and carbonic acid in the groundwater (Wetzel 1983). As a result of this disequilibrium, calcium bicarbonate precipitates from the groundwater and encrusts the substrate near the spring source. Over many years, the precipitate has formed a large solid wall of calcium carbonate. Along this terrace wall there are small pools which harbor numerous insects. Northern leopard frogs (*Rana pipiens*) were also observed using these pools and were seen throughout the site.

Overall, this site is in excellent condition. Compared to other creeks of a similar elevation, East Elk Creek is the most pristine riparian area observed during the course of this inventory.

#### Natural Heritage element occurrences at the East Elk Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Limnorchis ensifolia</i> ( <i>Platanthera sparsiflora</i> var. <i>ensifolia</i> )	Canyon bog orchid	G4G5T3?	S3				A
<b>Plant Communities</b>							
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	Montane riparian forest	G3?	S2				A
<i>Betula occidentalis</i> /Mesic graminoid	Lower montane riparian shrublands	G3	S2				A

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports an excellent (A-ranked) occurrence of the globally vulnerable (G4G5T3?/S3) plant subspecies, the canyon bog orchid (*Limnorchis ensifolia*), the globally vulnerable (G3?/S2) narrowleaf cottonwood/river birch (*Populus angustifolia*/*Betula occidentalis*) montane riparian forest, and the globally vulnerable (G3/S2) river birch/mesic graminoid (*Betula occidentalis*/mesic graminoid) lower montane riparian shrubland. The canyon bog orchid occurs in the southwestern U.S., Nevada, and Oregon. The narrowleaf cottonwood/river birch community is known from fewer than a dozen locations in Colorado and is expected to occur in Nevada, Wyoming,



and South Dakota. This stand has an unusually high diversity of shrubs and herbaceous species in the understory compared to most occurrences. The river birch/mixed graminoid community is well documented in several western states; however, improper livestock grazing, stream flow alterations, and heavy recreational use threaten it. This stand was in excellent condition as there is no grazing in this area. Overall species diversity in this community was also very high. In addition, East Elk Creek is one of the most pristine riparian areas in Garfield county at this elevation (~6500 ft.).

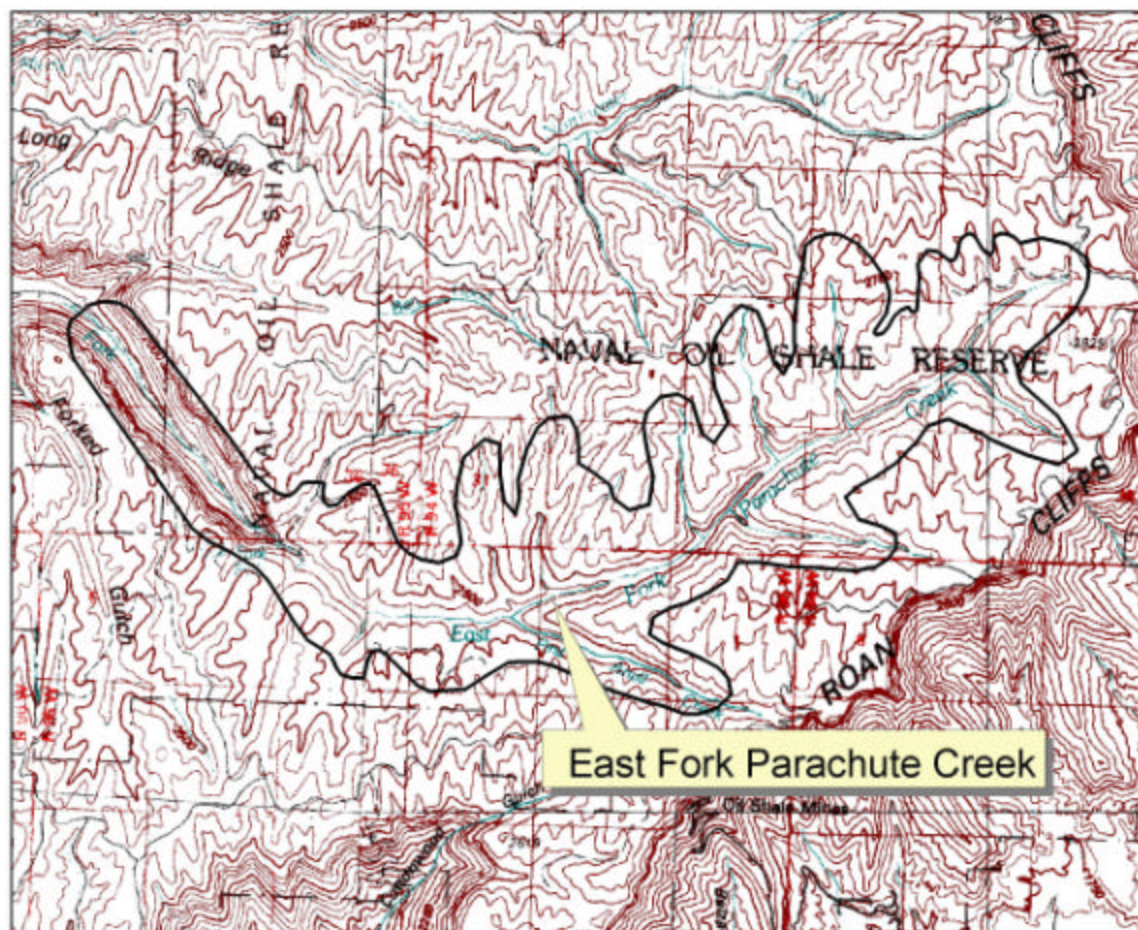
**Boundary Justification:** The boundaries were drawn to ensure that all of the springs and small side drainages were protected to ensure continued surface flow, periodic flooding, and space for the creek's fluvial processes to continually maintain existing riparian communities while also creating additional habitat via flood scouring, lateral flow, and channel meandering.

**Protection Rank Comments:** This site mainly occurs on U.S. Forest Service land and does not seem to receive much use other than occasional fishing and hiking. The Forest Service does not allow camping along the first 3 miles of the creek. In addition, East Elk Creek is the town of New Castle's water supply, thus it would seem unlikely that major land use changes would occur along the creek.

**Management Rank Comments:** The area does receive some recreational use, mainly angling. This activity does not appear to be affecting the elements but use should be monitored. Although development of the springs in the area does not seem likely, such activity would have a major detrimental affect on the ecological integrity of this riparian area.

## East Fork Parachute Creek

### Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lsh

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Douglas Pass, 39108-E1  
Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996

### Location in Project Area



## East Fork Parachute Creek Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P1** The occurrence is immediately threatened.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** East Fork Parachute Creek is located approximately five miles northwest of Rifle, ten miles southeast of Rio Blanco.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Anvil Points, Forked Gulch; T5S R94W Sections 23, 26, 27, 33, and 34; T5S R95W Section 35; T6S R95W Sections 1, 2, 3, 4, and 5

**Size:** 7,326 acres

**Elevation:** 6,700 – 9,000 ft.

**General Description:** East Fork Parachute Creek is a small but biologically significant tributary to the Colorado River. The headwaters for this creek begin at approximately 9,000 feet in elevation with gently rolling hills of aspen forests (*Populus tremuloides*), mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and snowberry (*Symphoricarpos rotundifolius*) shrublands, and grasslands. East Fork Parachute Creek originates near the eastern rim of the Roan Plateau and forms a deep canyon before plunging 200 feet into a narrow scenic box canyon.

Numerous creeks drain into East Fork Parachute Creek: JQS, Golden Castle, First and Second Anvil Creeks, First, Second, and Third Water Gulches, Camp, Grassy and Bull Gulches, Sheep Hollow Trail, etc. All of these tributaries begin with small springs and seeps, which flow more or less year round. Each tributary, except for Golden Castle and First and Second Anvil, has a dramatic cliff/waterfall near its confluence with East Fork Parachute Creek, providing picturesque hanging garden habitat.

The riparian plant communities of East Fork Parachute Creek are one of the most diverse in Garfield County. Near the headwaters of First Anvil Creek on a north-facing hillside, aspen (*Populus tremuloides*) and Rocky Mountain maple (*Acer glabrum*) dominate a large, forested slope wetland. Willow dominated communities, primarily Rocky Mountain willow (*Salix monticola*) and Drummond's willow (*S. drummondiana*), create several miles of habitat for common birds such as Yellow Warbler (*Dendroica petechia*), Cordilleran Flycatcher (*Empidonax occidentalis*), Song Sparrow (*Melospiza melodia*), House Wren (*Troglodytes aedon*), and Lincoln Sparrow (*Melospiza lincolnii*). Approximately a mile above the 200 foot waterfall, the canyon narrows and the riparian vegetation is forested with spruce-fir (*Picea-Abies* sp.) and narrowleaf cottonwoods (*Populus angustifolia*). Below the falls, the riparian vegetation changes drastically to a

low-elevation community of box elder (*Acer negundo*), narrowleaf cottonwood, and red osier dogwood (*Cornus sericea*).

Due to the westerly orientation of the creek, the north and south-facing slopes are dramatically different. The south-facing slopes are sparsely vegetated on the steep sections right above the creek and more densely vegetated on the more gentle slopes above, which are dominated by mountain sagebrush and snowberry. Spruce-fir forests on the steep, mesic slopes adjacent to the stream and aspen forests above these forests on more gentle terrain characterize the north-facing slopes.

The creek itself is primarily a pool/drop stream system on shale bedrock. Although the volume of this stream is relatively small, especially towards the end of the summer, it has an amazingly dense population of trout, primarily brook trout (*Salvelinus fontinalis*).

The Roan Plateau and surrounding areas were within the summer camps and hunting grounds for Ute and prehistoric Native Americans, dating back to more than 5000 B. C. (Tickner et al. 1996). They probably hunted bison, deer, elk, and other game and fished East Fork Parachute Creek. Grinding stones, arrowhead points, and bison bones have all been found within this site.

Native peoples were followed by ranchers. In the late 1800's ranchers from Rifle and Parachute began to use this area for summer grazing grounds (Rifle Reading Club 1973). They built many cabins near the numerous springs, which may still be seen today. The Bull Gulch cabin was built in the early 1900's and was first restored by BLM in 1940 (M. Kinser pers. comm.). Livestock grazing is still the primary use of this land, although hunting is extremely popular in this area.

Natural Heritage element occurrences at the East Fork Parachute Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2			BLM	A
<i>Festuca dasyclada</i>	Utah fescue	G3	S3				A
<i>Sullivantia hapemanii</i> var <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3			FS	A
<i>Sullivantia hapemanii</i> var <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3			FS	E
<b>Plant Communities</b>							
<b><i>Acer negundo</i>-<i>Populus angustifolia</i>/<i>Cornus sericea</i></b>	<b>Boxelder riparian forest</b>	<b>G2</b>	<b>S2</b>				<b>A</b>
<i>Populus tremuloides</i> / <i>Acer glabrum</i>	Montane riparian forests	G2	S1S2				B
<i>Populus angustifolia</i> / <i>Cornus sericea</i>	Cottonwood riparian forest	G3	S2?				B
<i>Salix drummondiana</i> / mesic forb	Drummond's willow/mesic forb	G3	S3				C
<i>Salix monticola</i> / mesic forb	Mountain willow/mesic forb	G3	SU				B
<i>Picea pungens</i> / <i>Cornus sericea</i>	Montane riparian forest	G4	S2				B
<i>Populus tremuloides</i> - <i>Pteridium aquilinum</i>	Aspen wetland forest	G4	S3S4				C
<i>Cardamine cordifolia</i> - <i>Mertensia ciliata</i> - <i>Senecio triangularis</i>	Alpine wetland	G4	S4				A
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Salix drummondiana</i>	Spruce-fir/Drummond's willow	GU	SU				B
<b>Fish</b>							
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T2T3	S2	C	SC	FS/BLM	C
<b>Birds</b>							
<i>Catharus fuscenscens</i>	Veery	G3	S3S4 BSZ N				B
<i>Aegolius funereus</i>	Boreal owl	G5	S2			FS	B
<i>Progne subis</i>	Purple martin	G5	S3B			FS	A
<i>Contopus borealis</i>	Olive-sided flycatcher	G5	S3S4 BS4N	C2			A
<i>Accipiter striatus</i>	Sharp-shinned hawk	G5	S3S4 BS4N				A
<b>Mammals</b>							
<i>Sorex c.f. preblei</i>	Preble's shrew	G5	S1?				A
<b>Insects</b>							
<i>Papilio bairdii</i>	Baird's swallowtail	G4	S3S4				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The East Fork Parachute Creek PCA hosts a very high concentration of Natural Heritage elements. Included in the 20 elements are eight significant natural communities (7 of these are riparian), one globally vulnerable fish, five species of birds, three globally vulnerable plants, one state vulnerable butterfly, and one state imperiled mammal.

This site harbors the best-known population (A-Ranked) of the globally vulnerable (G3T3/S3) hanging garden sullivantia (*Sullivantia hapemannii* var. *purpusii*), with over 25 high quality sub populations within the site. This site also contains an excellent (A-ranked occurrence) of the globally vulnerable (G3S3) Utah fescue (*Argilochloa dasyclada*) and good and fair (B- and C-ranked) occurrences of the state rare (G4T3/S3) Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). This population was given a B+ rating for genetic purity by the Colorado Division of Wildlife in 1983. Important plant communities included in this site are an excellent (A-ranked) occurrence of the globally imperiled (G2/S2) boxelder riparian forest (*Acer negundo* – *Populus angustifolia*/*Cornus sericea*), good (B-ranked) occurrences of the state imperiled (G4/S2) blue spruce/red-osier dogwood montane riparian forest (*Picea pungens*/*Cornus sericea*), fair (C-ranked) occurrence of the globally vulnerable (G3/S3) Drummond's willow/mesic forb (*Salix drummondiana*/Mesic forb). The globally imperiled (G2/S2) aspen/Rocky Mountain maple (*Populus tremuloides*/*Acer glabrum*) forest occurs on a hillslope where groundwater seepage has created moist soil conditions. There are less than 10 locations of this aspen forest association in the central and south-central mountain regions of Colorado. The globally imperiled (G4T2T3/S2) Colorado River cutthroat trout are a sensitive species that are native to the Colorado River basin, and have recently been in decline. Remnant populations still remain in Colorado, Wyoming, and Utah.

**Boundary Justification:** The site boundaries encompass East Fork Parachute Creek and all of its tributaries from the headwaters to approximately 1 mile beyond the Bureau of Land Management boundary. These boundaries will ensure continued natural surface flow and maintain a natural hydroperiod through East Fork Parachute Creek, which will maintain a dynamic distribution of riparian plant communities along the drainage and support fish populations. These boundaries enclose the riparian areas that should be protected from direct disturbances such as trampling of streamside vegetation and subsequent bank instability, which could result in decreased water quality and thus have detrimental affects on the trout population. The complete distribution of the trout population within the East Fork Parachute Creek drainage has not been scientifically determined.

**Protection Rank Comments:** The BLM portion of this site was transferred from the Department of Energy to the BLM in 1997. The potential for oil shale development exists, but at this time is not an economically viable option. However, if the price of oil increases significantly and extraction methods are improved enough to make oil shale mining economical or deemed critical to the national interest, mining could resume, and would be extremely destructive to the natural habitat. The threat may not be imminent, but is still present in the long term.



Oil and gas development is a more immediate potential threat to the rare plant occurrences, although currently, there are no oil and gas leases. The Resource Management Plan (RMP), now in progress, will address the status of these lands. Access roads, well pads, and pipelines can directly disturb the plants, as well as act as conduits for weed invasion.

Part of this PCA has been recommended as wilderness by the Colorado Wilderness Coalition. Wilderness designation will be one of the alternatives considered in the new RMP.

UNOCAL Oil Company owns the lower stretch of this site. UNOCAL should be contacted and made aware of the biological significance of the site.




**Management Rank Comments:** The primary management concern in this site is degradation of the native trout population from competition with the non-native brook trout. A study was begun in 1998 to document the effects of brook trout on Colorado River cutthroat trout in four Colorado streams, including along East Parachute Creek, and is currently in its third year (Peterson and Fausch 2000). Brook trout recruitment was exceptional in East Parachute Creek from 1998 to 1999, increasing over 311% while cutthroat trout recruitment was only 56% (Peterson and Fausch 2000). First year survival of brook trout (48%) at East Parachute Creek far exceeded cutthroat trout survival (5%) from 1998 to 1999 and brook trout are presently 10 times more abundant than cutthroat trout. Cutthroat trout populations are declining in East Parachute Creek, probably from competition with brook trout, and in time cutthroats may disappear from the stream. Without eradication of brook trout through chemical treatment it is unlikely that cutthroat trout will survive here. In addition, rehabilitation of both streambanks and water quality would enhance cutthroat trout survival. Streamside grazing by livestock at East Parachute Creek could change stream hydrology by increasing sedimentation and reducing streamside shrub cover, stream shade, and ultimately increasing water temperatures. Restricting grazing along East Parachute Creek would benefit the cutthroat trout population. Cutthroat trout are susceptible to overharvest if angling is unrestricted, so Colorado has instituted restrictive angling regulations. Strict enforcement of these regulations will help to ensure survival of this population of cutthroats.

Management strategies to benefit Boreal Owls include preservation of snags for nesting cavities, and maintenance of aspen groves with large diameter trees. Uneven-age timber management may be compatible, but clear-cuts are not considered suitable habitat for foraging Boreal Owls (Hayward and Hayward 1993). Long-term stewardship needs include furnishing nesting cavities and forest structure necessary for foraging.

# East Rifle Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30 x 60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--

## East Rifle Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** The site is located approximately 11 miles north-northeast of Rifle, CO. The site begins just north of the Rifle Fish Hatchery and encompasses all of Rifle Mountain Park.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Rifle Falls. T3S R92W Sections 34, 35, and 36; T4S R91W Section 6; T4S R92W Sections 1, 2, 3, and 10-15.

**Size:** 4,388 acres

**Elevation:** 7,000 to 9,000 feet

**General Description:** This site consists of a narrow box canyon surrounded by sheer vertical limestone cliffs. The riparian area is dominated by box elder (*Acer negundo*) and red-osier dogwood (*Cornus sericea*). The understory in this community is lush and exhibits high species diversity. Common understory species include: gooseberry (*Ribes* sp.), red raspberry (*Rubus idaeus*), Wood's rose (*Rosa woodsii*), baneberry (*Actaea rubra* subsp. *arguta*), false-Solomon's seal (*Maianthemum stellatum*), monkshood (*Aconitum columbianum*), Richardson's geranium (*Geranium richardsonii*), black-eyed Susan (*Rudbeckia ampla*), cow parsnip (*Heracleum sphondylium* var. *montanum*), blue wild rye (*Elymus glaucus*), large-leaved avens (*Geum macrophyllum*), and yellow avens (*G. aleppicum*). A few non-native species, such as orchard grass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*) are common along trails within the riparian area. Sandbar willow (*Salix exigua*) and common reed (*Phragmites australis*) are common in open wetland areas. There are numerous springs discharging along this stretch of East Rifle Creek. These springs discharge from the Leadville Limestone, which has been shown to be a major local aquifer (Teller 1983). This aquifer is recharged via precipitation, snowmelt, and stream flow and has a general subsurface flow toward the south, west, and northwest away from the White River Uplift (Teller 1983). Hanging garden sullivantia (*Sullivantia hapemanii* var. *purpusii*) and Oil shale columbine (*Aquilegia barnebyi*) are found growing near seeps located on the canyon walls. A few of these seeps occur in alcoves nestled into the limestone walls. Numerous springs also discharge at the base of the steep limestone walls where they have formed small marshes before discharging into East Rifle Creek. These marshes are mainly dominated by watercress (*Nasturtium officinale*), beaked sedge (*Carex utriculata*), and monkeyflower (*Mimulus guttatus*). The Colorado Division of Wildlife has developed a few of these

stream-level springs to supply the Rifle State Fish Hatchery, which is located just downstream from this site, with clear, fairly warm water (the spring water is 55° C and slightly warmer than the stream water from East Rifle Creek) high in calcium carbonate. As a result, many of the springs are currently dry or are discharging less water than prior to development. Common reed is fairly common in these disturbed areas. Upstream, above where the creek enters the narrow limestone canyon, the riparian community mainly consists of blue spruce (*Picea pungens*), red-osier dogwood, and various willow (*Salix*) species. Downstream from the Rifle State Fish Hatchery, there is an increase in non-native species in the understory, with reed canary grass (*Phalaris arundinacea*) and common reed becoming very abundant along the streamsides.

At one time, a large colony of Black Swifts occupied the canyon, as did a nesting pair of Bald Eagles and Peregrine Falcons. Extensive traffic from recreational climbers, however, caused the abandonment of the swift colony and subsequent migration of both the Bald Eagle and Peregrine Falcon nesting pairs.

#### Natural Heritage element occurrences at the East Rifle Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Sullivantia hapemanii</i> var <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3			FS	E
<b>Plant Communities</b>							
<i>Acer negundo</i> / <i>Cornus sericea</i>	<b>Montane riparian deciduous forest</b>	<b>G3?</b>	<b>S2</b>				<b>B</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a good (B-ranked) occurrence of the globally vulnerable (G3?/S2) box elder/red-osier dogwood (*Acer negundo*/*Cornus sericea*) montane riparian deciduous forest. This plant association is known from lower montane canyons in Utah and western Colorado. There are less than fifty known global occurrences and fewer than ten stands are known in Colorado. There is also an occurrence of the globally vulnerable, western Colorado endemic, hanging garden sullivantia, a plant species restricted to waterfalls, seeps, and moist cliffs of calcareous substrates.

**Boundary Justification:** The boundaries were drawn to ensure that all or most of the springs and small side drainages would continue to provide a major portion of the hydrological input to the creek and maintain natural water quality conditions, both of which are vital to the viability of the elements. The site boundaries were not intended to encompass the entire upstream watershed, although consideration of these areas is important to ensure adequate hydrological processes.

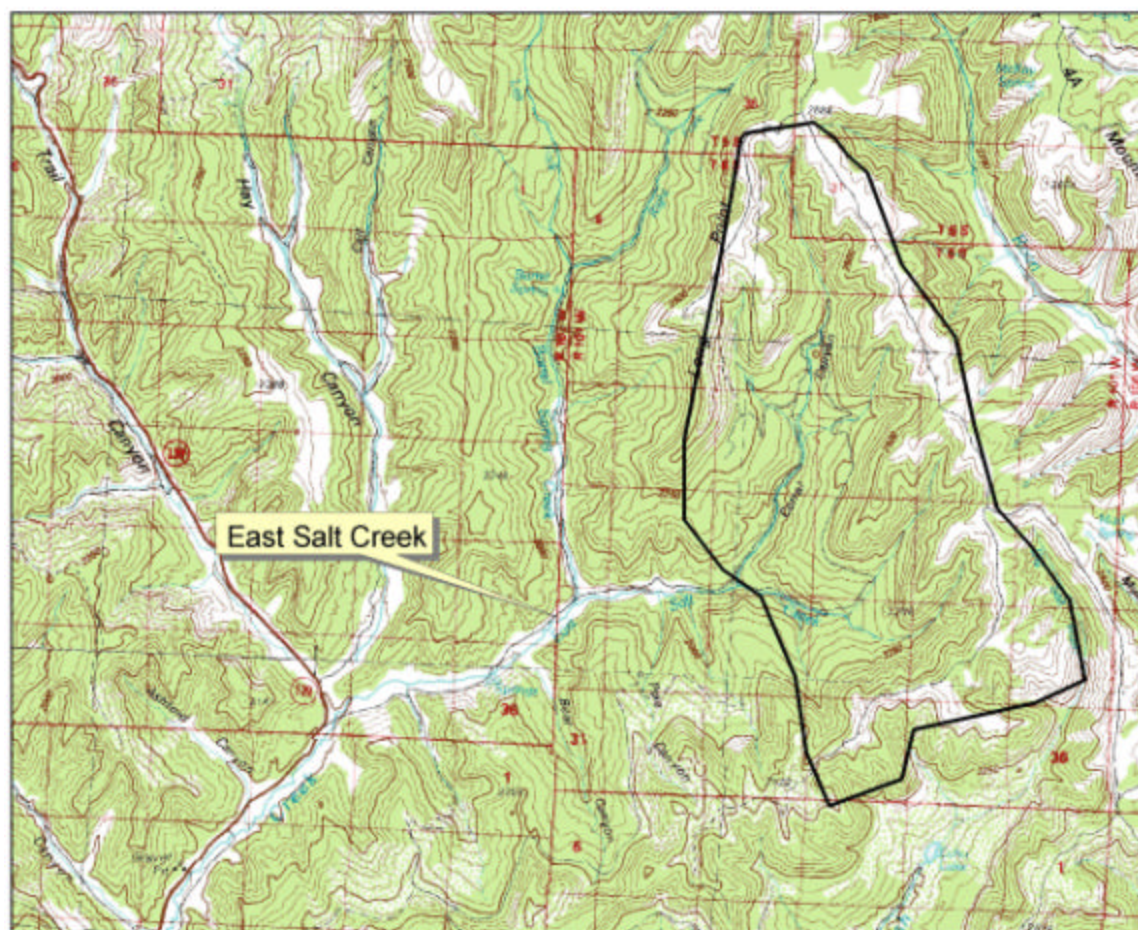
**Protection Rank Comments:** A portion of the site is managed by the U.S. Forest Service while the majority is managed by the City of Rifle.

**Management Rank Comments:** There is heavy recreational use throughout the site. Rock climbing is extremely popular on the limestone walls and there are at least three campgrounds located along the creek within the site. Current recreation use appears to be impacting localized areas but overall, use is mainly limited to canyon walls and campgrounds. Rock-climbing is the only potential direct threat to the hanging garden sullivantia, however most climbing appears to stay clear of the moist cliff walls. There are numerous foot trails throughout the riparian zone but use of these trails is not extremely heavy and adjacent vegetation is so dense that the probability of hikers venturing off trail is minimal. Forest road 832 runs directly through the riparian area and at times is immediately adjacent to the creek. There are non-native species associated with the road and recreation use. Thus far their impact is not overwhelming, but the potential is high. These potential threats and their impact on the elements should be closely monitored.



# East Salt Creek Headwaters

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Grand Junction, 39108-A1  
Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## East Salt Creek Headwaters Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Approximately 30 miles north of Loma, CO, east of Hwy. 139.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Henderson Ridge, Calf Canyon, Middle Dry Fork and Garvey Canyon. T5S R100W S30, 31; T5S R101W S36; T6S R101W S3-5, 8-11, 14-16, 20-28, 33-36.

**Size:** 9,561 acres

**Elevation:** 6,200 to 8,500 ft.

**General Description:** The East Salt Creek Headwaters PCA occupies the ridge separating the East Salt Creek drainage to the west and the Roan Creek drainage to the east, along with the riparian zone of Corral Canyon, a tributary of East Salt Creek. The uplands consist of sparsely vegetated shale slopes of the Green River Formation. There are scattered Douglas fir (*Pseudotsuga menziesii*), with snowberry (*Symphoricarpos rotundifolius*), spearleaf buckwheat (*Eriogonum lonchophyllum*) and *Penstemon* sp. Corral Canyon is a fairly steep, remote canyon with vertical, shale cliff faces exposed near the rim. Narrowleaf cottonwood (*Populus angustifolia*) and skunkbrush (*Rhus trilobata*) dominate the major drainage in Corral Canyon. Adjacent slopes are dominated by Gambel's oak (*Quercus gambelii*), Utah serviceberry (*Amelanchier utahensis*), and juniper (*Juniperus osteosperma*).

There are numerous seeps and springs scattered throughout the area due to the outcropping of the Green River shale formation. Approximately 2 miles upstream from where Corral Canyon opens into the East Salt Creek drainage, there is a fairly long, steep, step/pool complex on the east-facing slope. At the headwaters of this springbrook, is a stand of balsam poplar (*Populus balsamifera*). This species is common at more northern latitudes but is at the southern edge of its distribution in Colorado. The stand occurs at an old spring source, which no longer discharges at this location. The spring currently discharges approximately 20 meters west of the old source and is dominated by beaked sedge (*Carex utriculata*), alkali crowfoot (*Halerpestes cymbalaria* subsp. *saximontana*), and brookgrass (*Catabrosa aquatica*). The springbrook flows downhill along a steep drainage and is periodically interrupted by small flat areas where wetland vegetation has established around small pools. Beaked sedge, mare's tail (*Hippuris vulgaris*), hardstem bulrush (*Scirpus acutus*), cattail (*Typha latifolia*), American speedwell (*Veronica americana*), and wild mint (*Mentha arvensis*) are abundant in these small marshes.

Sandbar willow (*Salix exigua*), skunkbrush, and narrowleaf cottonwood are dominant along the springbrook.

Natural Heritage element occurrences at the East Salt Creek Headwaters PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Lesquerella parviflora</i>	<b>Piceance bladderpod</b>	<b>G2G3</b>	<b>S2</b>	<b>BLM</b>			<b>A</b>
<b>Plant Communities</b>							
<i>Populus angustifolia/Rhus trilobata</i>	Montane riparian forest	G3	S3				C
<i>Populus balsamifera</i>	Montane riparian woodland	GU	SU				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains an excellent (A ranked) occurrence of the Piceance bladderpod. It is one of the largest known, with an estimated 21,000 individual plants. The Piceance Bladderpod is a globally imperiled (G2S2) Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation

The site also supports a fair occurrence of the globally vulnerable narrowleaf cottonwood/skunkbrush montane riparian forest and a good occurrence of balsam poplar montane riparian woodland community. Balsam poplar has a limited distribution in Colorado and is somewhat restricted to the north-central regions of the state (Harrington 1954). Colorado may be the southern limit of the range of balsam poplar (USDA PLANTS ). The balsam poplar plant association is a minor type in Colorado and rarely forms stands larger than a few hundred yards long.

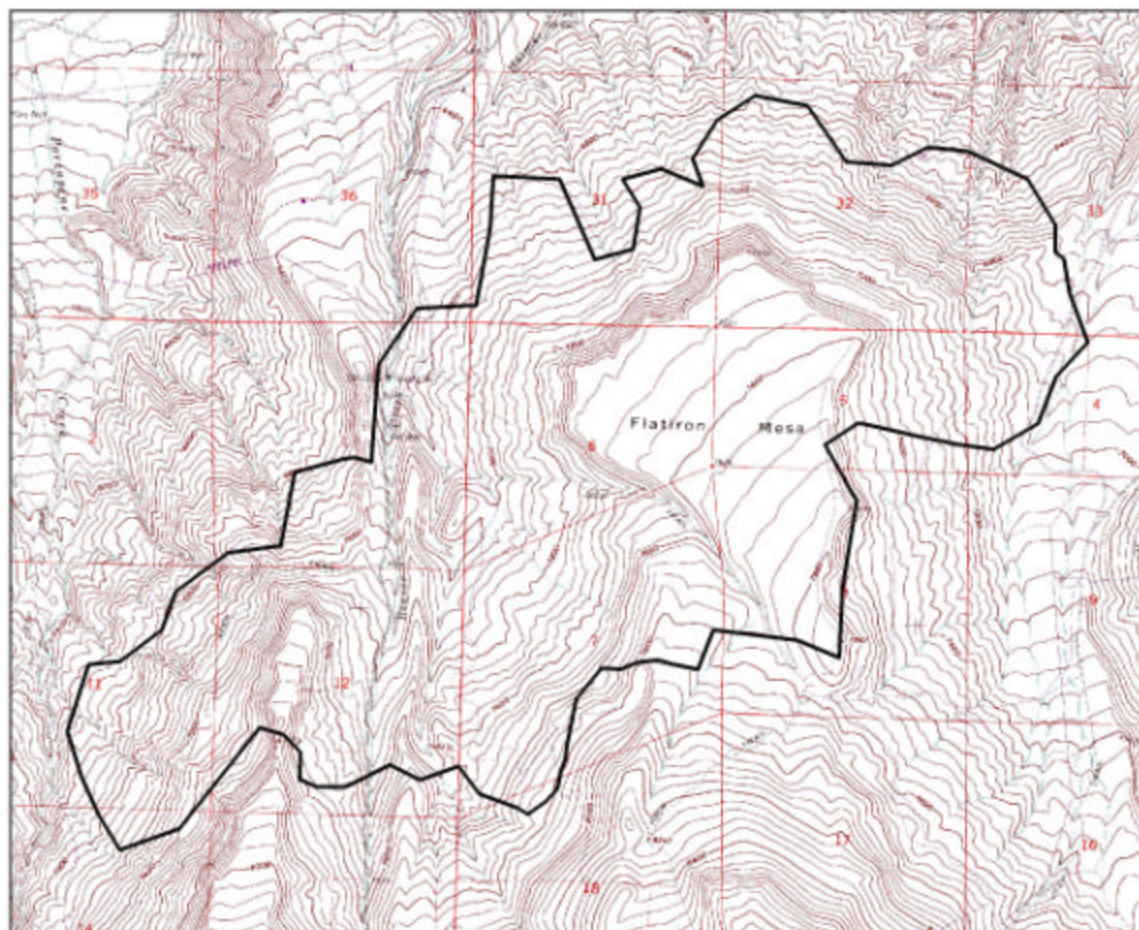
**Boundary Justification:** The boundary encompasses the locations of Piceance bladderpod, and takes in the suitable habitat from the ridge top to the bottom of the Green River Formation on southwest slopes. It also includes the riparian zone of Corral Canyon, and the adjacent uplands, which overlap with the Piceance bladderpod habitat. The narrow riparian area, surrounding slopes, and all of the upstream drainages and springs are essential to ensure that hydrological sources and the ability of the creek's fluvial processes to continue flooding, scouring, and sediment deposition are protected. These processes are necessary for the viability of the elements and maintenance of ecological functions such as a dynamic distribution of aquatic and terrestrial habitat and nutrient cycling.

**Protection Rank Comments:** The PCA contains both private and BLM land managed by the Grand Junction Resource Area. There is no special protective status. However, any new oil or gas development would require an Environmental Assessment, at which time the presence of the Piceance bladderpod would be addressed, and efforts made to avoid direct disturbance to the plants. There is no protection for the plants that may occur on private land within the PCA.

**Management Rank Comments:** No management needs for the rare plants that grow on the dry shale slopes are known. Steepness and lack of forage tend to discourage cattle from using these areas. However, improper grazing may degrade the riparian vegetation. Heavy grazing is occurring near the springs. Dense vegetation has precluded heavy livestock activity in portions of the step/pool complex, however in areas where there is little shrub or tree cover, excessive erosion is occurring from heavy hoof action disrupting the soil surface on steep slopes. Beneficial management actions would include fencing out the spring from cattle. If gas wells are developed in the canyon bottom, consideration should be given to directional drilling to minimize direct impacts to riparian vegetation.

# Flatiron Mesa

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

North Mamm Peak, 39107-D7

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Flatiron Mesa Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P1** The occurrence is immediately threatened.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Three miles southwest of Rifle, Colorado

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: North Mamm Peak. T6S R93W Sections: 31-33; T7S R93W S4-8, 18; T7S R94W S1, 11, 12, 14.

**Size:** 3,783 acres

**Elevation:** 6,600 to 7,883 feet

**General Description:** The Flatiron Mesa PCA comprises the level top of Flatiron Mesa, as well as gentle side slopes on the north and southwest. Beaver Creek and the Beaver Creek Road (317 Road) run through the site. The geology of the PCA has been mapped as Wasatch and Ohio formations along Beaver Creek, with older Quaternary gravels and alluvium on the mesa top, and Quaternary landslide deposits on the side slopes, on both sides of Beaver Creek. The soils have been described as stony loam. Part of the mesa top has been burned, eliminating much of the sagebrush, and leaving a low cover of oak and serviceberry. Harrington beardtongue was found both on the mesa top and midslope in a sagebrush/mountain shrub community. It occurred in both burned and unburned areas, but was more abundant in the unburned places with less dense grass cover. Associated species were Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), Gambel's oak (*Quercus gambelii*), serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos rotundifolius*), Utah juniper (*Juniperus osteosperma*), rabbitbrush (*Chrysothamnus nauseosus*) and a variety of grasses and herbaceous plants, including Indian rice grass (*Oryzopsis hymenoides*), bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Stipa comata*), lupine (*Lupinus* sp.), longleaf phlox (*Phlox longifolia*), and scarlet gilia (*Ipomopsis aggregata*).

Natural Heritage element occurrences at the Flatiron Mesa PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	Harrington beardtongue	G3	S3	FS/BLM	B
<i>Penstemon harringtonii</i>	Harrington beardtongue	G3	S3	FS/BLM	B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA includes two good (B ranked) occurrences, comprised of eleven sub-populations, of a globally vulnerable (G3S3) plant species which is endemic to the Colorado Rocky Mountains. Harrington beardtongue is known from 39 locations in Eagle, Garfield, Grand, Pitkin, Routt and Summit Counties.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of Harrington beardtongue at this site. The PCA boundary includes the occurrences and some surrounding potential habitat, based on topography and vegetation.

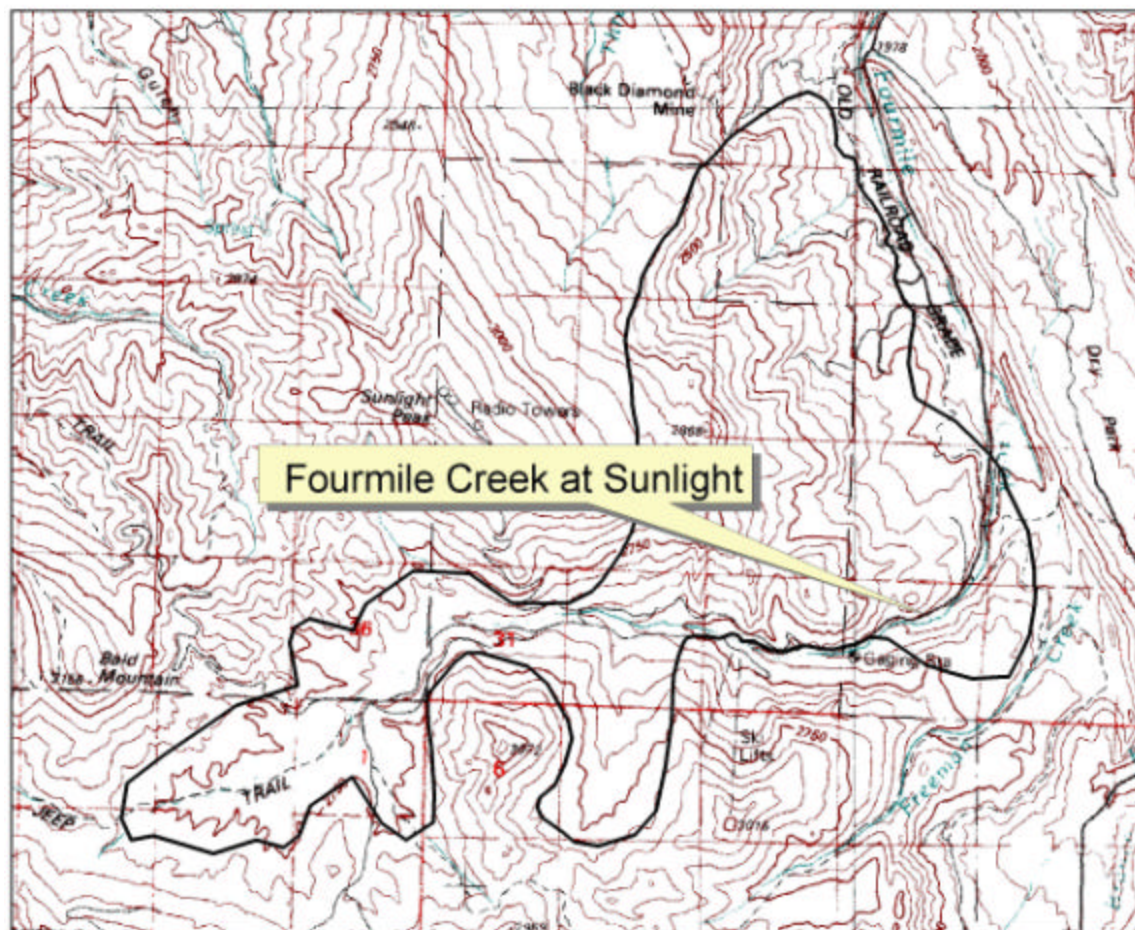
**Protection Rank Comments:** Ownership of the PCA is approximately 50% BLM and 50% private land. BLM is mindful of the Harrington beardtongue population, and will take it into consideration when making management decisions. As a BLM sensitive species, the beardtongue location is subject to Controlled Surface Use (CSU) stipulations, which may require modification of proposed activities to protect the plant and surrounding habitat (USDI 1999). However, about half of the population is on the west side of Beaver Creek on private land, and could be threatened by development. Current proposals to use seismic equipment for geologic exploration could seriously damage this site.

**Management Rank Comments:** One survey noted that many of the flowering stalks of Harrington beardtongue had been grazed. However, there appeared to be good regeneration, with young plants established near the older ones. Fire on the mesa top has resulted in a community with less sagebrush, which doesn't resprout after burning, and more serviceberry and oak, which do sprout. Although the effects of fire on Harrington penstemon have not been thoroughly studied, it appears that the plants can regenerate in the burned areas, but are less abundant where fire has encouraged a dense growth of grass. There is some cheatgrass (*Bromus tectorum*) and hound's tongue (*Cynoglossum officinale*) in the site.



# Fourmile Creek at Sunlight

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

□ PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Carbondale, 39107-A1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Fourmile Creek at Sunlight Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** Fourmile Creek is located approximately 4 miles south-southwest of Glenwood Springs, just upstream from Sunlight Ski Area.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Cattle Creek; Center Mountain. T7S R89W Sections 8, 9, 15, 16, 17, 20, 21, 22, 26-29, and 31-35; T7S R90W Sections 35 and 36; T8S R89W Sections 5, 6, 8, and 10-12; T8S R90W Sections 1-3.

**Size:** 8,212 acres

**Elevation:** 6,800 to 9,400 feet

**General Description:** The eastern portion of this site is characterized by a Gambel's oak (*Quercus gambelii*)- serviceberry (*Amelanchier utahensis*) shrubland dominating dry upland slopes and narrowleaf cottonwood (*Populus angustifolia*), blue spruce (*Picea pungens*), and thinleaf alder (*Alnus incana*) dominating the riparian areas. The upland oak-serviceberry shrublands are dense and include other shrub species such as mountain mahogany (*Cercocarpus montanus*), piñon pine (*Pinus edulis*), Douglas fir (*Pseudotsuga menziesii*), and sagebrush (*Artemisia* sp.). Several drainages cross the oak-serviceberry shrubland, most of which are dominated by aspen (*Populus tremuloides*). Further upstream, spruce-fir (*Picea engelmannii*-*Abies lasiocarpa*), willows (*Salix drummondiana*, *S. monticola*, and *S. bebbiana*), thimbleberry (*Rubus parviflorus*) and thinleaf alder dominate a moderately wide valley bottom. Large mesic meadows occupy most of Fourmile Park, while Booth's willow (*Salix boothii*), wolf willow (*S. wolfii*), beaked sedge (*Carex utriculata*), and water sedge (*C. aquatilis*) are dominant along Fourmile Creek and the numerous drainages within the park. Near the eastern end of Fourmile Park, on a north-facing slope, is an extremely large willow carr supported by groundwater discharge. This carr is dominated by Booth's willow, wolf willow, strapleaf willow (*Salix eriocephala* var. *ligulifolia*) and a very high diversity of herbaceous species such as small-winged sedge (*Carex microptera*), beaked sedge (*C. utriculata*), golden sedge (*C. aurea*), bluejoint reedgrass (*Calamagrostis canadensis*), brookgrass (*Catabrosa aquatica*), false hellebore (*Veratrum tenuipetalum*), chiming bells (*Mertensia ciliata*), American speedwell (*Veronica americana*), Macoun's buttercup (*Ranunculus macounii*), cowbane (*Oxypholis fendleri*), monkeyflower (*Mimulus guttatus*), bog orchid (*Limnorchis dilatata* subsp. *albiflora*), elephantella (*Pedicularis groenlandica*), and alpine bistort (*Bistorta vivipara*). Adjacent, upland slopes in Fourmile Park are generally dominated by mixed aspen-conifer forests.

The site is in good condition overall; however there are a few scattered roads and trails that fragment the PCA. The activity along these pathways is creating erosion and weed problems. Sunlight Ski area is southeast of the PCA. Downstream of the ski area the riparian vegetation is in poor condition.

Natural Heritage element occurrences at the Fourmile Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix boothii</i> /Mesic graminoid	Willow carr	<b>G3</b>	<b>S3</b>				<b>A</b>
<i>Salix boothii</i> / <i>Carex utriculata</i>	Willow carr	<b>G4</b>	<b>S3</b>				<b>B</b>
<i>Abies lasiocarpa</i> / <i>Rubus parviflorus</i>	Subalpine forests	G5	S2				B
<i>Quercus gambelii</i> - <i>Amelanchier utahensis</i>	Mixed mountain shrubland	G3G5	SU				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** An excellent (A-ranked) example of the globally vulnerable (G3/S3) Booth's willow/mesic graminoid (*Salix boothii*/mesic graminoid) willow carr with a very high diversity of herbaceous species is found at this site. This community is found in Colorado, Utah, Idaho, and likely occurs in Wyoming and Montana. The site also harbors a good (B-ranked) example of the state rare Booth's willow/beaked sedge (*Salix boothii*/*Carex utriculata*) willow carr, a good (B-ranked) example of the state imperiled fir/thimbleberry (*Abies lasiocarpa*/*Rubus parviflorus*) subalpine forest, and a good (B-ranked) example of the common oak-serviceberry (*Quercus gambelii*-*Amelanchier utahensis*) shrubland.

**Boundary Justification:** Surrounding habitat for the oak-serviceberry community is included to act as a buffer against direct disturbances, such as trampling, and indirect disturbances, such as unnatural erosion. Fourmile Park and the numerous streams draining into Fourmile Creek were included to ensure natural hydrological process remain intact for the two riparian communities. The large willow carr is supported by groundwater discharge. The site boundaries do not account for the source of this groundwater and adequate protection for this community should consider those areas that contribute to this groundwater flow.

**Protection Rank Comments:** This PCA consists of both private land and lands that are publicly owned and managed by the White River National Forest. Residential and recreational development pressures are high in this area. If Sunlight Ski area is expanded, residential development in this area is expected to follow. Any developments may threaten this site.

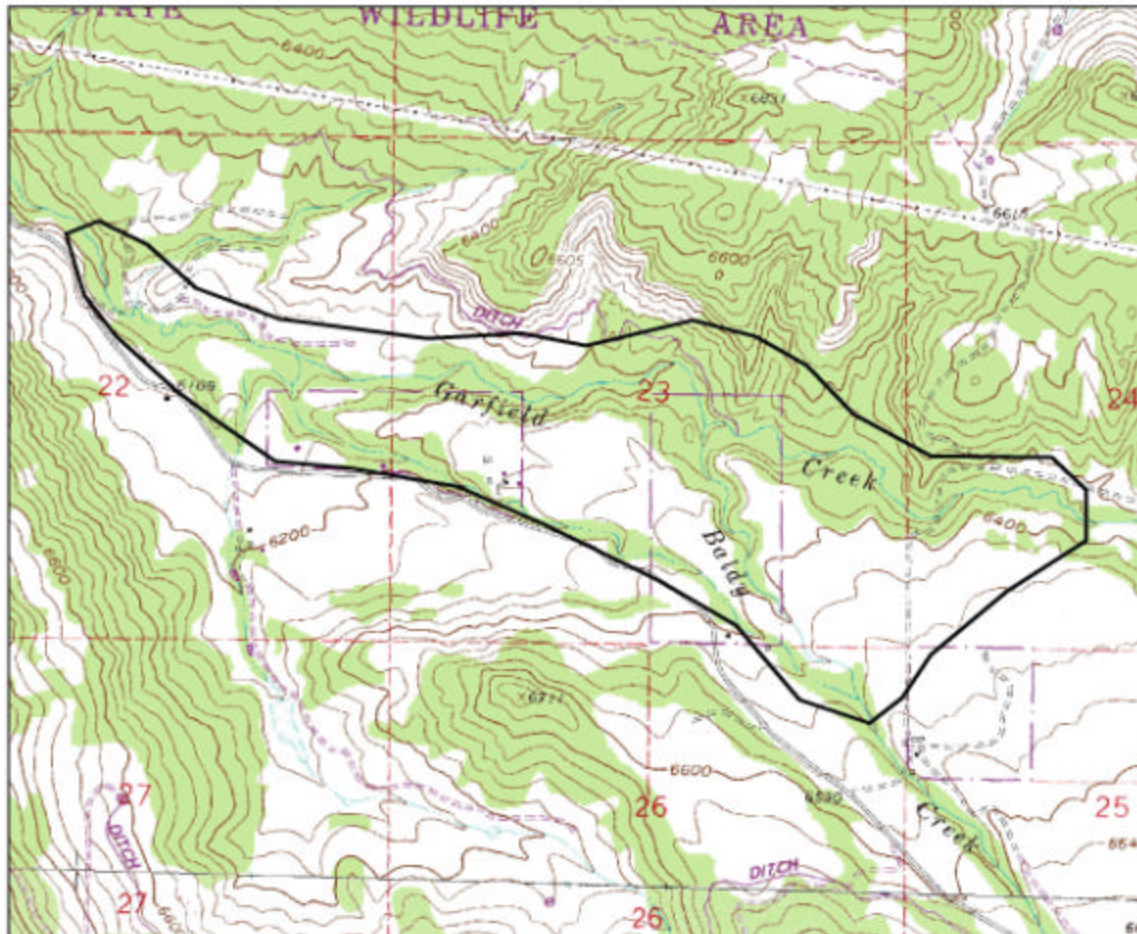
**Management Rank Comments:** There are roads scattered throughout the area, which may cause erosion problems. These roads are also acting as conduits for non-native species,




such as Kentucky bluegrass (*Poa pratensis*), yellow sweet clover (*Melilotus officinale*), bindweed (*Convolvulus arvensis*), dandelion (*Taraxacum officinale*), tansy (*Tanacetum vulgare*), curly dock (*Rumex crispus*), smooth brome (*Bromus inermis*), and mullein (*Verbascum thapsus*). Recommended management actions include the implementation of a non-native plant eradication program. One of the best defenses against the spread of these non-native species is to discourage future trails/roadways. A management agreement with private landowners should be pursued.



# Garfield Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangle*          New Castle, 39107-E5</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	--	--

## Garfield Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** This site is located approximately 3.5 miles south of the town of New Castle, CO within the Garfield Creek State Wildlife Area.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: New Castle. T6S R91W Sections 22-26.

**Size:** 463 acres

**Elevation:** 6,100 to 6,500 feet

**General Description:** The reach of Garfield Creek contained in this site is best described as a medium sized stream meandering through a long wide valley. Surrounding slopes are dominated by piñon (*Pinus edulis*)/juniper (*Juniperus osteosperma*) and sage (*Artemisia* sp.). Upstream, on adjacent upland areas, there are numerous hay meadows, pasture, new housing developments, and County Road 312. The riparian area along the downstream portion of this site is dominated by a sparse overstory of narrowleaf cottonwood (*Populus angustifolia*), river birch (*Betula occidentalis*), and hawthorn (*Crataegus rivularis*) with Canada goldenrod (*Solidago canadensis*) and Indian hemp (*Apocynum cannabinum*) being fairly common in the understory. Further downstream, there are a series of old beaver dams with high species diversity. Cattail (*Typha latifolia*), beaked sedge (*Carex utriculata*), water speedwell (*Veronica catenata*), spikerush (*Eleocharis palustris*), and hardstem bulrush (*Scirpus acutus*) dominate the wettest areas. Sandbar willow (*Salix exigua*), pale bulrush (*Scirpus pallidus*), wild mint (*Mentha arvensis*), showy milkweed (*Asclepias speciosa*), shortawn foxtail (*Alopecurus aequalis*), tall mannagrass (*Glyceria elata*), foxtail barley (*Hordeum jubatum*), tuberous rush (*Juncus nodosus*), wild licorice (*Glycyrrhiza lepidota*), and dock (*Rumex crispus*) occupy saturated areas surrounding the beaver ponds. A small meadow, which appears to have formed behind an old beaver dam and is now elevated above the current stream level, is dominated by woolly sedge (*Carex lanuginosa*), sloughgrass (*Beckmannia syzigachne*), and redtop (*Agrostis gigantea*). There are numerous non-native species that occupy the riparian area, especially the wetlands near the beaver ponds. Non-natives such as redtop, barnyard grass (*Echinochloa crus-galli*), Canada goldenrod, Canada thistle (*Cirsium arvense*), white sweetclover (*Melilotus albus*), smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), and timothy (*Phleum pratense*) are common in the area. Numerous northern leopard frogs (*Rana pipiens*) were observed in this area as well as signs of recent bear activity.



Natural Heritage element occurrences at the Garfield Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Populus angustifolia/Crataegus rivularis</i>	Narrowleaf cottonwood riparian forest	G2?	S2?				C
<b>Amphibians</b>							
<i>Rana pipiens</i>	Northern leopard frogs	G5	S3		SC	FS/BLM	E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a fair (C ranked) occurrence of the globally imperiled (G2?S2?) narrowleaf cottonwood/hawthorn riparian forest. This community type was previously only known from six stands located on the lower slopes of the San Juan Mountains and along tributaries of the San Miguel River, Colorado.

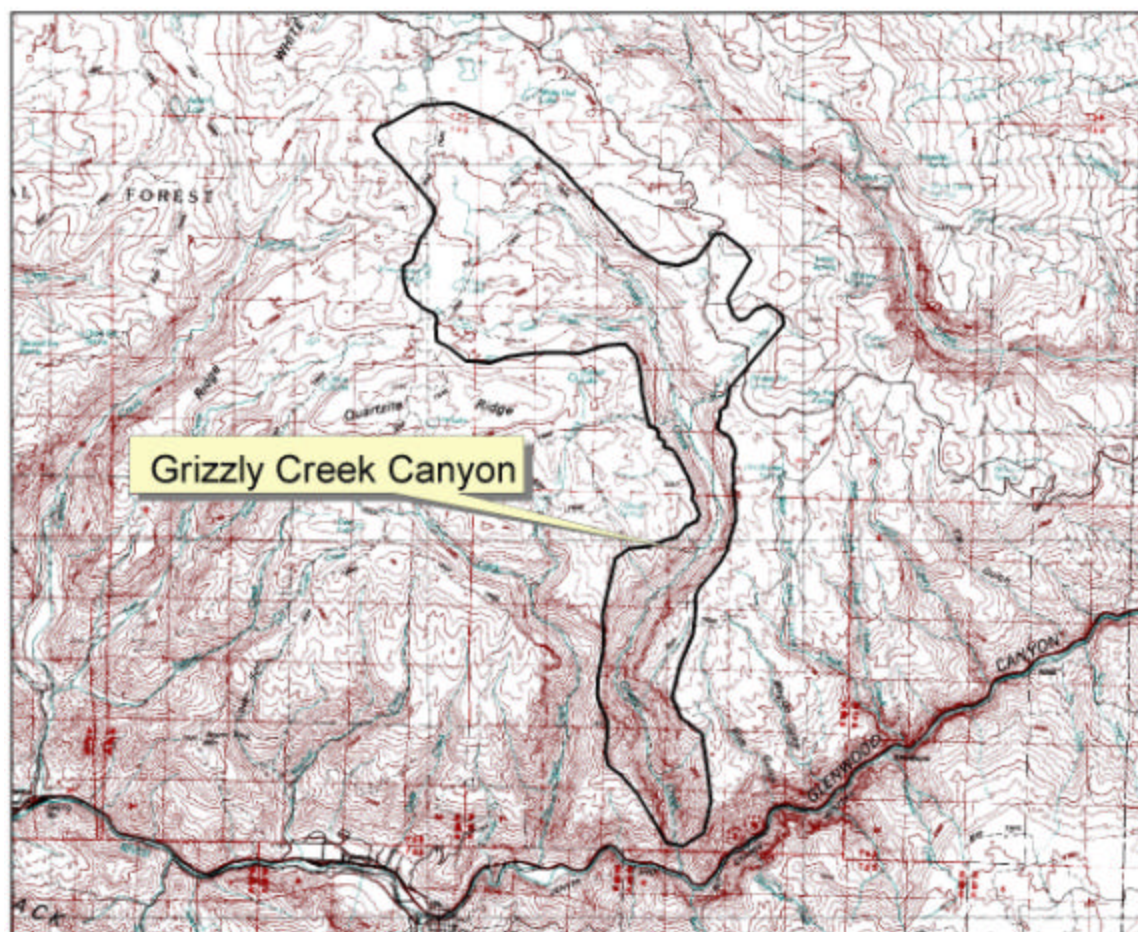
**Boundary Justification:** The site boundaries protect the plant community from direct disturbances associated with development and improper grazing. The boundaries also provide a buffer from nearby populations of non-native species growing on nearby disturbed sites such as housing developments, roads, hay meadows, and pasture. While the boundaries would allow Garfield Creek to maintain natural fluvial processes along this stretch of the creek they do not protect upstream hydrological sources. Thus, any management/conservation plan should address upstream water use and quality.

**Protection Rank Comments:** The site is currently managed by the Colorado Division of Wildlife as the Garfield Creek State Wildlife Area. Current use appears to mainly be hunting and grazing, although no signs of recent grazing were observed. There are new houses being constructed in the area, thus it is suspected that development pressure in the area is high.

**Management Rank Comments:** Management concerns mainly stem from upstream land and water use. Non-native species are abundant. Eradication and prevention of further spread of these species needs to be addressed. Upstream water diversions may be impacting stream dynamics at this site, as portions of the stream appear to be entrenching.

# Grizzly Creek Canyon

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Grizzly Creek Canyon Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This site is located approximately 3.5 miles east of Glenwood springs within the White River National Forest. The site includes the entire Grizzly Creek drainage including Monument, Duck, and Grizzly Lakes.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Broken Rib Creek; Carbonate; Glenwood Springs. T3S R88W Section 31; T3S R89W Sections 35 and 36; T4S R88W Sections 5-11, 14-24, 26-28, 34, and 35; T4S R89W Sections 1, 2, 11-14, and 24; T5S R88W Sections 2-4, 8-10, 15-17, 20-22, 27, 28, 33, and 34.

**Size:** 16,356 acres

**Elevation:** 6,100 to 10,800 feet

**General Description:** This is a very large site encompassing the entire Grizzly Creek watershed. Near the headwaters, the area consists of an expansive, open, flat area with numerous subalpine lakes connected via a series of large wetlands and small streams. There are numerous large boulders scattered throughout the area and small limestone outcroppings and cliffs. The non-forested, adjacent hillsides are covered with shortfruit willow (*Salix brachycarpa*) while conifers dominate higher slopes. The lakes are surrounded by concentric rings of water and beaked sedge (*Carex aquatilis* and *C. utriculata*, respectively) meadows grading into low-stature willow carrs mainly composed of sedges and planeleaf willow (*Salix planifolia*). There appears to be an ephemeral hydrological surface connection between Monument and Duck Lake, although there may be persistent groundwater flow between the two. There is a permanent stream that connects Duck Lake to Grizzly Lake. Mountain willow (*S. monticola*) and a variety of herbaceous species dominate this stream. Grizzly Creek drains out of Grizzly Lake and heads east where it has cut a steep canyon through limestone down to its confluence with the Colorado River. Mountain willow, Drummond's willow (*S. drummondiana*), marsh bittercress (*Cardamine cordifolia*), beaked sedge, and field horsetail (*Equisetum arvense*) are common along this stretch of Grizzly Creek. Near Grizzly Creek Springs there are a few mesic meadows dominated by Idaho fescue (*Festuca idahoensis*) and Thurber fescue (*Festuca thurberi*). These meadows are interrupted by islands of spruce-fir forest while aspens (*Populus tremuloides*) are common adjacent to the meadows. Further downstream, narrowleaf cottonwood (*Populus angustifolia*) is common along the creek while the upland slopes are dominated by Douglas fir (*Pseudotsuga menziesii*),

Oregon boxleaf (*Paxistima myrsinites*), Gambel's oak (*Quercus gambelii*), snowberry (*Symphoricarpos oreophilus*), and sticky-laurel (*Ceanothus velutinus*). On west and south facing slopes, Douglas fir is often dominant with an understory of Oregon boxleaf, while Gambel's oak and Oregon boxleaf are common on east and south facing slopes. About 3.5 miles upstream from the mouth of Grizzly Creek, an aqueduct removes water from the creek and transports it into No Name Creek to supplement Glenwood Springs' city water supply.

#### Natural Heritage element occurrences at the Grizzly Creek Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<b><i>Salix monticola</i>/Mesic forb</b>	<b>Montane riparian willow carr</b>	<b>G3</b>	<b>S3</b>				<b>B</b>
<i>Pseudotsuga menziesii</i> / <i>Paxistima myrsinites</i>	Lower montane forest	G2G3	S2S3				E
<i>Salix monticola</i> /Mesic forb	Montane riparian willow carr	G3	S3				E
<i>Festuca idahoensis</i> - <i>Festuca thurberi</i>	Montane grasslands	G3G4	S3S4				E
<i>Salix drummondiana</i> / <i>Carex utriculata</i>	Montane willow carr	G4	S3				E
<i>Quercus gambelii</i> / <i>Paxistima myrsinites</i>	Mixed mountain shrublands	GU	SU				E
<b>Plants</b>							
<i>Draba spectabilis</i> var. <i>oxyloba</i>	Whitlow-grass	G3?T3Q	S3				E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The site supports a good (A-ranked) and an unranked (E) occurrence of the globally vulnerable (G3/S3) mountain willow/mesic forb (*Salix monticola*/mesic forb) montane riparian willow carr. This association is only known from Colorado where over thirty occurrences have been documented. The site also harbors an unranked (E) occurrence of the globally vulnerable (G2G3/S2S3) Douglas fir/Oregon boxleaf (*Pseudotsuga menziesii*/*Paxistima myrsinites*) lower montane forest. This association has a naturally restricted distribution, being found on very steep, well-drained terrain of mostly northern exposures. There are unranked (E) occurrences of the Idaho-Thurber fescue (*Festuca idahoensis*-*Festuca thurberi*) montane grassland, the state rare (G4/S3) Drummond's willow/beaked sedge (*Salix drummondiana*/*Carex utriculata*) montane willow carr, and the Gambel's oak/Oregon boxleaf (*Quercus gambelii*/*Paxistima myrsinites*) mixed mountain shrubland. An unranked (E) occurrence of the globally vulnerable (G3?T3Q/S3) Whitlow-grass (*Draba spectabilis* var. *oxyloba*) is also found at this site.

**Boundary Justification:** The boundary encompasses the entire Grizzly Creek watershed and thus, ensures continued hydrological flow and allows natural fluvial processes to dynamically maintain the riparian plant communities found at this site. The boundaries also provide enough area to allow natural disturbances (fire, insects, disease, etc.) to maintain viable upland plant communities.

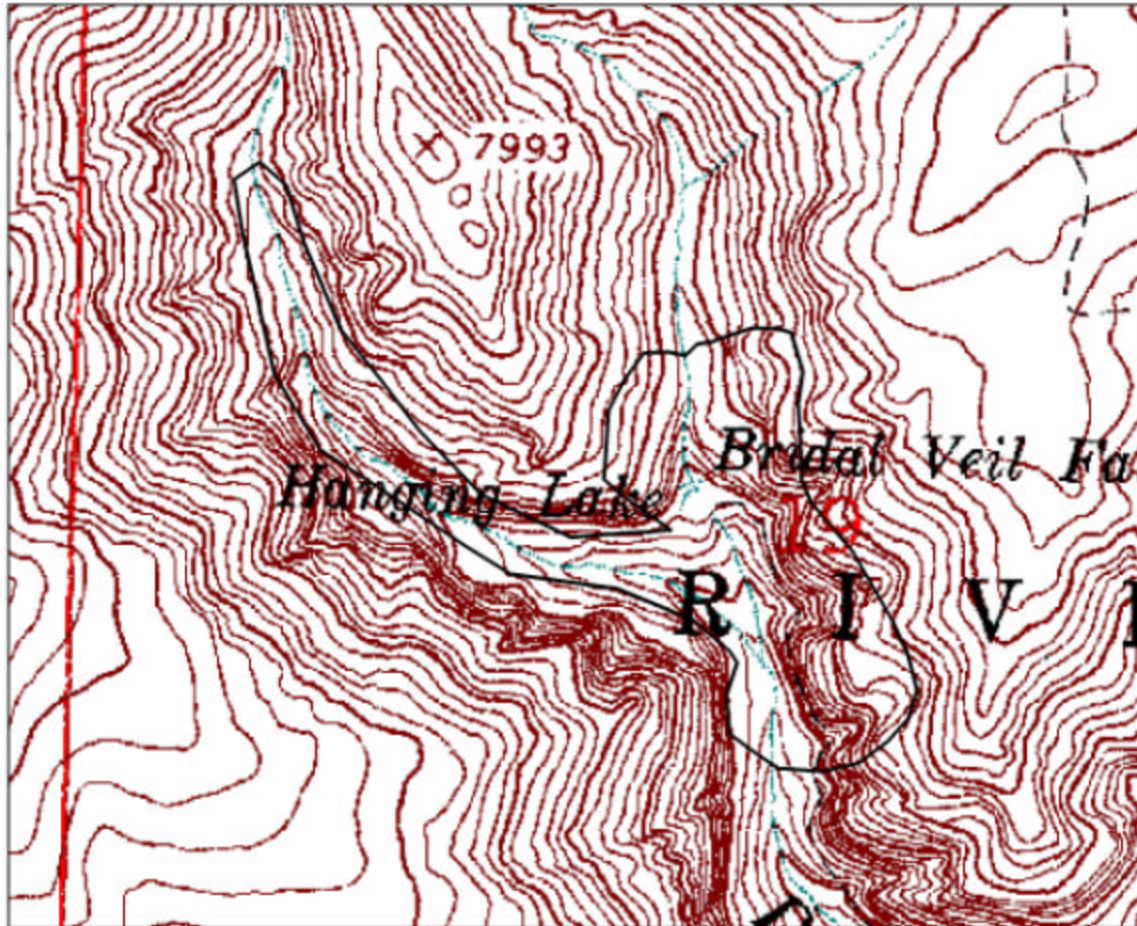
**Protection Rank Comments:** The site is managed by the White River National Forest and does not have any special protection status. The area currently receives multiple use from logging, grazing, and recreation users.

**Management Rank Comments:** Cattle and sheep graze heavily on upland slopes within the upper portion of the site. Management actions should reduce intensity of grazing to minimize potential impacts on the elements. Recreational use has resulted in numerous new roads and trails in the area. This activity should be closely monitored.



# Hanging Lake

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Shoshone, 39107-E2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## Hanging Lake Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** Hanging Lake is located along West Fork of Deadhorse Creek within Glenwood Canyon. The site is approximately 7 miles northeast of Glenwood Springs, CO.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Shoshone. T5S R87W Section 19.

**Size:** 38 acres

**Elevation:** 6,300 – 6,700 ft.

**General Description:** This site encompasses a narrow, steep canyon flanked by 400-600 foot horizontally stratified sandstone and limestone cliffs. Douglas fir (*Pseudotsuga menziesii*) occurs sporadically on these slopes while also occurring in the riparian area along with box elder (*Acer negundo*), blue spruce (*Picea pungens*), and red-osier dogwood (*Cornus sericea*). Hanging Lake, which is located along East Fork Deadhorse Creek just above the confluence with West Fork Deadhorse Creek, is a unique environment with lush vegetation and aqua-blue water. Stream flow in East Fork Deadhorse Creek is perennial while flow in West Fork Deadhorse Creek, although indicated on maps as perennial, appears to be intermittent. Downstream of the confluence of these two forks, stream flow is perennial due to drainage from Hanging Lake.

Hanging Lake was formed by a geologic fault, which caused the lake bed to drop away from the valley floor above. The lake receives perennial flow from East Fork Deadhorse Creek via Bridal Veil Falls. The lake edge has built up from dissolved carbonates, which are deposited on the shore and on surrounding slopes as the lake water flows over the edge and makes its way down to the confluence with West Fork Deadhorse Creek. Thus, the lake's edge and the downstream slope are encrusted with a thick deposit of calcium carbonate where species such as Oil shale columbine (*Aquilegia barneybi*) and hanging garden sullivanian (*Sullivanian hapemanii* var. *pupusii*) are fairly common. Small wetlands are located upstream of Bridal Veil Falls (near Spouting Rock), along the edge of Hanging Lake, and on the downstream slope where drainage from Hanging Lake saturates the hillside. These areas are dominated by Oil shale columbine, hanging garden sullivanian (on steep faces), red-osier dogwood, river birch (*Betula occidentalis*), beaked sedge (*Carex utriculata*), Rocky Mountain rush (*Juncus saximontanus*), bog orchid (*Limnorchis* sp.), brookgrass (*Catabrosa aquatica*), redtop

(*Agrostis gigantea*), leafybract aster (*Aster foliaceus*), and American speedwell (*Veronica americana*). Hornwort (*Ceratophyllum demersum*) is the dominant aquatic species in these areas. The riparian vegetation near Hanging Lake and Spouting Rock consisted of red-osier dogwood, river birch, box elder, and mock-orange (*Philadelphus microphyllus*).

Natural Heritage element occurrences at the Hanging Lake PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Sullivantia hapemanii</i> var. <i>purpusii</i>	Hanging garden sullivantia	G3T3	S3				<b>B</b>
<b>Plant Communities</b>							
<i>Acer negundo</i> / <i>Cornus sericea</i>	Montane riparian forest	G3?	S2				<b>B</b>
<b>Birds</b>							
<i>Cypseloides niger</i>	Black Swift	G4	S3B				E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains a good (B-ranked) occurrence of a globally vulnerable (G3T3/S3) plant subspecies, the hanging garden sullivantia (*Sullivantia hapemanii* var. *purpusii*), which is endemic to western Colorado. The site also contains a good (B-ranked) occurrence of the globally vulnerable (G3?/S2) box elder/red-osier dogwood (*Acer negundo*/*Cornus sericea*) montane riparian forest. This riparian plant community is known from less than 50 occurrences globally and less than 10 occurrences are known in Colorado. The Black Swift record represents a traditional nesting colony with five to nine nesting pairs. Estimates suggest that over 200 nesting pairs of Black Swifts occur in Colorado, representing between 10% and 20% of the total nesting population of the species (Boyle 1998). This makes Colorado's population an important component of this bird's total population. In addition, Black Swifts restrict their nesting to areas near or behind waterfalls or to caves with running water. Because such habitats are uncommon, any that support breeding swift populations are important to protect. This species' low population size, few occurrences, and lack of local trend data are all reasons for its vulnerable ranking in the state.

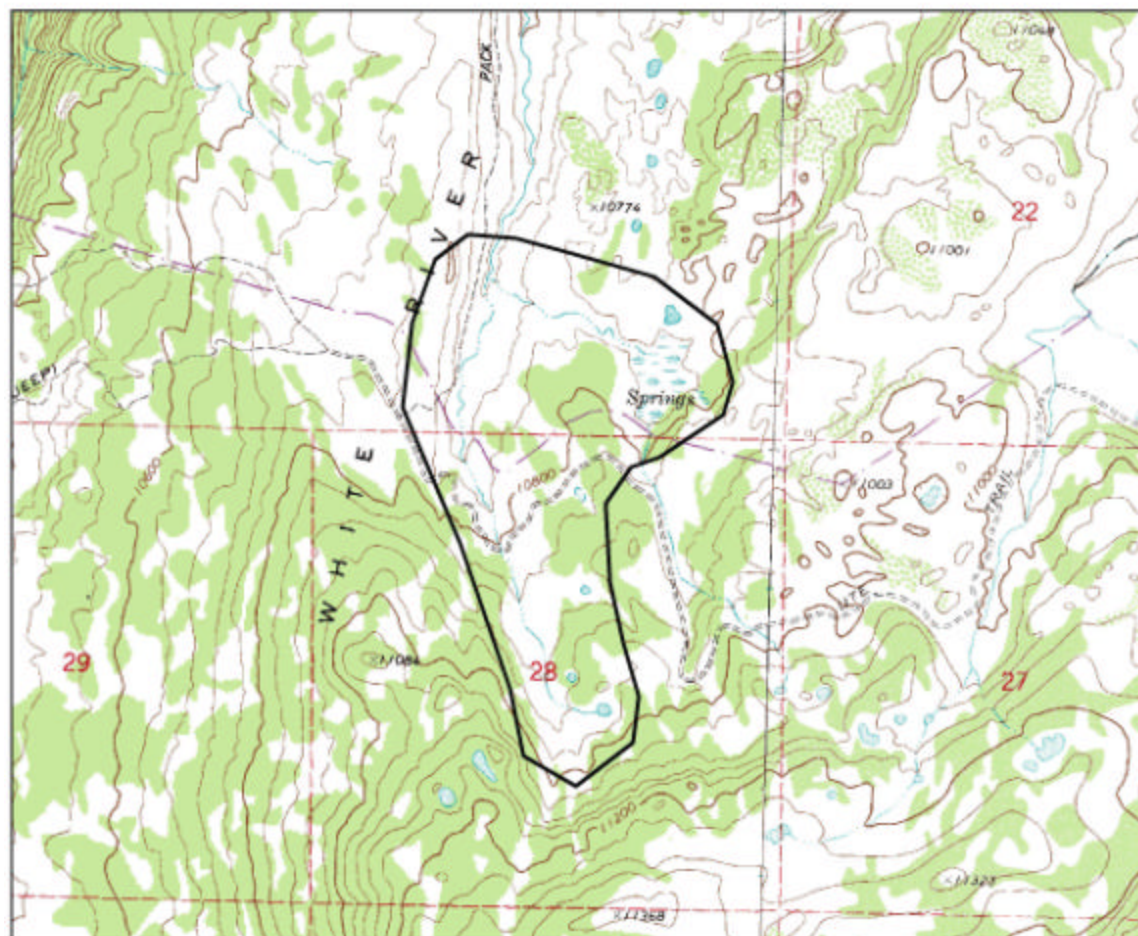
**Boundary Justification:** The boundary encompasses the entire riparian area along Deadhorse Creek and a portion of the adjacent slopes. However, upstream reaches of East and West Fork Deadhorse Creek were not included in the site boundaries. A comprehensive management/protection plan needs to consider these areas to ensure hydrological processes, which are necessary for the viability of the wetland and riparian elements, remain intact. The current boundaries allow fluvial processes along the creek to dynamically maintain riparian and wetland communities. The boundaries, along with the inaccessibility of the Black Swift's particular habitat, would prevent direct disturbance to the Black Swift nests.

**Protection Rank Comments:** The U.S. Forest Service currently manages the site and it is a popular hiking destination. Designating this site as a “Special Interest Area” would assist in protecting the site’s unique geologic features and ecological diversity.

**Management Rank Comments:** There is heavy recreational use along the creek up to Hanging Lake and Spouting Rock. There are few obvious threats to Black Swifts, except where development, such as trails and boardwalks, alters nesting habitat. Protecting stream flows and the present physical state of the falls at Hanging Lake from alteration and limiting direct access to the falls through the design and placement of trails would ensure continued nesting by the swifts. Diversion of stream water causing reduced flow at the falls could cause swifts to abandonment the site and affect the viability of the wetland and riparian plant communities. Heavy recreational use has trampled streamside vegetation in some areas and has resulted in the spread of non-native species such as Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale*), and smooth brome (*Bromus inermis*).

## Headwaters of Patterson Creek

### Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Blair Mountain, 39107-G4

\*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996.

### Location in Project Area



## Headwaters of Patterson Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** The site is approximately 13.5 miles north of Glenwood Springs, CO just east of the Elk Lakes. The site partially lies within the Flat Tops Wilderness along an unnamed drainage, near the headwaters of Patterson Creek.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Blair Mountain. T3S R89W Sections 21 and 28.

**Size:** 305 acres

**Elevation:** 10,700 to 10,800 feet

**General Description:** The site encompasses a narrow subalpine valley bordered by two low ridges. The riparian area consists of a mosaic of willows (*Salix wolfii* and *S. planifolia*) and sedge (*Carex aquatilis*, *C. utriculata*, and *C. microptera*) meadows. Other species found in this mosaic include tufted hairgrass (*Deschampsia cespitosa*), rosecrown (*Clementsia rhodantha*), marsh marigold (*Caltha leptosepala*), marsh bittercress (*Cardamine cordifolia*), and hemlock parsley (*Conioselinum scopulorum*). There are numerous springs, which, along with drainage from the many small lakes in the area, support hydrological flow in this unnamed side-drainage of Patterson Creek. The creek flows due north for a short distance, then turns west down a steep gulch before its confluence with Patterson Creek.

Natural Heritage element occurrences at the Headwaters of Patterson Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix wolfii</i> /Mesic forb	Subalpine riparian willow carr	<b>G3</b>	<b>S3</b>				<b>A</b>
<i>Carex aquatilis</i> - <i>Carex utriculata</i>	Montane wet meadows	<b>G4</b>	<b>S4</b>				<b>A</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The site supports an excellent (A-ranked) occurrence of the globally vulnerable (G3/S3) wolf willow/mesic forb (*Salix wolfii*/mesic forb) subalpine riparian willow carr. This community has a widespread distribution but does not appear to be abundant where it occurs. The site also supports an excellent (A-ranked)

occurrence of the common (G4/S4) water sedge/beaked sedge (*Carex aquatilis*/*C. utriculata*) montane wet meadow.

**Boundary Justification:** The boundary encompasses upstream hydrological sources and provides space for dynamic changes in the distribution of plant communities along the creek. A series of springs, which support a fairly large wetland located northeast of the elements of concern, were also included in the site boundaries due to the potential for this area to provide nearby seed sources and the probability that this area harbors similar elements.

**Protection Rank Comments:** A large portion of the site occurs within the Flat Tops Wilderness Area. The remaining portion is within the White River National Forest.




**Management Rank Comments:** Sheep grazing is the main management concern for the site. Current impacts are minimal, but the activity should be monitored. There are very few non-native species present.



# Horse Mountain

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Grand Junction, 39108-A1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--

## Horse Mountain Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** Eighteen miles northeast of Fruita, Colorado, on the Roan Plateau

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Middle Dry Fork, The Saddle. T8S R100W S1-5, 7, 8, 12; T8S R99W S3-10.

**Size:** 2,669 acres

**Elevation:** 7,400 to 8,362 feet

**General Description:** Horse Mountain is the highland between two east-flowing tributaries of Roan Creek, the Middle Dry Fork and McKay Fork. The PCA is confined to the south facing slopes of Green River shale, which are the home of the three shale endemic plants found in the PCA. The plants grow in abundance on barren shale surfaces with large, loose fragments. Associated plant species in the site are serviceberry (*Amelanchier utahensis*), Indian rice grass (*Oryzopsis hymenoides*), western wheatgrass (*Pascopyrum smithii*), scarlet gilia (*Ipomopsis aggregata*), spearleaf buckwheat (*Eriogonum lonchophyllum*), native thistles (*Cirsium* sp.), Colorado bedstraw (*Galium coloradense*), and *Penstemon* sp. The site was surveyed by a private consultant for the BLM in 1988.

Natural Heritage element occurrences at the Horse Mountain PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Lesquerella parviflora</i>	Piceance bladderpod	G2G3	S2S3		A
<i>Thalictrum heliophilum</i>	Sun-loving meadowrue	G3	S3	BLM	B
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The Horse Mountain PCA supports three Green River shale endemic plants. Although locally common, these species are vulnerable due to their very limited range.

The site contains an excellent (A ranked) occurrence of the Piceance Bladderpod, a globally rare (G2S2) Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation.

There is a good (B ranked) occurrence of the sun-loving meadowrue, a globally vulnerable (G3S3) plant that grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

The site also has an unranked (E) occurrence of Utah fescue, another globally vulnerable (G3S3) plant. Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the three rare plants found in the PCA. It encompasses the upper slopes of the south facing side of Horse Mountain, where the three endemic plants are found. It also includes some adjacent suitable habitat to allow for movement of the plant populations over time, as landslides open up new sites, and existing sites become too heavily vegetated for the targeted species.

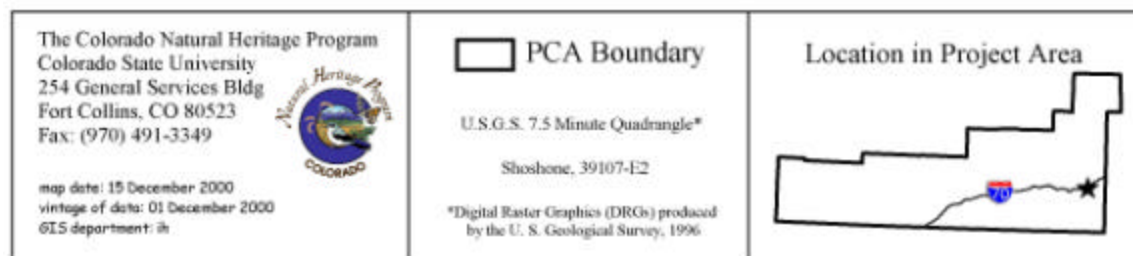
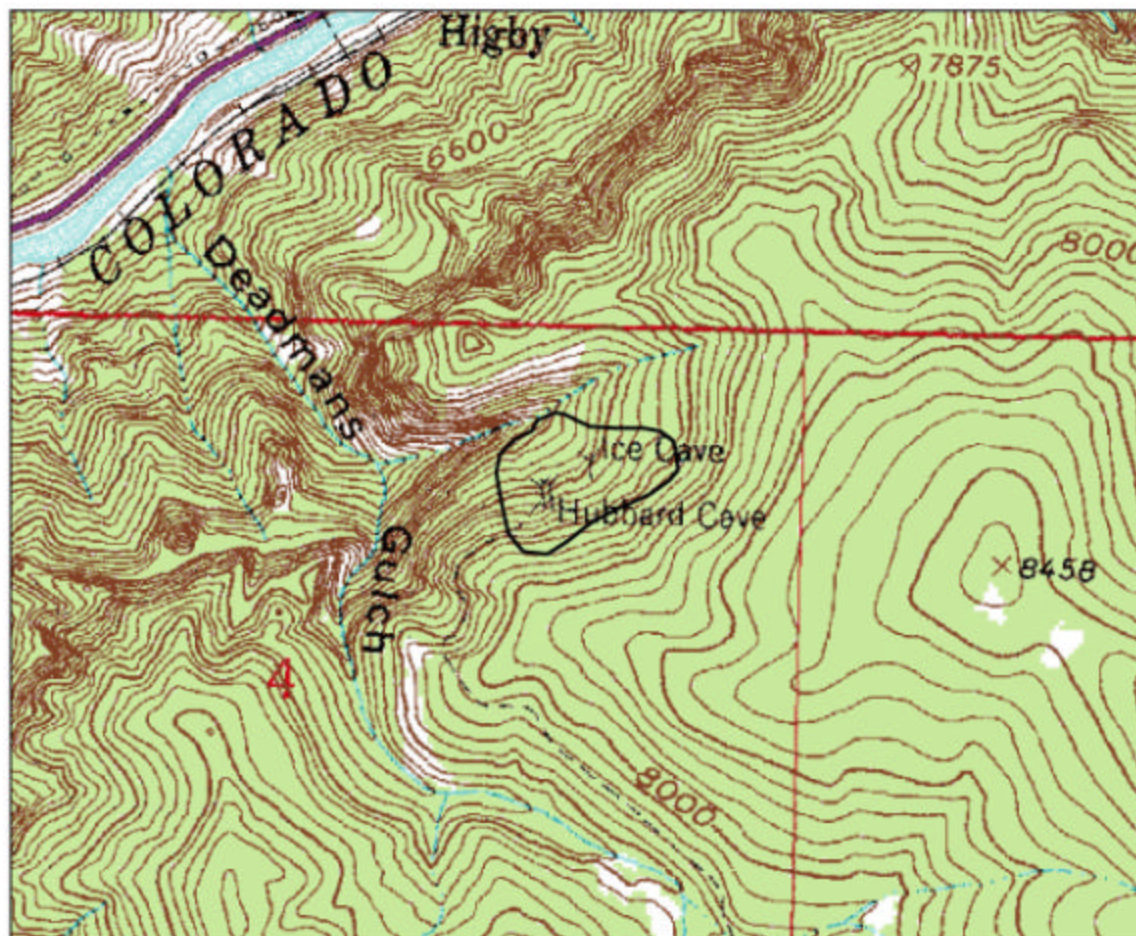
**Protection Rank Comments:** The PCA is located primarily on BLM land, with some inholdings (about 800 acres) of private land. The three rare plants were located on BLM land, but are likely to also occur on the private land in the site. Since Piceance bladderpod is listed as a sensitive species by BLM, any mineral development would require an Environmental Assessment that should protect this species from direct disturbances on BLM land. There is no comparable protection for the private land in the site.

**Management Rank Comments:** No immediate management needs are known. Locations of these shale endemic plants tend to be too barren and steep for cattle or human activity. The area should be periodically monitored for presence of weeds.



# Hubbard Cave

## Potential Conservation Area



## Hubbard Cave Potential Conservation Area

**Biodiversity Rank: B5** General Biodiversity Significance. This site contains a marginal occurrence of a subspecies that is imperiled in the state, but apparently secure globally.

**Protection Urgency Rank: P1** The occurrence is immediately threatened. Recreational cavers frequently use Hubbard Cave, and the bats are sensitive to human disturbance.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of the cave for occupancy by pale lump-nose bats.

**Location:** Hubbard Cave is located 4.5 miles due east of the northwest corner of Rifle, Colorado's city limits.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Shoshone. T6S R88W S4

**Size:** 10 acres

**Elevation:** 7,274 to 7,776 feet

### General Description:

A forest of Douglas fir (*Pseudotsuga menziesii*) with mountain shrubs surrounds Hubbard Cave. The cave is located in the upper limestone cap rock of Glenwood Canyon at the base of a cliff overlooking Interstate Highway 70 to the north. The area can be accessed with little difficulty and is used extensively by recreational cavers. The cave itself and the surrounding area lie within the White River National Forest. The cave formation occurs in Pre-Pennsylvanian sedimentary rock of the Paleozoic Era.

Natural Heritage elements at the Hubbard Cave PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Corynorhinus townsendii</i>	pale lump-nose bat	<b>G4T4</b>	<b>S2</b>			<b>FS/BLM</b>	<b>C</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** Pale lump-nose bats were documented using Hubbard Cave as a roosting site in 1994, and the occurrence was ranked fair (C). Historical sites of the pale lump-nose bat in Colorado seem to be abandoned or greatly reduced in size (Kirk Navo pers. comm.). Their abundance in Colorado is limited, with only 20 recent occurrences recorded in the state. This species is considered imperiled in Colorado (S2) because of the low number of individuals encountered for a colonial species, low population size, and high threats. This roosting site is of particular importance because human disturbance at caves, mine closures, deforestation, and urban and agricultural

practices have eliminated many traditional roosts making it difficult for bats to find replacement roosts in the time permitted by current rates of disturbance.

**Boundary Justification:** The planning boundary encompasses the cave, which should, if possible, be closed to human visitors, as well as the immediate area around the cave including likely water sources. The boundary does not include the feeding area of the pale lump-nose bat, the extent of which is difficult to define.

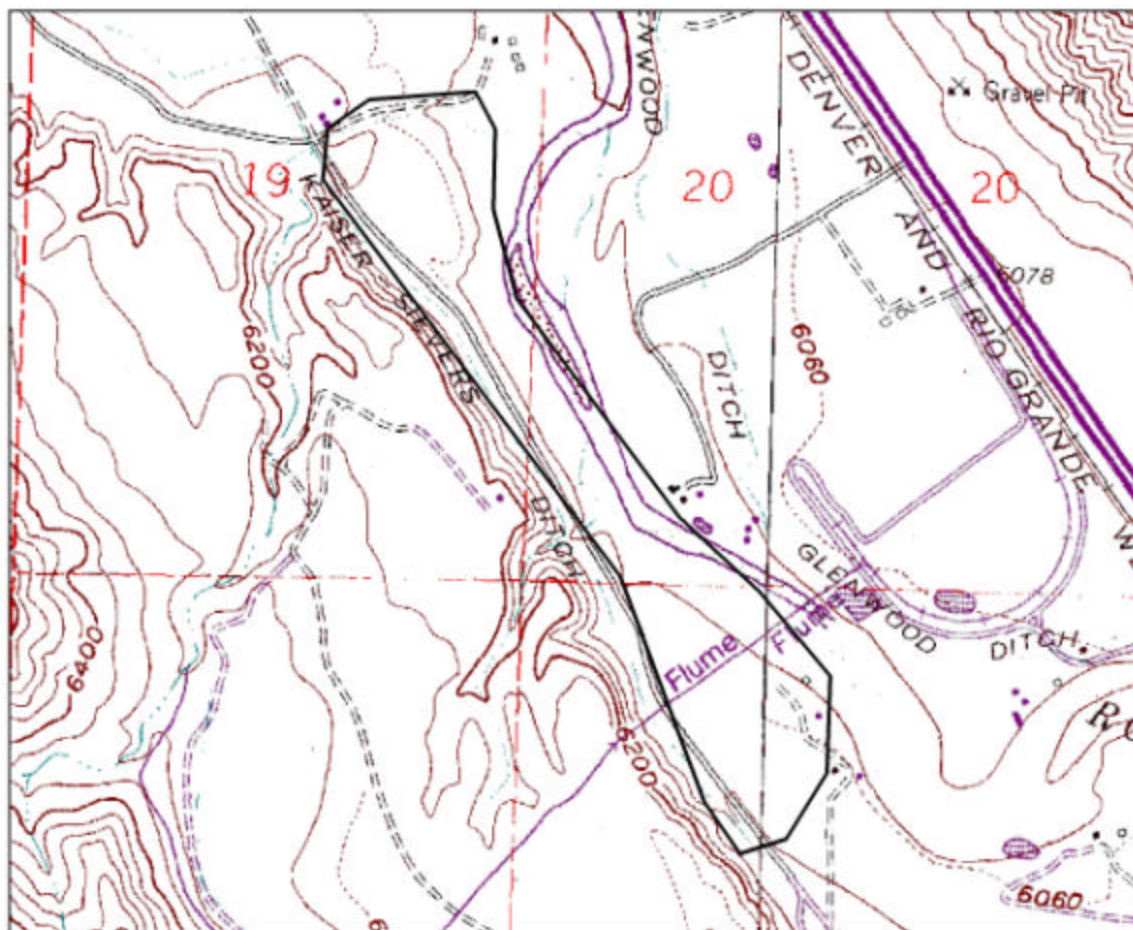
**Protection Rank Comments:** Frequency of use by recreational cavers at Hubbard Cave is high, and pale lump-nose bats are sensitive to human disturbance. This area is under the management of the White River National Forest. Forest Service management plans should consider the sensitive nature of this natural resource and special designation for this area would ensure conservation of this important bat roost.




**Management Rank Comments:** There is easy access to Hubbard Cave and cavers regularly use it. Maintaining a low visitation policy would reduce disturbance to the bats. Needs for the survival of pale lump-nose bats at this PCA include protection of the cave from disturbance (May to mid-September for maternity roosts, October-April for hibernacula), and evaluation of the cave for gate installation. Survey work to document patterns of bat use would assist in identifying if this is a maternity roost, hibernacula or general roosting site. See White and Seginak (1987) for gate designs for protecting caves. Gates can successfully limit human access and disturbance, but if poorly designed, gates may restrict bat access and result in population decline. Conditions for the bats can be improved by maintaining canopy cover in the immediate area, retaining large diameter snags and stands of old growth, avoiding heavy equipment and blasting near roosts and avoiding the use of chemical insecticides.



# Kaiser Stevens Ditch

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangle*</p> <p>Cattle Creek, 39107-D3          Carbondale, 39107-D2</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Kaiser Stevens Ditch Potential Conservation Area

**Biodiversity Rank: B5** General biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Two miles northwest of Carbondale, Colorado, in the Roaring Fork Valley

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Cattle Creek, Carbondale. T7S R88W S 19, 20, 29.

**Size:** 94 acres

**Elevation:** 6,000 to 6,200 feet

**General Description:** This site supports a small patch of riparian vegetation at an elevation of about 6100 feet. In the past, the riparian vegetation seen here stretched for miles along the Roaring Fork River. It is fragmented now by a county road on the west, and a housing/golf course development to the north. It is dominated by coyote willow (*Salix exigua*) stands interspersed with aquatic sedge (*Carex aquatilis*) and rush (*Juncus* spp.) meadows. This riparian area supports an occurrence of a globally vulnerable orchid subspecies.

Natural Heritage element occurrences at the Kaiser Stevens Ditch PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Limnorchis ensifolia</i>	Canyon bog orchid	<b>G4G5T3</b>	<b>S3</b>		<b>B</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site includes a good (B ranked) occurrence of a globally vulnerable (G4G5T3) orchid subspecies within a low quality riparian area. The canyon bog orchid grows in moist or wet soil in mountain meadows, marshes, swamps, fens, open or dense forests, on stream banks and open seepage, frequently about springs. It has a wide range, from Oregon to Mexico, but good habitat is limited. The orchid's survival depends on a reliable year-round supply of moisture.

**Boundary Justification:** This site is a fragment of a larger riparian community along the Roaring Fork. It is bounded by a county road and a housing/golf course development. The site follows these boundaries and only includes this small riparian patch and

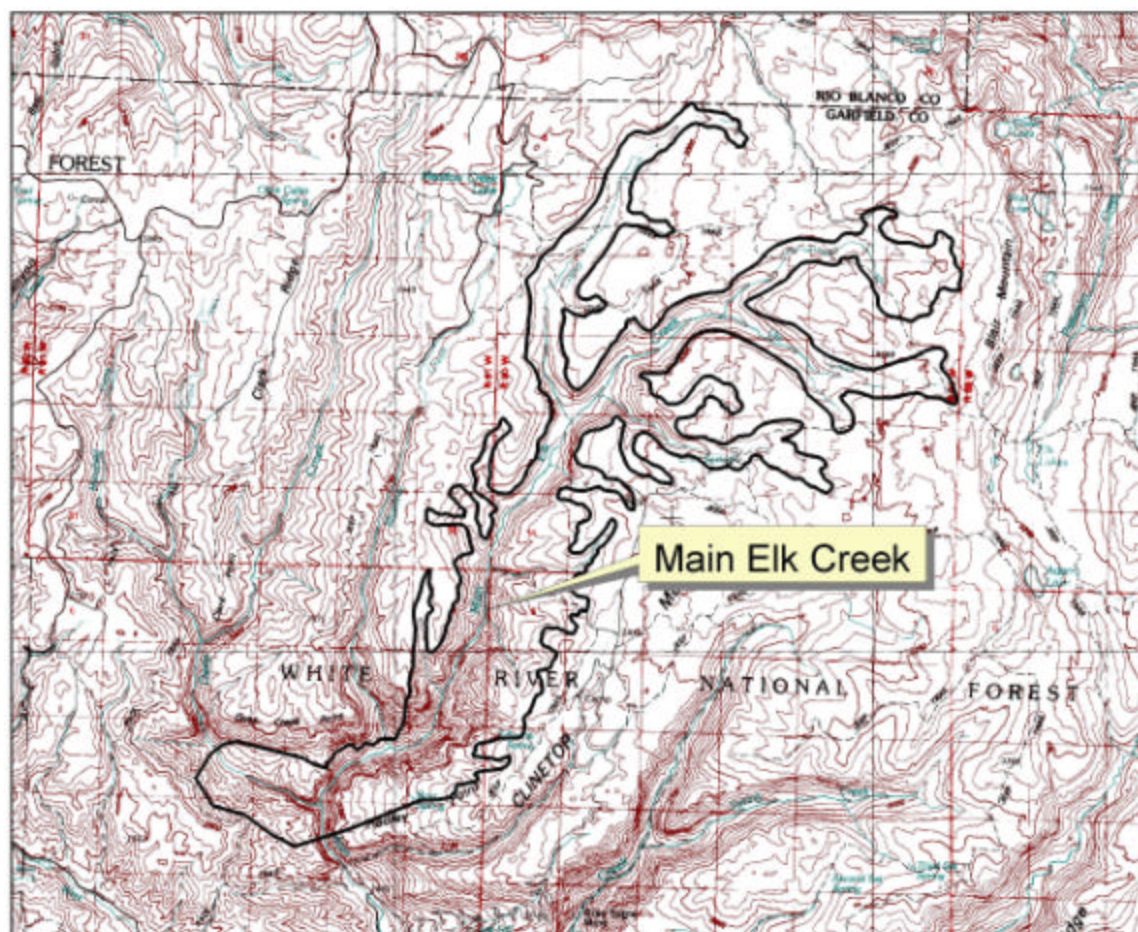
the rare plant occurrence. A larger area should be considered necessary to protect the hydrological setting at this site.




**Protection Rank Comments:** This site is privately owned. A golf course/housing subdivision is immediately adjacent to the site. This small area has been set aside as open space by the golf course designers. The small area is probably not currently threatened, but it may be developed in the future.

**Management Rank Comments:** A management agreement with the private land owner to provide protection for the rare plant species is recommended. This small area is not currently being used for human activities and management strategies should aim to continue this status. Due to the disturbances and complete habitat destruction surrounding this site, exotic plants such as hay grasses, thistles (*Cirsium* spp.), and sweetclover (*Melilotus officinale*) are common in this area and are moving into this site. At present, these species have not been found to occur with the canyon bog-orchid (*Limnorchis ensifolia*) and should be controlled to maintain this status. Road maintenance on County Road 109 may affect the site and should be considered in a management plan for this site. The orchids should be monitored every other year to detect changes in population size or condition.

# Main Elk Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--



## Main Elk Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Main Elk Creek is located approximately 7 miles north of the town of New Castle, CO and is within the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Blair Mountain; Deep Creek Point; Meadow Creek Lake. T3S R90W Sections 4, 5, 7-24, and 26-32; T3S R91W Sections 25 and 36; T4S R90W Sections 5-7, and 18; T4S R91W Sections 1, 11-16, and 21-23.

**Size:** 11,633 acres

**Elevation:** 6,400 to 10,800 feet

**General Description:** The lower portion of this site occurs in a beautiful, steep-sided limestone canyon with a narrow riparian area along the canyon bottom. The surrounding canyon walls are dominated by periodic Utah serviceberry (*Amelanchier utahensis*) and spruce-fir forest, while other upland areas have a prevalence of Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), and Gambel's oak (*Quercus gambelii*). The steep limestone walls create a cool, moist, and lush riparian area dominated by narrowleaf cottonwood (*Populus angustifolia*), chokecherry (*Prunus virginiana*), river birch (*Betula occidentalis*), blue spruce (*Picea pungens*), red-osier dogwood (*Cornus sericea*), thinleaf alder (*Alnus incana*), mountain willow (*Salix monticola*), sandbar willow (*S. exigua*), and Drummond's willow (*S. drummondiana*). The understory is composed of a diversity of herbaceous species. Further upstream, various willow species dominate the riparian areas while Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and aspen dominate the upland slopes. Main Elk Creek also supports a population of the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*).

Natural Heritage element occurrences at the Main Elk Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Betula occidentalis</i> /Mesic forb	Foothills riparian shrubland	G3	S2				E
<i>Picea pungens</i> / <i>Cornus sericea</i>	Montane riparian forest	G4	S2				A

<i>Salix drummondiana</i> /Mesic forb	Drummond's willow/Mesic forb riparian shrubland	G4	S4				B
<b>Fish</b>							
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3		SC	FS/BLM	E
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3		SC	FS/BLM	E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports an unranked (E) occurrence of the globally vulnerable (G3/S2) river birch/mesic forb (*Betula occidentalis*/mesic forb) foothills riparian shrubland, an excellent (A-ranked) occurrence of the state imperiled (G4/S2) blue spruce/red-osier dogwood (*Picea pungens*/*Cornus sericea*) montane riparian forest, and a good (B-ranked) occurrence of the common (G4/S4) Drummond's willow/mesic forb (*Salix drummondiana*/mesic forb) riparian shrubland. The site also contains two unranked (E) occurrences of a globally rare (G4T3/S3) fish subspecies, the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Cutthroat trout are a sensitive species that are native to the Colorado River Basin, and have recently been in decline. Remnant populations still remain in Colorado, Wyoming, and Utah. The genetic purity of the cutthroat at this site is rated B-.

**Boundary Justification:** The boundary encompasses all of Main Elk Creek and its tributaries upstream from the element occurrences. Thus, the floodplain and immediate watershed, which are necessary to protect hydrological sources and the ability of the creek's fluvial processes to continue flooding, scouring, and sediment deposition. These processes are necessary to ensure the long-term maintenance of the riparian ecosystems, including the fish populations.

**Protection Rank Comments:** Currently, the site is managed by the White River National Forest and has no special protection status. The White River National Forest Oil and Gas Environmental Impact Statement (USDA 1993) stipulates that there be No Surface Occupancy in the riparian zone. Oil and gas potential in the area is estimated to be low (USDA 1993). The area was proposed and evaluated as a Research Natural Area in 1995. This designation would protect the natural values of the site; however, it appears unlikely that Congress will make such a designation in the near future. The amended Forest Plan that is currently in progress could include some special protective status.

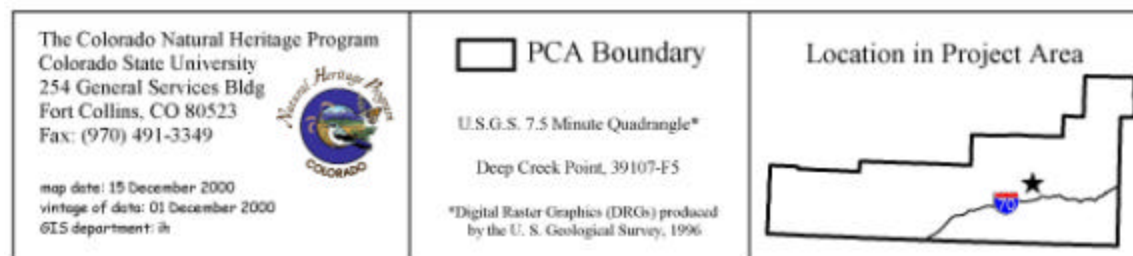
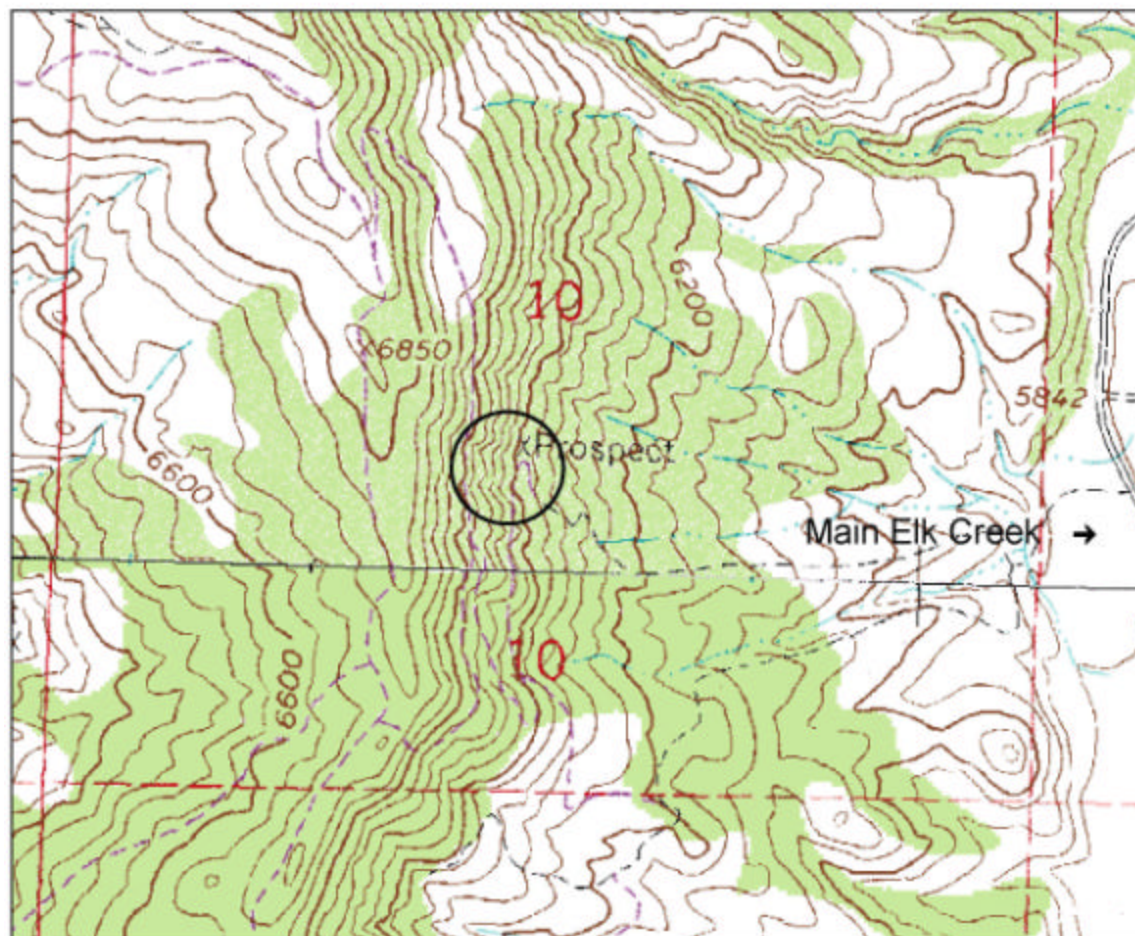
**Management Rank Comments:** Non-native species such as hound's tongue (*Cynoglossum officinale*), Canada thistle (*Cirsium arvense*), and timothy (*Phleum pratense*) are prevalent in some portions of the lower part of the site. The purity of the Colorado River cutthroat trout population needs to be reevaluated. There are several roads in the upper reaches that should be monitored for siltation. The U.S. Forest Service should consider removing rainbow trout from Meadow Creek Lake. Management should include locating and/or erecting a downstream barrier. Installation of fish barriers to prevent further migration of non-native trout into the cutthroat habitat, elimination of the



non-native brook and rainbow trout through chemical treatment, and transplanting genetically pure cutthroat into the rehabilitated habitat (Spahr *et al.* 1991) would assist in preserving this cutthroat population. Streamside grazing by livestock could change the hydrology of Main Elk Creek by increasing sedimentation and reducing streamside shrub cover, stream shade, and ultimately increasing water temperatures. Restricting grazing along Main Elk Creek would benefit the cutthroat trout population. Cutthroat trout are susceptible to overharvest if angling is unrestricted, so Colorado has instituted restrictive angling regulations. Strict enforcement of these regulations will help to ensure survival of this population of cutthroats.

# Main Elk Creek West

## Potential Conservation Area



## Main Elk Creek West Potential Conservation Area

**Biodiversity Rank: B5** General Biodiversity Significance. This potential conservation area contains an unranked occurrence of a bat species that is apparently secure globally, but rare in Colorado.

**Protection Urgency Rank: P2** A definable threat is expected in this PCA within the next five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to prevent loss of the element occurrence.

**Location:** This PCA is located 3.8 miles northwest of New Castle, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Deep Creek Point. T5S R91W, S10.

**Size:** 6 acres

**Elevation:** 6,381 to 6,667 feet

### General Description:

This potential conservation area rings the Teakee Mine and is located in piñon-juniper (*Pinus edulis-Juniperus* spp.) habitat associated with big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus* spp.). The riparian habitat of Main Elk Creek, located three quarters of a mile to the east, consists of a narrow leaf cottonwood forest (*Populus angustifolia*) while hay meadows occupy a floodplain terrace to the east. The piñon-juniper covered slopes and the mine are located on BLM land while the valley bottoms, including the riparian areas, hay meadows, and pastures are privately owned.

A number of geologic strata from the Cretaceous, Jurassic, Triassic, Permian and Pennsylvanian periods are visible here. Sandstones of the Dakota, Morrison, Entrada, Curtis, Chinle, State Bridge, Weber and Maroon formations are visible in the region surrounding this PCA. A group of pale lump-nose bats (*Corynorhinus townsendii*) was documented using the Teakee Mine as either a roosting site or hibernacula in October of 1997.

Natural Heritage elements at the Main Elk Creek West PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Corynorhinus townsendii</i>	pale lump-nose bat	G4T4	S2			FS/BLM	C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** Historical sites of the pale lump-nose bat in Colorado seem to be abandoned or greatly reduced in size (Kirk Navo pers. comm.). This species is

considered imperiled in Colorado (S2) because of the low number of individuals encountered for a colonial species, low population size, and high threats.

**Boundary Justification:** The boundary of this PCA protects specific habitat consisting of the Teakee Mine, a roosting site of the pale lump-nose bat, and adjacent areas surrounding the cave. The boundary does not include the feeding area of the pale lump-nose bat, the extent of which is difficult to define. The mine, should, if possible, be closed to human visitors. This roosting site is of particular importance because human disturbance at caves, deforestation, and urban and agricultural practices leave few alternatives for bats and they can not change roosts in the time permitted by current rates of mine closures.

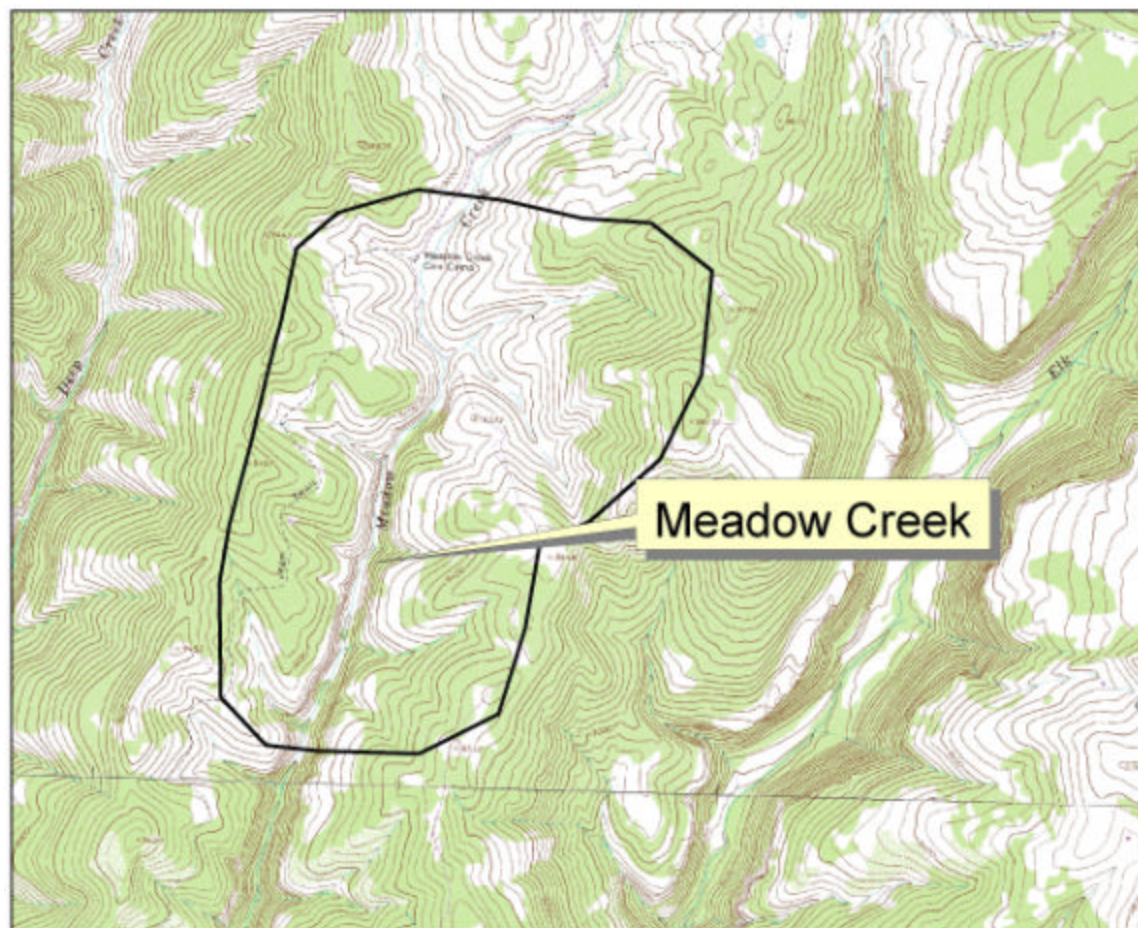
**Protection Rank Comments:** The mine is not gated and is open to exploration by the public. There is a sign on County Road 243 identifying the mine site and a jeep road only one-quarter mile in length leads directly to the mine. Sensitivity of the bats to disturbance by humans coupled with the area's high level of recreational activity and easy accessibility justifies special designation for this PCA. As a BLM sensitive species, the pale lump-nose bat should receive special consideration if any oil or gas development is planned.

**Management Rank Comments:** The mine is easily viewed and reached from an off road trail directly below it. Pale lump-nose bats are sensitive to human disturbance, and overuse by the public may force the bats to abandon this roost. This may be particularly damaging if the roost is actually a winter hibernacula. Removing the sign at County Road 245 identifying the mine's location would reduce traffic and help ensure continuation of the mine's use by pale lump-nose bats. Closing or blocking the BLM road leading to the mine and closing off the mine's entrance with a bat gate would also promote continued use by bats. Monitoring the bat population would aid in identifying both its size and how the population is using the mine.



# Meadow Creek at Deep Creek Point

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Deep Creek Point, 39107-F5  
Meadow Creek, 39107-G5

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Meadow Creek at Deep Creek Point Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This site is located approximately 12 miles north of the town of New Castle, CO within the White River National Forest. The site is also about 1 mile south of the Meadow Creek Cow Camp.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Meadow Creek Lake. T3S R90W Section 19; T3S R91W Sections 23-26, 35, and 36.

**Size:** 1,565 acres

**Elevation:** 9,000 to 9,700 feet

**General Description:** This portion of Meadow Creek is a small mountain stream near the creek's headwaters. At the confluence of numerous small drainages, where Meadow Creek forms, there is a fairly large reservoir, Meadow Creek Lake. Downstream from the reservoir, the creek cuts through a narrow limestone canyon. Above the canyon, willows (*Salix* sp.) mainly dominate the riparian area whereas within the canyon Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) increase in abundance. Large willow carrs, dominated by mountain willow (*Salix monticola*), Drummond's willow (*S. drummondiana*), and planeleaf willow (*S. planifolia*), also occur within the confines of the limestone canyon. Further downstream, conifers become the dominant overstory species.

Natural Heritage element occurrences at the Meadow Creek at Deep Creek Point PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix monticola</i> /Mesic forb	Montane riparian willow carr	G3	S3				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S3) mountain willow/mesic forb (*Salix monticola*/mesic forb) montane riparian willow carr. This association is only known from Colorado, where over thirty occurrences have been documented.



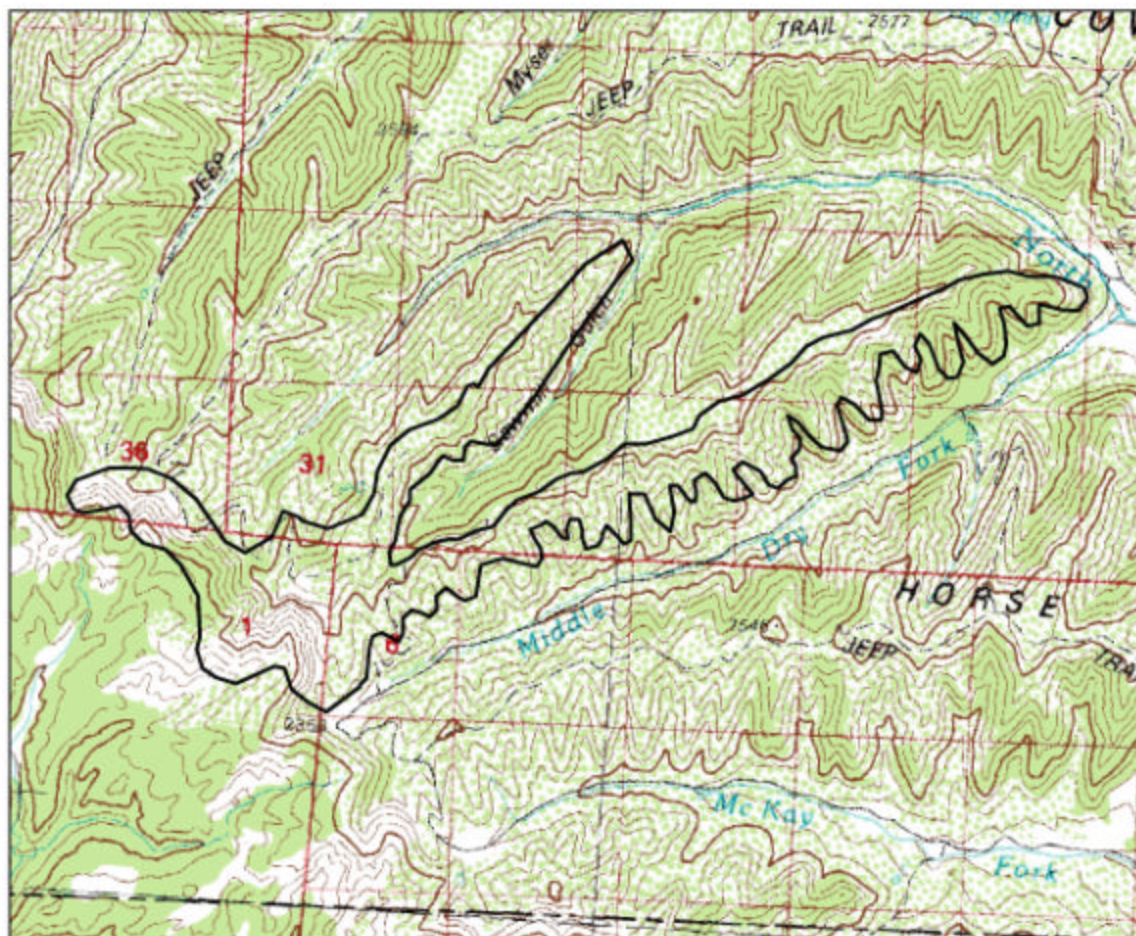
**Boundary Justification:** The boundary encompasses the entire riparian area along Meadow Creek and a portion of the adjacent slopes. However, upstream reaches of Meadow Creek were not included in the site boundaries. A comprehensive management/protection plan needs to consider these areas to ensure hydrological processes, which are necessary for the viability of the wetland and riparian elements, remain intact. The current boundaries allow fluvial processes along the creek to dynamically maintain riparian and wetland communities.

**Protection Rank Comments:** The site is managed by the White River National Forest and has no special protection status.

**Management Rank Comments:** Current management is adequate for the viability of the element. Some grazing is occurring upstream. The upstream reservoir impacts natural hydrological processes but the impacts currently appear to be minimal.

# Middle Dry Fork

## Potential Conservation Area



The Colorado Natural Heritage Program  
 Colorado State University  
 254 General Services Bldg  
 Fort Collins, CO 80523  
 Fax: (970) 491-3349



map date: 15 December 2000  
 vintage of data: 01 December 2000  
 GIS department: ih

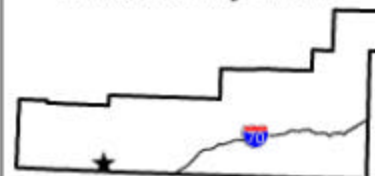
□ PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Grand Junction, 39108-A1

\*Digital Raster Graphics (DRGs) produced  
 by the U. S. Geological Survey, 1996

Location in Project Area



## Middle Dry Fork Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About 13 miles west northwest of DeBeque, Colorado, near the Garfield/Mesa county line.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Middle Dry Fork. T7S R100W S26-29, 31-34, 36; T8S R100W S5, 6; T8S R101W S1.

**Size:** 2,152 acres

**Elevation:** 6,800 to 8,564 feet

**General Description:** The Middle Dry Fork PCA is located on the steep hillsides above the Middle Dry Fork and Sawmill Gulch, both tributaries of the North Dry Fork, which in turn joins Dry Fork, and then Roan Creek a few miles north of DeBeque at the Garfield County line. It is comprised of loose shale slopes of the Green River formation, in a mixed mountain shrub zone. Both the Piceance bladderpod and the Arapien stickleaf were found on upper slopes, near the tops of the ridges. Associated plant species at the site were serviceberry (*Amelanchier utahensis*), chokecherry (*Prunus virginiana*), Colorado bedstraw (*Galium coloradense*), and Indian rice grass (*Oryzopsis hymenoides*). The site was documented by a private consultant, Mountain West, for BLM in 1988.

### Natural Heritage elements at the Middle Dry Fork PCA

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Lesquerella parviflora</i>	Piceance bladderpod	<b>G2G3</b>	<b>S2S3</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	Arapien stickleaf	<b>G3</b>	<b>S3</b>			<b>BLM</b>	<b>A</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Middle Dry Fork PCA contains excellent (A ranked) occurrences of two rare shale endemic plants. The Piceance Bladderpod is a globally imperiled (G2G3) Colorado endemic known only from Garfield and Rio Blanco counties, and one location in Mesa County. It is restricted to shale barrens of the Green River Formation. Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in

Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

**Boundary Justification:** The boundary is drawn to include the rare plant occurrences, which have several sub-populations, and the similar adjacent habitat on the steep Green River shale slopes above the Middle Dry Fork and Sawmill Gulch. This allows for movement or expansion of the populations over time as landslides open up new sites, and existing sites become more heavily vegetated.

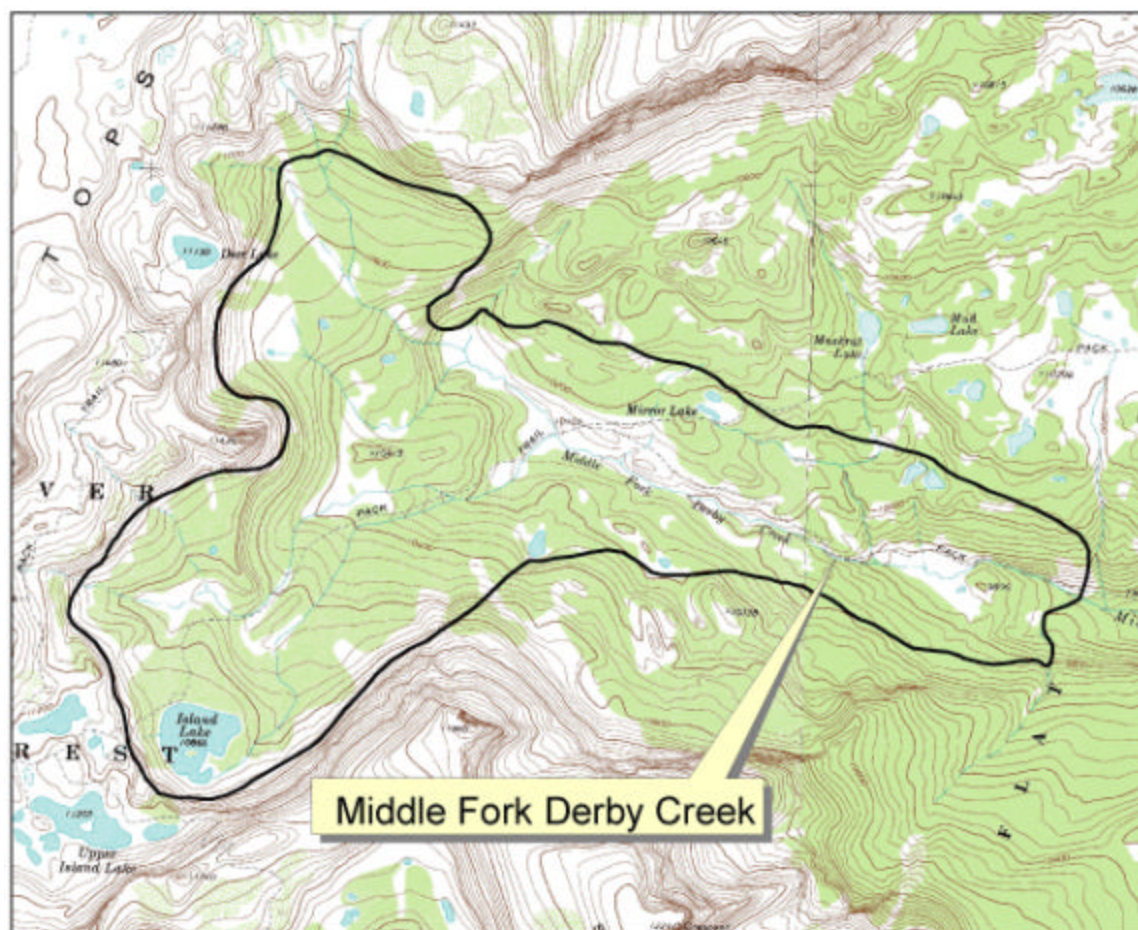
**Protection Rank Comments:** The site is located on BLM land, although access is controlled by the private lands along the Middle Dry Fork valley bottom. There do not appear to be immediate threats to the rare plant populations. If oil and gas development were to take place, the rare plants at this site could be impacted. Both the Piceance bladderpod and Arapien stickleaf are listed as sensitive species by BLM, and as such will be considered in an Environmental Assessment that would be required before any new developments were approved. In addition, their location on steep slopes, which carry No Surface Occupancy (NSO) stipulations, should protect them from direct disturbance. Although private land does not carry the same restrictions, it is probably not practical to drill on the steep shale slopes. However, roads and pipelines often are routed over these areas.

**Management Rank Comments:** No management needs are known. Cattle avoid the steep slopes with loose shale fragments. The erosion that occurs here is natural. Weedy species that are sometimes brought in to the level ridge tops around stock ponds, although undesirable, are not able to survive in the shale barrens, and do not pose a threat to the rare plants.



# Middle Fork Derby Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

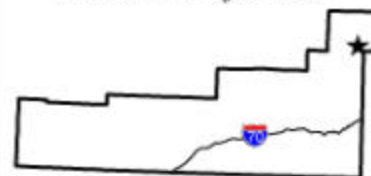
PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Dome Peak, 39107-H1  
Trappers Lake, 39107-H2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Middle Fork Derby Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P5** Land protection is adequate.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This site is located approximately 5 miles southeast of Trappers Lake within the Flat Tops Wilderness Area in the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Trappers Lake and Dome Peak. T1S R87W Sections 21, 22, 26-29, 32, and 33.

**Size:** 1,936 acres

**Elevation:** 9,700 to 11,000 feet

**General Description:** This site consists of a series of subalpine streams and beaver ponds surrounded by aspen (*Populus tremuloides*) and spruce-fir forests. The riparian areas are dominated by planeleaf willow (*Salix planifolia*), wolf willow (*S. wolfii*), Drummond's willow (*S. drummondiana*), marsh marigold (*Caltha leptosepala*), and marsh bittercress (*Cardamine cordifolia*). Beaked sedge (*Carex utriculata*), water sedge (*C. aquatilis*), and elephantella (*Pedicularis groenlandica*) dominate around the edges of the beaver ponds.

Natural Heritage element occurrences at the Middle Fork Derby Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<b><i>Salix planifolia/Caltha leptosepala</i></b>	<b>Subalpine riparian willow carr</b>	<b>G4</b>	<b>S4</b>				<b>A</b>
<i>Salix planifolia/Carex aquatilis</i>	Subalpine riparian willow carr	G5	S4				A
<i>Carex utriculata</i>	Beaked sedge montane wet meadow	G5	S4				A
<i>Carex aquatilis</i>	Montane wet meadow	G5	S4				A

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.



**Biodiversity comments:** The site supports two excellent (A-ranked) occurrences of common subalpine riparian willow carrs and two excellent (A-ranked) occurrences of common montane wet meadows.

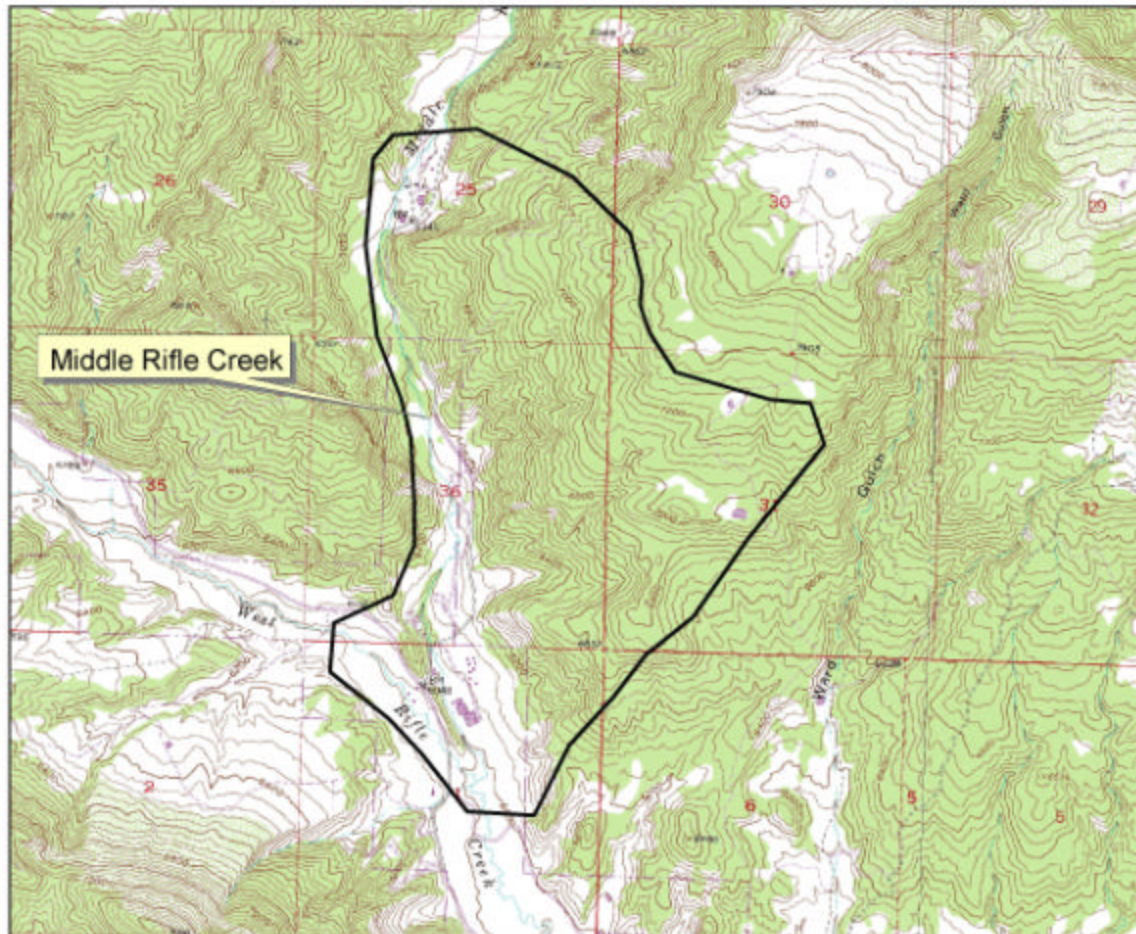
**Boundary Justification:** The boundary encompasses the entire upper watershed of Middle Fork Derby Creek. Thus, the floodplain and immediate watershed, which are necessary to protect hydrological sources and the ability of the creek's fluvial processes to continue flooding, scouring, and sediment deposition, are encompassed. These processes are necessary to ensure the long-term maintenance of the riparian ecosystem.




**Protection Rank Comments:** The site is currently within the Flat Tops Wilderness Area and is managed by the White River National Forest.

**Management Rank Comments:** There is some grazing and recreational use in the area but impacts appear to be minimal at this time.

# Middle Rifle Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Rifle Falls, 39107-F6          Horse Mountain, 39107-F7</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	--	--

## Middle Rifle Creek Potential Conservation Area

**Biodiversity Rank: B3** High Biodiversity Significance. This PCA contains a good occurrence of *Astragalus wetherillii* that is vulnerable both globally and within Colorado.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This PCA is located approximately five miles north of Rifle, Colorado just northwest of Rifle Gap Reservoir at the junction of County Roads 252 and 219.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Horse Mountain. T4S R92W, S30, 31; T4S R93W, S25, 26; T5S R92W, S6; T5S R93W S1.

**Size:** 1,321 acres

**Elevation:** 6,000 to 7,366 feet

### **General Description:**

This PCA contains many steep washes of sandstone leading down to Middle Rifle Creek. There is a mixture of riparian vegetation along Middle Rifle Creek and piñon-juniper woodland (*Pinus edulis-Juniperus* sp.) upslope. The woodland has a high diversity of shrubs, including sagebrush, Gambel's oak, serviceberry, mountain mahogany and skunkbrush (*Artemisia*, *Quercus*, *Amelanchier*, *Cercocarpus*, and *Rhus*). Portions of this PCA are on BLM land and within Rifle Gap State Wildlife Area, while the northern one third of the PCA is privately owned. Livestock presently graze both the private and BLM lands.

The PCA contains a complex mix of sedimentary sandstones from the Pennsylvania, Triassic, Cretaceous, Permian and Jurassic periods. There are also formations of Mancos shale from the Cretaceous.

A large population of Wetherill milkvetch (*Astragalus wetherillii*) estimated at over 200 individual plants occupies approximately 5 acres of the PCA. The population is in good condition except for weedy exotics at the edges and in smaller patches spread within the PCA. A previously reported population of the Gray Vireo (*Vireo vicinior*) was relocated during this survey. There is some discussion as to what species of vireo this population represents. The woodland has somewhat more brush than is often described for the Gray Vireo, but the authors are satisfied that these are indeed Gray Vireos. A state-rare snake, the western yellowbelly racer (*Coluber constrictor mormon*), was also observed along Middle River Creek in this PCA in 1999.

Natural Heritage elements at the Middle Rifle Creek site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Astragalus wetherillii</i>	<b>Wetherill Milkvetch</b>	<b>G3</b>	<b>S3</b>				<b>B</b>
<i>Vireo vicinior</i>	Gray Vireo	G4	S2B,SZN				B
<i>Coluber constrictor mormon</i>	western yellowbelly racer	G5T5	S3				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA contains a good (B ranked) occurrence of the globally vulnerable (G3S3) Wetherill milkvetch, a plant with only 38 known occurrences in seven western Colorado counties. There is one historical population from Utah. Threats to this species include gas and oil development, roads, erosion, and over-grazing. Breeding vireos were identified here in 1996 and verified by song during this survey. Breeding populations of the Gray Vireo have been recorded in at least 17 areas in Colorado, and are suspected in many more locales (Kingery 1998). Although considered globally secure, few breeding occurrences, lack of knowledge on population status, and limited range within the state, are all factors that contribute to the S2B rank in Colorado. A western yellowbelly racer was observed here in 1999. There are no quantitative data on abundance and trends of the western yellowbelly racer, but anecdotal observations suggest it is abundant in some places, with observations over many years in the same areas.

**Boundary Justification:** This site includes the plant occurrence and some additional adjacent suitable habitat to allow for additional individuals to become established over time. It also includes habitat along Middle Rifle Creek that provides for the western yellowbelly racer. The site boundary protects the arid shrubland and the dry open piñon-juniper woodlands, common nesting and foraging habitats of the Gray Vireo.

**Protection Rank Comments:** This PCA is partially owned by the state and protected as a wildlife area. Since the Gray Vireo population occurs on BLM land, similar protection through special designation is justified. The portion of this PCA consisting of BLM land is to be, or already has been, transferred to the Rifle Correctional Facility. The BLM and Rifle Correctional Facility should be encouraged to designate this area for non-use, which would benefit the imperiled milkvetch. Any plans to maintain this area as undeveloped by the correctional facility should be encouraged.

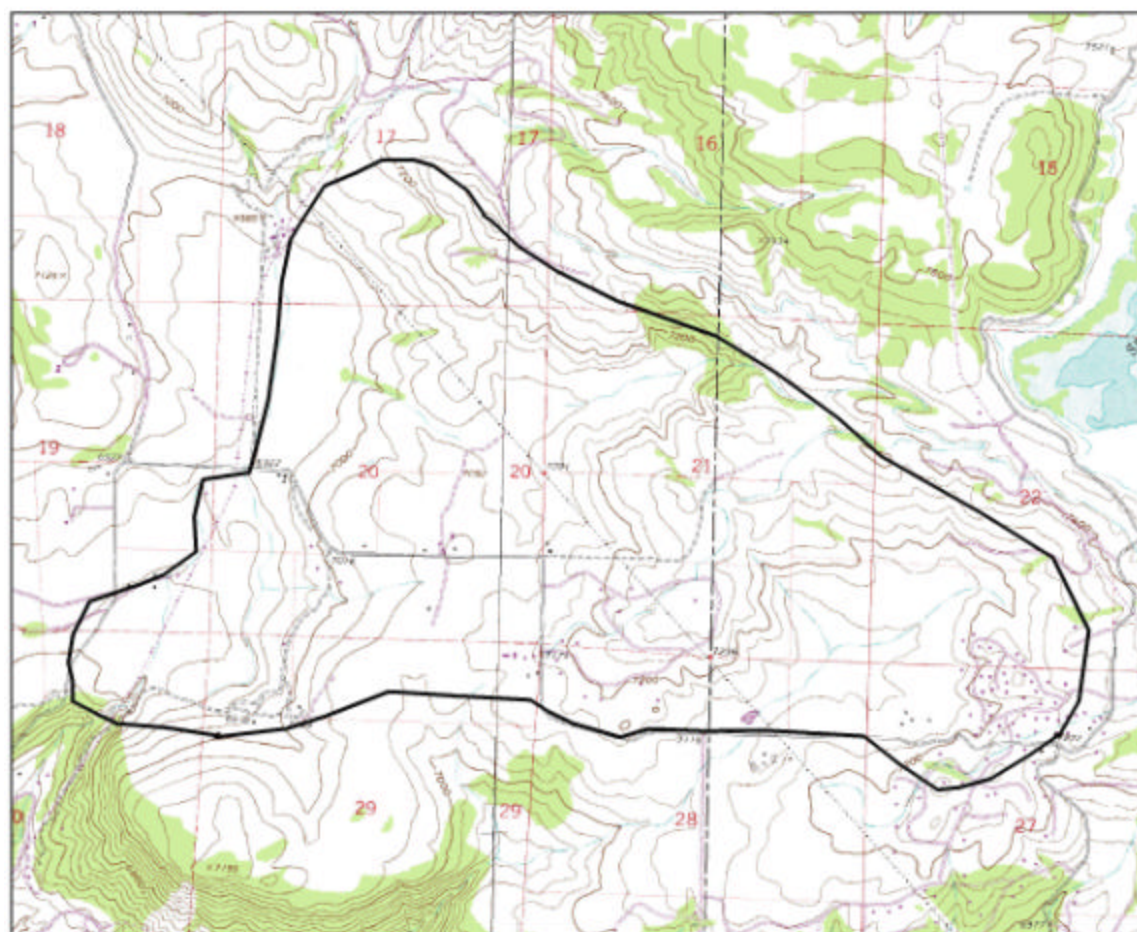
**Management Rank Comments:** Many areas of the site are remote, rugged, and only accessed by a rough four wheel drive road, making active management unnecessary. Grazing and the infestation of exotic species, however, could pose a threat to the milkvetch. Special designation for the known location of the plant would ensure long-term viability of the occurrence and a monitoring program would aid in identifying the impacts that disturbance have on the milkvetch population. Both cheatgrass and sweet clover occur along the roadsides of the PCA, with white sweet clover extending up the

washes. There are also patches of sweet clover spread within the population of Wetherill milkvetch. Control of these exotics would benefit the Wetherill milkvetch population. Historical management of piñon-juniper habitat may have negatively impacted the ecological integrity of this plant community over large areas (Ron Lambeth, pers. comm.), and consequently may impact the Gray Vireo. The occurrence of wildfire may exacerbate the problem of weedy invasion into this bird's habitat. Management of both the piñon-juniper woodlands and wildfire to prevent invasion of exotics would benefit this population of vireos.



# Missouri Heights

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Leon, 39107-D1  
Carbondale, 39107-D2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## Missouri Heights Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance

**Protection Urgency Rank: P1** The occurrence is immediately threatened.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** About four miles east northeast of Carbondale, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale, Leon. T7S R87W S 16, 17, 19-21, 28-30. (Garfield County portion only, more in Eagle County.)

**Size:** 1,453 acres

**Elevation:** 7,000 to 7,200 feet

**General Description:** The Missouri Heights PCA is characterized by rolling hills of sagebrush (*Artemisia tridentata*) shrublands with spectacular views of Mt Sopris and the Elk Range. The surrounding slopes are dominated by piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodlands; bottomlands have been converted for agricultural uses. About 50% of the sagebrush shrublands have been cleared for agricultural or residential developments. The remaining sagebrush is highly fragmented by residential development and associated roads, and/or degraded as a result of cattle grazing. Exotic grasses such as Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*) are spreading into the shrublands. High quality shrublands are difficult to find in this area. Harrington beardtongue (*Penstemon harringtonii*) is found in these relatively high quality areas as well as between residences where landscaping has spared the native vegetation. There are countless roads, and a power line that cross through the PCA.

Natural Heritage element occurrences at the Missouri Heights PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	Harrington beardtongue	G3	S3	FS/BLM	C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The PCA contains a fair (C ranked) occurrence of Harrington beardtongue, a globally vulnerable (G3S3) plant. The occurrence consists of twelve sub-populations, ten of which are in Garfield County, and two in Eagle County. The species is restricted to Colorado, and is found almost exclusively in sagebrush habitat. It is known from approximately 41 locations, centered around the town of Edwards in Eagle County. In general, Harrington beardtongue and its habitat are highly threatened, due to

agricultural, residential and recreational development. These threats, in addition to its restricted range, create an urgency for protection. This is a degraded PCA, containing a very degraded and fragmented, although extensive, occurrence of Harrington beardtongue.

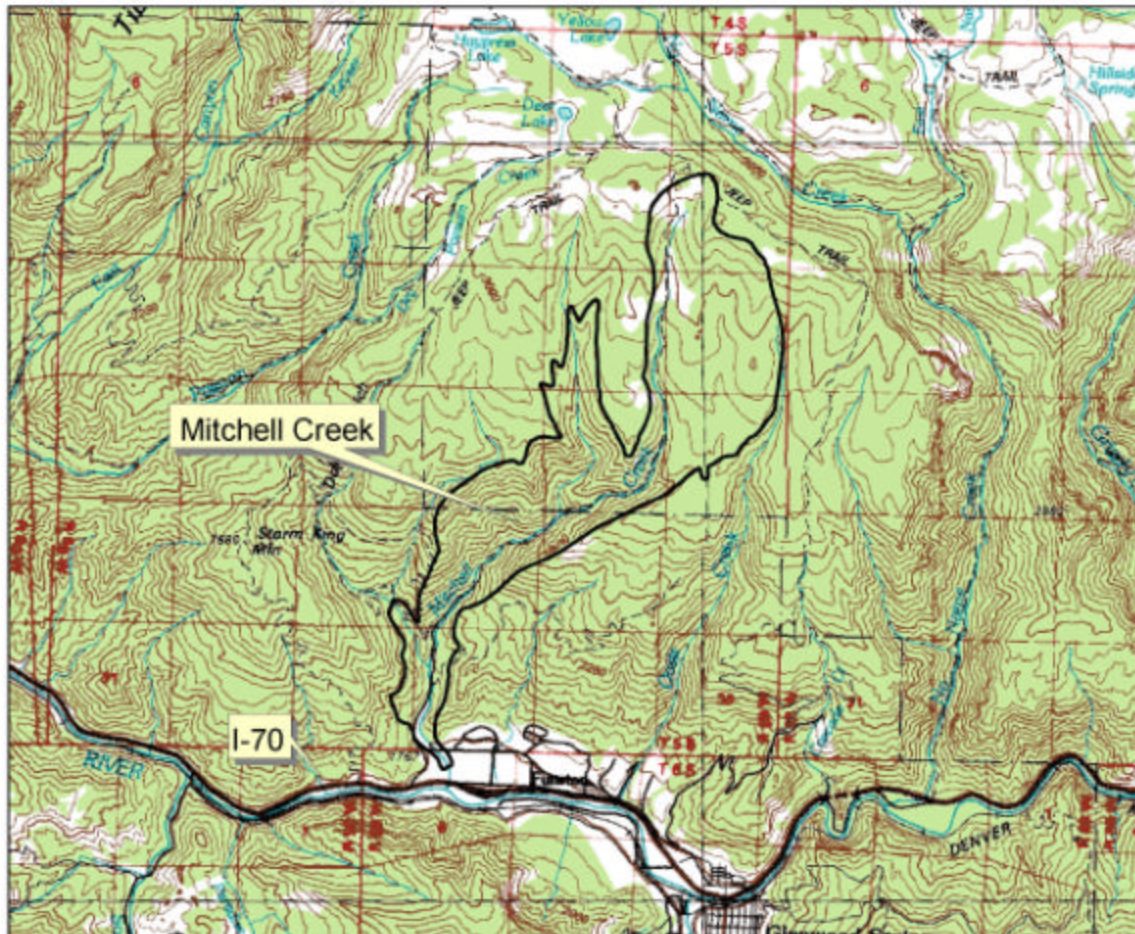
**Boundary Justification:** The primary threats to Harrington beardtongue at this PCA are residential development and heavy livestock grazing. The PCA boundary includes the occurrence of Harrington beardtongue and a buffer that is considered necessary to protect it from these direct disturbances. Indirect disturbances, such as unnatural erosion caused from upslope activities or the establishment of exotic species within the PCA, should be considered, but are not included within the PCA boundary.




**Protection Rank Comments:** This PCA is on private land, is heavily platted in areas, and includes an estimated 100 different landowners. This area is being developed very rapidly. Unless some protection such as a conservation easement is secured for the Harrington beardtongue population soon, this population will probably not survive.

**Management Rank Comments:** The primary threats to Harrington beardtongue at this PCA are residential development and heavy livestock grazing. A power line, several roads, and extensive housing developments occur in this PCA. Additional construction activities including the maintenance of the power line or of the roads may destroy, or further degrade, this PCA. Homeowners associations and county planners should be encouraged to institute strict landscaping guidelines that will allow Harrington beardtongue to survive in the remaining sagebrush. Roads and agricultural fields are introducing exotics such as yellow sweet clover (*Melilotis officinale*), smooth brome (*Bromus inermis*), and Kentucky bluegrass (*Poa pratensis*). Research is needed on the impacts of grazing (cattle, elk, and deer), and of habitat fragmentation on Harrington beardtongue.

# Mitchell Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	---	--

## Mitchell Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance. This PCA contains an excellent occurrence of a globally vulnerable plant community. Mitchell Creek also contains an excellent occurrence of a globally vulnerable fish subspecies.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** The Mitchell Creek PCA is located just north of Glenwood Springs Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Carbonate, Glenwood Springs, Storm King Mountain. T5S R89W Sections: 11-13, 22-24, 26-28, 33, 34; T6S R89W Section: 6.

**Size:** 2,894 acres

**Elevation:** 5,800 to 10,600 feet

**General Description:** The Mitchell Creek PCA is located along Mitchell Creek from just north of its confluence with the Colorado River, and extending to its headwaters in the White River National Forest. The bedrock is composed of Ordovician Formation, a mixture of dolomite, quartz, and Leadville limestone. The dominant vegetation in the area includes aspen (*Populus tremuloides*) forests and stands of Gambel's Oak (*Quercus gambelii*)

This PCA contains an excellent occurrence of the Colorado River cutthroat trout, a subspecies which is vulnerable in Colorado. It also contains unranked occurrences of Mixed Mountain Shrublands and Montane Grasslands, globally vulnerable community types, and the state rare Montane Riparian Forest.

The land owners include Bureau of Land Management and White River National Forest, as well as a small parcel of private land in the southern portion of the PCA. There do not appear to be any definable threats at this time.

Natural Heritage element occurrences at the Mitchell Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
Fish					
<b><i>Oncorhynchus clarki pleuriticus</i></b>	<b>Colorado River cutthroat trout</b>	<b>G4T3</b>	<b>S3</b>	<b>FS/BLM</b>	<b>A</b>
Plant communities					
<i>Quercus gambelii-Cercocarpus montanus/ Carex geyeri</i>	Mixed Mountain Shrublands	G3	S3		E
<i>Festuca idahoensis-Festuca thurberi</i>	Montane Grassland	G3G4	S3S4		E
<i>Picea pungens/ Cornus sericea</i>	Montane Riparian Forest	G4	S2		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This PCA contains an excellent (A ranked) occurrence of the globally vulnerable (G4T3S3) Colorado River cutthroat trout. Unranked (E) occurrences of three natural communities are also present. Cutthroat trout are a sensitive species that are native to the Colorado River Basin, and have recently been in decline. Remnant populations still remain in Colorado, Wyoming, and Utah. A waterfall in Mitchell Creek below the current cutthroat trout distribution prevents invasion by non-native trout, protecting the genetic purity (A+) of this population and increasing its conservation importance.

**Boundary Justification:** The PCA boundary represents the area required to support the long-term survival of the Colorado cutthroat trout in Mitchell Creek. It includes the headwaters and major tributaries, as well as an upland buffer to limit direct disturbance and local hydrologic alterations. Tributaries and the riparian areas are included because of their importance in maintaining bank stability to protect water quality.

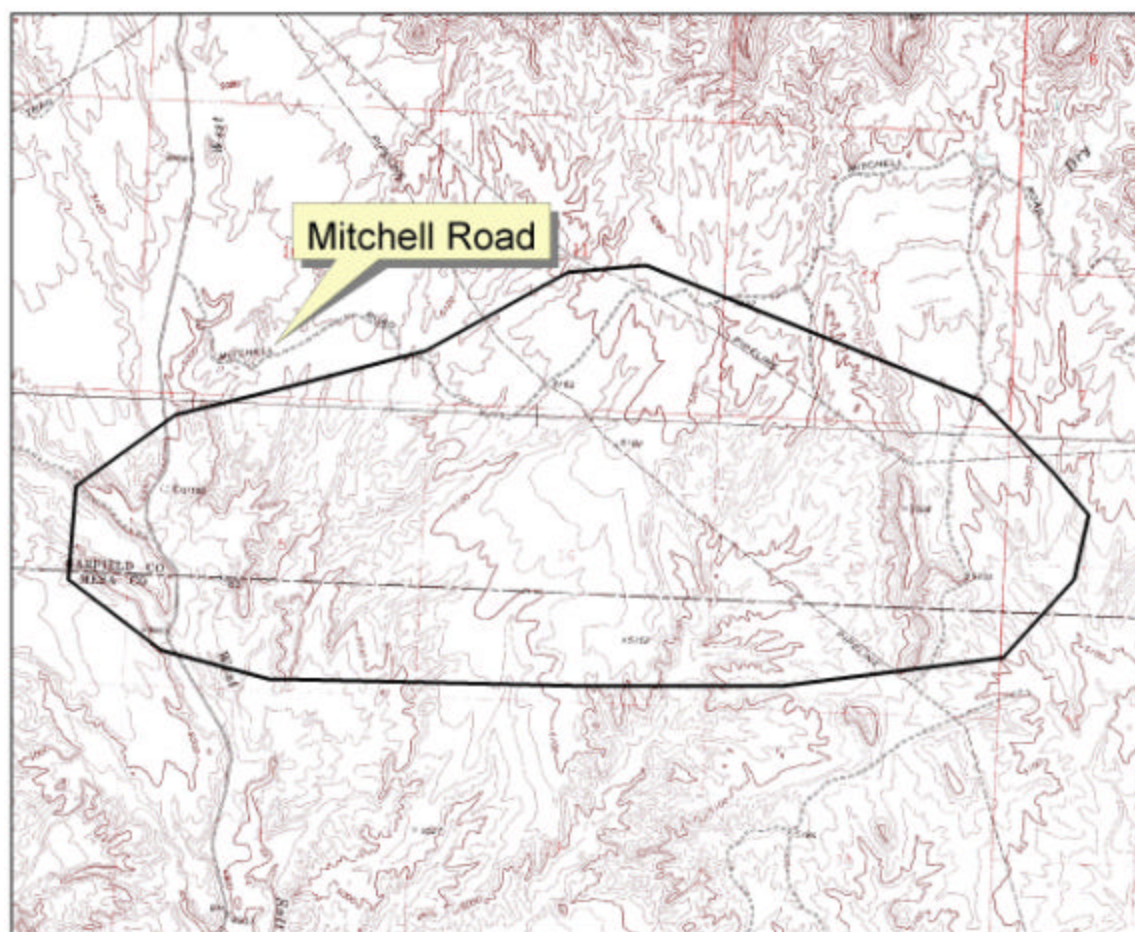
**Protection Rank Comments:** The PCA includes private, BLM and National Forest land. Part of Mitchell Creek that lies within the White River National Forest has been recommended as a Research Natural Area. The forest plan is now in the process of being revised, and this designation should be addressed in the new plan.

**Management Rank Comments:** Cutthroat trout are susceptible to overharvest if angling is unrestricted, so Colorado has instituted restrictive angling regulations. Strict enforcement of these regulations will help to ensure survival of this population of cutthroats.



# Mitchell Road

## Potential Conservation Area



0 0.5 1 Miles



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lsh

□ PCA Boundary

U.S.G.S. 7.5 Minute Quadrangles\*

Badger Wash, 39108-C8  
Carbonera, 39108-D8

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## Mitchell Road Potential Conservation Area

**Biodiversity Rank: B3** High diversity significance. The PCA contains an excellent occurrence of a globally vulnerable plant.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About 20 miles northwest of Fruita, Colorado, just east of the Baxter Pass Road.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Badger Wash and Carbonera. T8S R103W S7, 18; T8S R104W S10-16.

**Size:** 2,283 acres

**Elevation:** 5,000 to 5,280 feet

### **General Description:**

This PCA lies within the saltbush fans and flats characteristic of areas south of the Bookcliffs, and possesses a large percentage of bare ground. The PCA contains gently rolling hills of light gray clay soils derived from Mancos shale and a sparse cover of desert shrubs. Between the hills lie shallow draws and swales dominated by grasses. Several drainages that are dry most of the year run generally south to West Salt Creek. Two pipelines pass through the site, and Mitchell Road and Baxter Pass Road form the north and west boundaries.

Substrata of the area consists of unconsolidated alluvial and gravel deposits of the Quaternary period and older sedimentary deposits of Mancos shale from the Cretaceous period.

Vegetation in the PCA is salt desert shrubland dominated by shadscale (*Atriplex confertifolia*) and Gardner saltbush (*A. gardneri*), with a substantial amount of bare soil. Other common plants are pretty buckwheat (*Eriogonum bicolor*), snakeweed (*Gutierrezia sarothrae*), and Prince's plume (*Stanleya pinnata*). Major weed species in the site are cheatgrass (*Bromus tectorum*), yellow sweet clover (*Melilotus officinalis*), and Jim Hill mustard (*Sisymbrium altissimum*). Pipelines are visible from some distance because of the abundance of sweet clover, probably planted for revegetation. In some areas the grass understory is dominated by cheatgrass. The PCA in its entirety is on BLM land and is managed for watershed protection and livestock grazing.

Natural Heritage elements at the Mitchell Road site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Plants</b>							
<i>Eriogonum contortum</i>	<b>Grand buckwheat</b>	G3	S2			BLM	A
<b>Reptiles</b>							
<i>Gambelia wislizenii</i>	Long nose leopard lizard	G5	S1				B
<b>Mammals</b>							
<i>Cynomys leucurus</i>	White-tail prairie dog	G4	S4				C
<i>Cynomys leucurus</i>	White-tail prairie dog	G4	S4				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** There are recent observations of a rare plant, mammal, and lizard in this PCA.

The excellent (A ranked) occurrence of the globally vulnerable (G3S2) Grand buckwheat found during this survey is the largest, and possibly the only occurrence in Garfield County. Although one historic record of the buckwheat in Garfield County was mapped in Howard Canyon, it could not be located during this survey. The habitat in the mapped area was not suitable for the species. All other known locations of this species are in Mesa County, Colorado or Grand County, Utah. Thirty-two occurrences are known in Colorado (all but one in Mesa County) and thirteen in Utah. This PCA represents the northernmost occurrence of the plants. There were an estimated 10,000 plants in the site, covering about 160 acres

Two colonies of white-tailed prairie dogs were documented here during this survey. Although the populations appear healthy, the abundance of cheatgrass without dense native grasses suggests the area would never support a large population of prairie dogs. The White-tailed prairie dog is widespread in northwestern Colorado and is found in abundance in some colonies. The range includes approximately 15% of the State. There are few threats, and populations were increasing through the 1980s, probably due to termination of active poisoning campaigns in the late 1960s and 1970s. More recent data on population trends are unavailable, but numbers appear to be in decline. Only three colonies were found in Garfield County during this survey, and populations are smaller in Garfield County compared to Mesa County where prairie dogs are more abundant.

Colorado is the eastern margin of the range for the longnose leopard lizard and it occurs only in Garfield, Mesa, and Montezuma counties. Longnose leopard lizards were observed at this PCA in 1963, 1981 and again during this survey. There are 28 localities known in Colorado; however, repeated searches at occupied sites have revealed low numbers and suggested declines (Hammerson 1999). Although habitat is common, much of it shows reduced suitability due to cheatgrass. Because of the apparently low numbers, limited Colorado range, and threats from invasion of cheatgrass, the species is considered imperiled in Colorado.

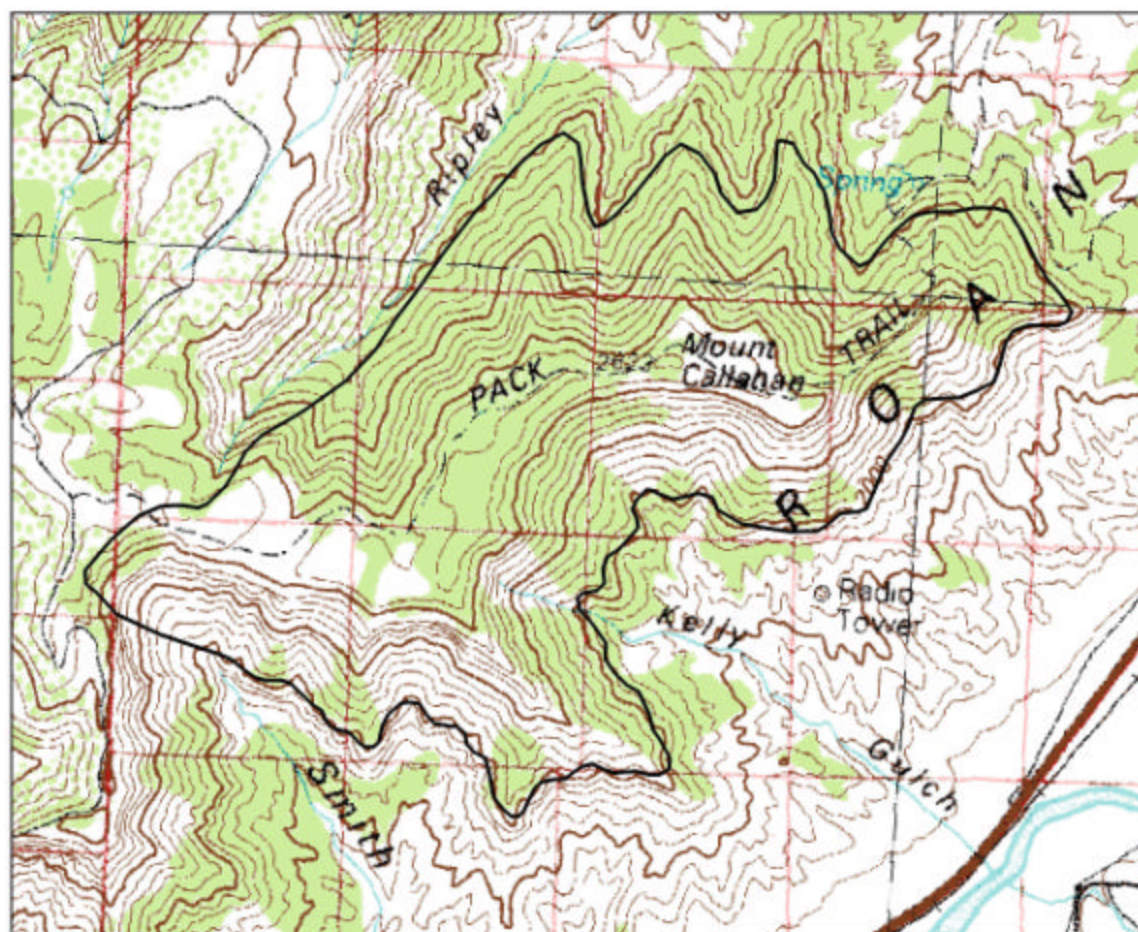
**Boundary Justification:** The boundary is drawn to include three sub-populations of Grand buckwheat, as well as nearby occurrences of the longnose leopard lizard and white-tail prairie dog. The habitat of all three species is the salt desert shrub community below the Book Cliffs. Adjacent habitat not included in the PCA may also support expansion of the buckwheat and prairie dog populations, and have conservation value.




**Protection Rank Comments:** The PCA is managed for livestock grazing, and oil and gas leasing is allowed. Status of the oil and gas development is unknown and any further development would negatively impact all rare species occupying the PCA. This PCA is just north of the Badger Wash State Natural Area in Mesa County, which is also a BLM Area of Critical Environmental Concern (ACEC), designated because of rare plants. Since the new Grand buckwheat population is as large and in as good condition as the one in the ACEC, this PCA would make a good addition to the ACEC and State Natural Area. This designation carries a No Surface Occupancy (NSO) stipulation for oil and gas development (USDI 1987).

**Management Rank Comments:** Key issues identified by BLM for the ACEC management plan are the effects of livestock grazing, oil and gas exploration and development, and other surface-disturbing activities on water quality in the Badger Wash watershed; and protection of sensitive plants (USDI 1992). Extending the management plan to this PCA would benefit the natural values found here as well. This would include posting the area as off limits to ORVs, and allowing no surface occupancy for oil and gas projects. A monitoring program for the rare plants is prescribed in the ACEC plan, and has been implemented by Colorado Natural Areas Program, with volunteer assistance from the Colorado Native Plant Society. The Grand buckwheat population in this PCA could be added to the monitoring program. Although cheatgrass (*Bromus tectorum*), Jim Hill mustard (*Sisymbrium altissimum*) and other exotic species are present, they tend to be along roads, in the bottomlands and on level areas, while the rare plants occupy hillside habitats, and are not presently impacted by weeds. However, cheatgrass interferes with lizard locomotion and both lizard and prairie dog foraging behavior, disrupting the long-term stability of both populations. Management practices favoring the shrublands of this PCA and their associated burrowing rodent populations, as well as recovery of cheatgrass invaded areas to native grasses and forbs would benefit both the longnose leopard lizard (Hammerson 1999) and the prairie dogs.

# Mount Callahan

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*          Grand Junction, 39108-A1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Mount Callahan Potential Conservation Area

**Biodiversity Rank: B1** Outstanding biodiversity significance

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** 2 miles west of Parachute, Colorado, and 7 miles northeast of DeBeque, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Red Pinnacle, Grand Valley. T7S R96W S8-11, 15-21, 28, 29; T7S R97W S24

**Size:** 3,459 acres

**Elevation:** 7,400 to 8,500 feet

**General Description:** The steep shale exposures on the south-facing slopes and cliffs of Mt. Callahan tower 2500 feet above the Colorado River and Interstate 70, about 15 miles downstream of Rifle, Colorado. These shale exposures provide important habitat for four rare plant species, and support the highest quality known occurrences of the critically imperiled Parachute Penstemon (*Penstemon debilis*). Surrounding the shale exposures, the more gentle slopes support high quality grasslands and sagebrush shrublands. Douglas Fir is found in north-facing ravines and scattered throughout the grassland. This site has been designated as a State Natural Area.

Natural Heritage element occurrences at the Mount Callahan PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plants</b>					
<i>Penstemon debilis</i>	Parachute penstemon	G1	S1	C	A
<i>Penstemon debilis</i>	Parachute penstemon	G1	S1	C	A
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2	BLM	A
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2	BLM	A
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		A

<i>Thalictrum heliophilum</i>	Sun-loving meadowrue	G3	S3		A
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		B
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		H
<i>Monardella odoratissima</i>	Mountain wild mint	G4G5	S2		B
<b>Plant communities</b>					
<i>Pseudoroegneria spicata</i>	Western slope grasslands	G2?	S2?		A
<i>Artemisia nova/Pseudoroegneria spicata</i>	Western slope shrublands	G5	S2?		A
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Pseudoroegneria spicata</i>	Western slope sagebrush shrublands	G5	S2		B
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos rotundifolius</i>	Western slope Douglas fir forest	G5	S4		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains five rare plant species which occur on the shale barrens of the Parachute Creek Member of the Green River Formation. The Green River Formation contains some of the largest oil reserves in the United States (Cronquist *et al.* 1972). This area shows a high rate of endemism in plants.

Of most concern is the critically imperiled (G1S1) Parachute penstemon, which was recently described in 1986, and seems to occur on only one outcrop of the Parachute Creek Member, the Mahogany Zone. There are only five known sites for this species, all in Garfield County. The two excellent (A ranked) occurrences in this site are the two best in the world.

Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

Three occurrences of Utah fescue are found in the PCA, including one ranked excellent (A ranked), observed in 2000. Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

Mountain wild mint is a bushy plant that grows to approximately one foot tall, and has foliage with a very strong and distinctive scent. It is distributed throughout western United States and Canada, but only known from 4 localities in Colorado, in Ouray, Montrose and Garfield counties.

The Mount Callahan PCA also supports three high quality plant communities that are adjacent to this shale barren rare plant location. All of these elements add to the wide range of biodiversity of Mount Callahan.



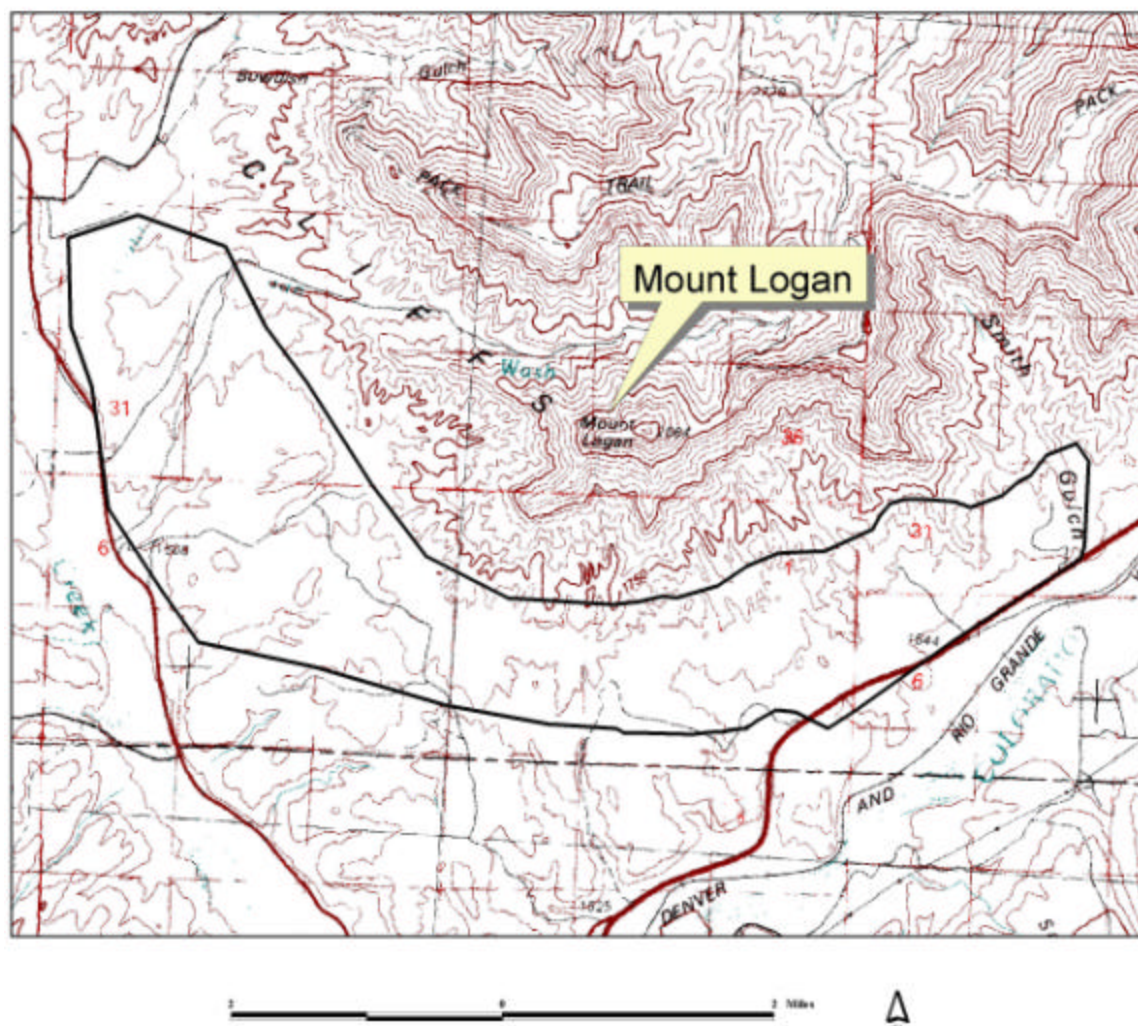
**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the Parachute penstemon. It includes all occurrences on the shale barrens and the community occurrences on the adjoining grasslands. A buffer is drawn which would protect the element occurrences from indirect and direct disturbances and to encourage the long-term integrity of the various plant communities at the site.




**Protection Rank Comments:** This site includes oil shale found in the Green River Formation. Mining of oil shale is a very destructive activity. Large amounts of rock must be processed to produce small amounts of oil. This process takes large quantities of water and also produces large amounts of waste material that must be deposited nearby. Oil shale is not cost effective to extract at this time. Occidental Oil Company (the owner of Mount Callahan) is not currently mining the area. However, the possibility of the renewal of extraction activities could be detrimental to the rare species and high quality communities of Mount Callahan. In order to protect this site and the area's natural features, surface disturbance by mining must be precluded. The site has been designated as a State Natural Area; however, this designation does not confer any legal protection. Nevertheless, the Natural Area boundaries should be adjusted to include both occurrences of the Parachute penstemon.

**Management Rank Comments:** Grazing should be permitted only with intense management. Element occurrences should be monitored every one to five years to detect changes in size and conditions. Threats should be monitored annually. There is a need to control the spread of cheatgrass (*Bromus tectorum*) which was noted in 1996 in just a few small patches. Cheatgrass should be removed before seed set to prevent further infestation.

# Mount Logan Foothills

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*          Grand Junction, 39108-A1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Mount Logan Foothills Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Three miles north of DeBeque, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Long Point, Red Pinnacle, DeBeque. T7S R97W S29-33; T8S R97W S1-6, 8-12; T7S R96W S31, 32; T8S R96W S5, 6.

**Size:** 6,729 acres

**Elevation:** 5,100 to 5,600 feet

**General Description:** Northeast of the town of DeBeque, between the Bookcliffs and the Colorado River, foothills of soft clay support a sparse shrubland of sagebrush and saltbushes, dotted with Utah juniper. Soils are derived from the Wasatch and Ohio Creek formations, with gravel and shale fragments on the surface. Many eroded gullies dissect the site, and carry seasonal flows from Mount Logan southeast to the Colorado River. The Uinta Basin hookless cactus is often found along the rims of these gullies. Deeper soils on the level uplands support a sagebrush community, while bottomlands often have greasewood. Sides of the gullies are drier, and are dominated by shadscale. In the upper drainages, there is a sparse piñon-juniper community. Other common plants in this part of the PCA include woody aster (*Xylorhiza venusta*), winterfat (*Kraschenninnikovia lanata*), bud sage (*Artemisia spinescens*), prickly pear cactus (*Opuntia polyacantha*), Moffatt's penstemon (*Penstemon moffattii*), fineleaf hymenopappus (*Hymenopappus filifolius*), yucca (*Yucca harrimanniae*), Wingate milkvetch (*Astragalus wingatanus*), great rushy milkvetch (*Astragalus lonchocarpus*), chainpod (*Hedysarum boreale*), Indian paintbrush (*Castilleja chromosa*), sand aster (*Chaetopappa ericoides*), Hood's phlox (*Phlox hoodii*), pallid milkweed (*Asclepias cryptoceras*), galleta (*Hilaria jamesii*), and cat's-eye (*Cryptantha flavoculata*). Where the soil has not been trampled by cattle, there is a healthy microbiotic crust.

Along the rims of some small canyons, bedrock is exposed, and a distinctive community composed of about equal parts of Utah juniper (*Juniperus osteosperma*), mountain mahogany (*Cercocarpus montanus*) and spiny horsebrush (*Foresellesia meionandra*) forms a narrow band. This is the habitat for the Naturita milkvetch (*Astragalus naturitensis*), which was found here for the first time in Garfield County in 2000. Other species in the rim habitat are Easter daisy (*Townsendia incana*), Yucca (*Yucca harrimanniae*), cat's eye (*Cryptantha flavoculata*), and snakeweed (*Gutierrezia sarothrae*). This community was in excellent condition, with no exotic species present.

The rim community occurs within the larger matrix of sagebrush and piñon-juniper woodlands.

Natural Heritage elements at the Mount Logan Foothills site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Plants</b>							
<i>Astragalus naturitensis</i>	Naturita milkvetch	G3	S3			BLM	B
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT			C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT			D
<b>Plant communities</b>							
<i>Juniperus osteosperma/ Forsellesia meionandra</i>	Utah juniper/ spiny horsebrush rimrock woodland	GU	SU				C
<b>Birds</b>							
<i>Amphispiza belli</i>	Sage sparrow	G5	S3B, SZN				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Mount Logan Foothills PCA contains the first known occurrence of the globally vulnerable (G3S3) Naturita milkvetch in Garfield County. The species is known from a total of 39 occurrences, including nearby Mesa County along the rim of the DeBeque Canyon, as well as from San Miguel, Montrose and Montezuma counties in Colorado, and a few populations in Utah and New Mexico.

The PCA also has two occurrences of the Uinta Basin hookless cactus, a species that is listed as threatened by the USFWS. One occurrence is comprised of five small sub-populations. The Uinta Basin hookless cactus is a regional endemic of western Colorado and adjacent Utah, with about 96 occurrences in Colorado and an estimated 7600 individuals (NatureServe 2000). It occurs in Delta, Garfield, Mesa, and Montrose counties. This species is a Federally listed threatened plant (LT). This site represents the northeastern extent of the plants' distribution. While the plants are less abundant here than in areas to the southwest, especially in Mesa and Delta counties, the edges of a species' range are thought to have added biological significance for genetic diversity.

The plant community found along canyon rims in this PCA is just now being described for the first time. It has been observed in several locations in Garfield and Mesa counties, as well as in Montezuma County. It occupies areas in the piñon-juniper zone where bedrock is exposed and soils are very poorly developed.

Sage Sparrows occur locally in the lower elevation sagebrush steppes of western Colorado (Andrews and Righter 1992, Ron Lambeth pers. comm.). There are less than 100 occurrences of this species in Colorado. There are at least 12 occurrences in Mesa County and perhaps more than 50 in Moffat county (Ron Lambeth pers. comm.). There are four records of Sage Sparrows dating to the late 1980s from western Garfield County. Breeding populations of Sage Sparrows are ranked S3B within the state because of a loss

in sagebrush shrubland habitat occurring throughout its range and the species' relatively low numbers.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of the Naturita milkvetch and Uinta Basin hookless cactus. The PCA encompasses the gently rolling area at the foot of Mount Logan. It circumscribes five sub-populations of the Uinta Basin hookless cactus, and a small amount of adjacent potential habitat that has not been surveyed. The suitable habitat is bordered by steep shale slopes on the northwest and flat valley bottomland on the southeast. The boundary of the PCA follows Smith Gulch on the east, the railroad on the southeast, a gravel road on the south, and the steep slopes of Mount Logan on the north.

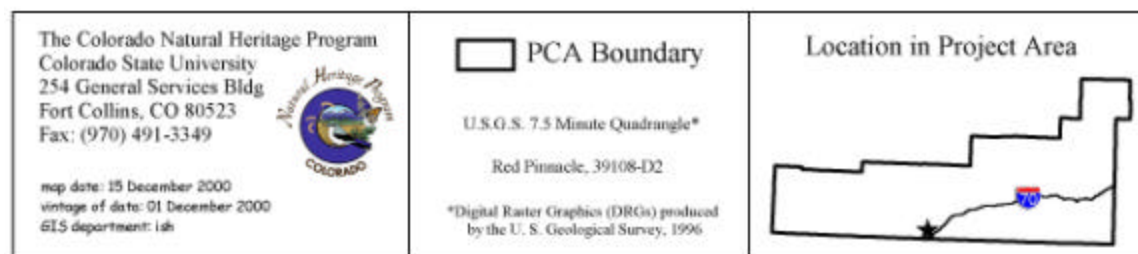
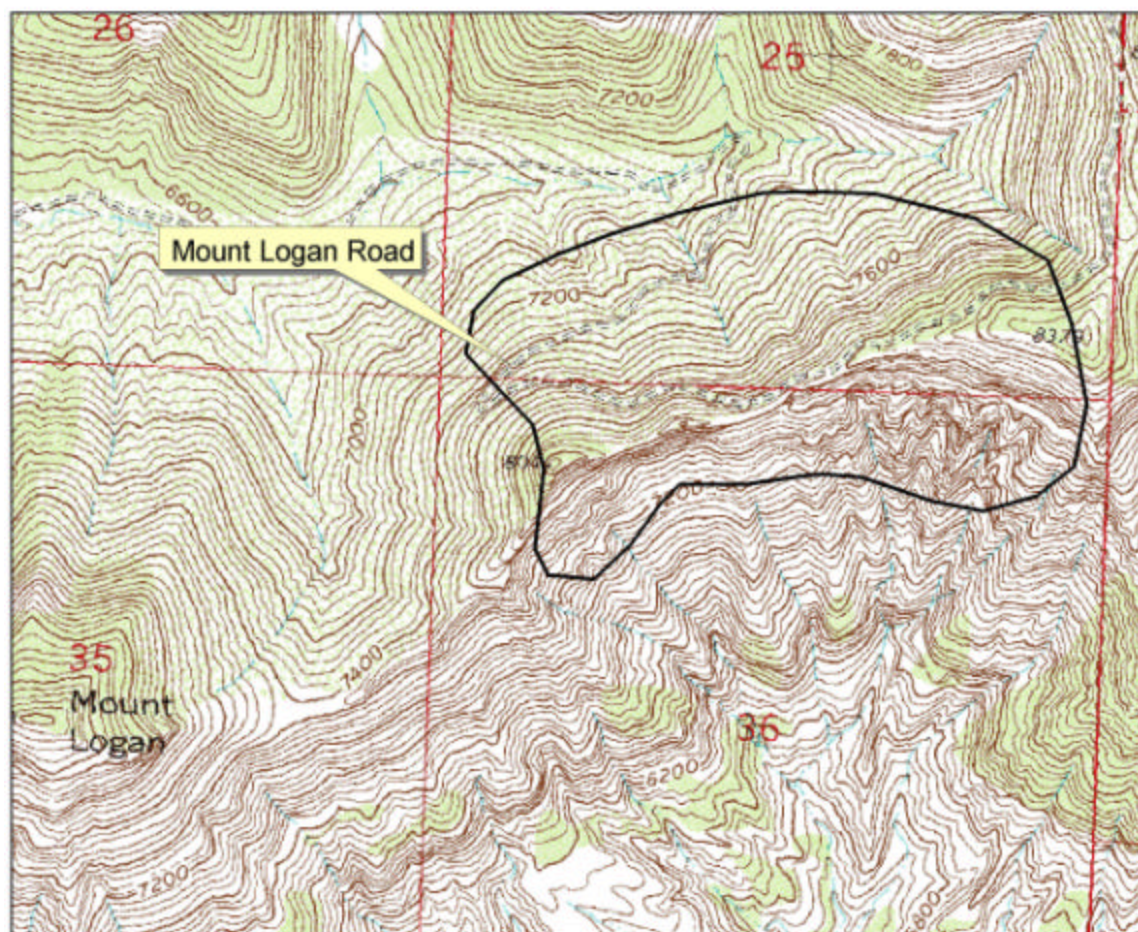
**Protection Rank Comments:** Although all of the Uinta Basin hookless cactus locations that are known in the site are on BLM land, adjacent private land also contains suitable habitat and could be subject to development or other potentially damaging land uses. The BLM is aware of the locations of the Uinta Basin hookless cactus in this site, and the federal threatened status of the species should ensure that the plants and their habitat are protected. The BLM's Oil and Gas EIS (USDI 1999) stipulates No Surface Occupancy (NSO) for locations of threatened or endangered species. Naturita milkvetch is a BLM sensitive species, and its locations carry a Controlled Surface Use (CSU) stipulation for oil and gas development (USDI 1999). However, merely protecting the exact location of individual plants will not assure the survival of the population, as additional adjacent habitat will be needed for the establishment of new individuals over time.

**Management Rank Comments:** Much of the area within the PCA has been impacted by oil and gas development, roads, and grazing. The area where the Uinta Basin hookless cactus was found is grazed, but in many places has an intact, healthy cryptobiotic soil crust. The site is not particularly weedy, but does have some cheatgrass and yellow sweetclover. The position of many of the cactus plants under shrubs suggests that trampling by livestock may limit their survival in more open sites. BLM has an ongoing monitoring program for the cactus plants in this site, although the monitoring frequency is limited by staff time available.



# Mount Logan Road

## Potential Conservation Area





## Mount Logan Road Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** Six miles northeast of DeBeque, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Red Pinnacle. T7S R97W S25, 36.

**Size:** 230 acres

**Elevation:** 7,000 to 8,044 feet

**General Description:** This site includes the roadside of a narrow dirt road that switchbacks up Mt. Logan.. The site is an unnatural one for the Parachute penstemon, Arapien stickleaf and Utah fescue, which normally grow on steep south facing slopes. In this site, the roadcut exposes the Green River shale on a north facing slope that, except for the roadcut, is heavily vegetated. The Utah mountain lilac, on the other hand, is at home in the dense growth of shrubs above the roadcut. Over 100 large plants of this species were counted in a small area with a diverse assortment of mountain shrubs including Gambel's oak, serviceberry, snowberry, bitterbrush, mountain mahogany, currant and wild rose.

Natural Heritage element occurrences at the Mount Logan Road PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon debilis</i>	Parachute penstemon	G1	S1	C	C
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S2	BLM	C
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3		E
<i>Ceanothus martinii</i>	Utah mountain lilac	G4	S1		B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site includes four rare plant species which occur along a roadside.

This is one of only five locations worldwide for the critically imperiled (G1S1) *Penstemon debilis*, all in Garfield County. Although this is a small occurrence, ranked fair (C) in an unnatural habitat, the few extant occurrences of this species make this a

very highly significant site. Adjacent south facing slopes were surveyed in 2000, but no new populations of the penstemon were found.

Arapien stickleaf is a globally vulnerable species that is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

The Utah fescue occurrence, although unranked, was confirmed in 1996. Utah fescue is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County.

Utah mountain lilac (or Martin *Ceanothus* as it is sometimes known) occurs from eastern Nevada to southwest Wyoming, south to northwest Arizona and east to Colorado. It is known from five locations in Colorado, in Garfield and Rio Blanco counties. The Garfield County populations represent the eastern extent of its range.

**Boundary Justification:** The site includes occurrences of four rare plant species on a roadcut and a small buffer up and downslope of the road. Because the adjacent habitat outside the roadcut is not suitable for the species, additional area was not included.

**Protection Rank Comments:** The PCA is privately owned by Occidental Oil Company. The road which supports the rare plants is used by oil company personnel and grazing lessees. Protection for the plants is essential because the few occurrences existing put the species at great risk of extinction.

**Management Rank Comments:** Oil shale mining operations and the associated road traffic threaten this site. A management agreement should be reached with Occidental Oil Company that will prevent damage by road maintenance. There is some invasion of an exotic species, smooth brome (*Bromus inermis*) along the roadside. However, spraying for roadside weeds is not advised.

# No Name Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

□ PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## No Name Creek Potential Conservation Area

**Biodiversity Rank: B2** Very high biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** The site is located approximately 1 mile northeast of Glenwood Springs, CO, within the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Glenwood Springs and Carbonate. T4S R88W Sections 29, 31, and 32; T4S R89W Sections 33-36; T5S R88W Sections 5-8, 17-20, and 29-32; T5S R89W Sections 1-3, 11, and 12; T6S R89W Section 2.

**Size:** 7,851 acres

**Elevation:** 6,000 to 10,700 feet

**General Description:** This is a very large site that encompasses the entire watershed for No Name Creek, which is used by the City of Glenwood Springs for their city water supply. The lower reach of the creek is dominated by a dense and diverse overstory of trees and shrubs including narrowleaf cottonwood (*Populus angustifolia*), Douglas fir (*Pseudotsuga menziesii*), river birch (*Betula occidentalis*), red-osier dogwood (*Cornus sericea*), black twinberry (*Lonicera involucrata*), Rocky Mountain maple (*Acer glabrum*), and thimbleberry (*Rubus parviflorum*). Upland slopes along the lower reach are very steep and mainly covered with scattered Douglas fir. Non-native species such as orchard grass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*) are fairly abundant in this area. Upstream, above the narrow limestone canyon (approx. 6 miles), the vegetation changes to a riparian system more typical of subalpine environments. These subalpine areas have gentler upland slopes dominated by Engelmann spruce (*Picea engelmannii*) and aspen (*Populus tremuloides*). The riparian areas are dominated by Drummond's willow (*Salix drummondiana*), planeleaf willow (*S. planifolia*), and a variety of herbaceous species. About 3 miles upstream from the mouth of No Name Creek, an aqueduct dumps water, from nearby Grizzly Creek to the east, into No Name Creek to supplement Glenwood Springs' city water supply.

Natural Heritage element occurrences at the No Name Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Populus tremuloides</i> / <i>Ceanothus velutinus</i>	Aspen forests	<b>G2G3</b>	<b>S2S3</b>				<b>B</b>
<i>Populus angustifolia</i> / <i>Cornus sericea</i>	Narrowleaf cottonwood riparian forest	<b>G4</b>	<b>S3</b>				<b>B</b>
<i>Salix drummondiana</i> / Mesic forb	Drummond's willow deciduous alluvial shrubland	G4	S4				B
<i>Salix drummondiana</i> / Mesic forb	Drummond's willow deciduous alluvial shrubland	G4	S4				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports one good (B-ranked) occurrence of the globally vulnerable plant community with aspen and sticky laurel (*Ceanothus velutinus*), a good occurrence of the state rare (G4/S3) narrowleaf cottonwood/red-osier dogwood (*Populus angustifolia*/*Cornus sericea*) riparian forest, and two good (B-ranked) occurrences of the common (G4/S4) Drummond's willow/mesic forb (*Salix drummondiana*/mesic forb) deciduous alluvial shrubland.

**Boundary Justification:** The boundary encompasses the entire No Name Creek watershed and thus, ensures continued hydrological flow and allows natural fluvial processes to dynamically maintain the riparian plant communities found at this site.

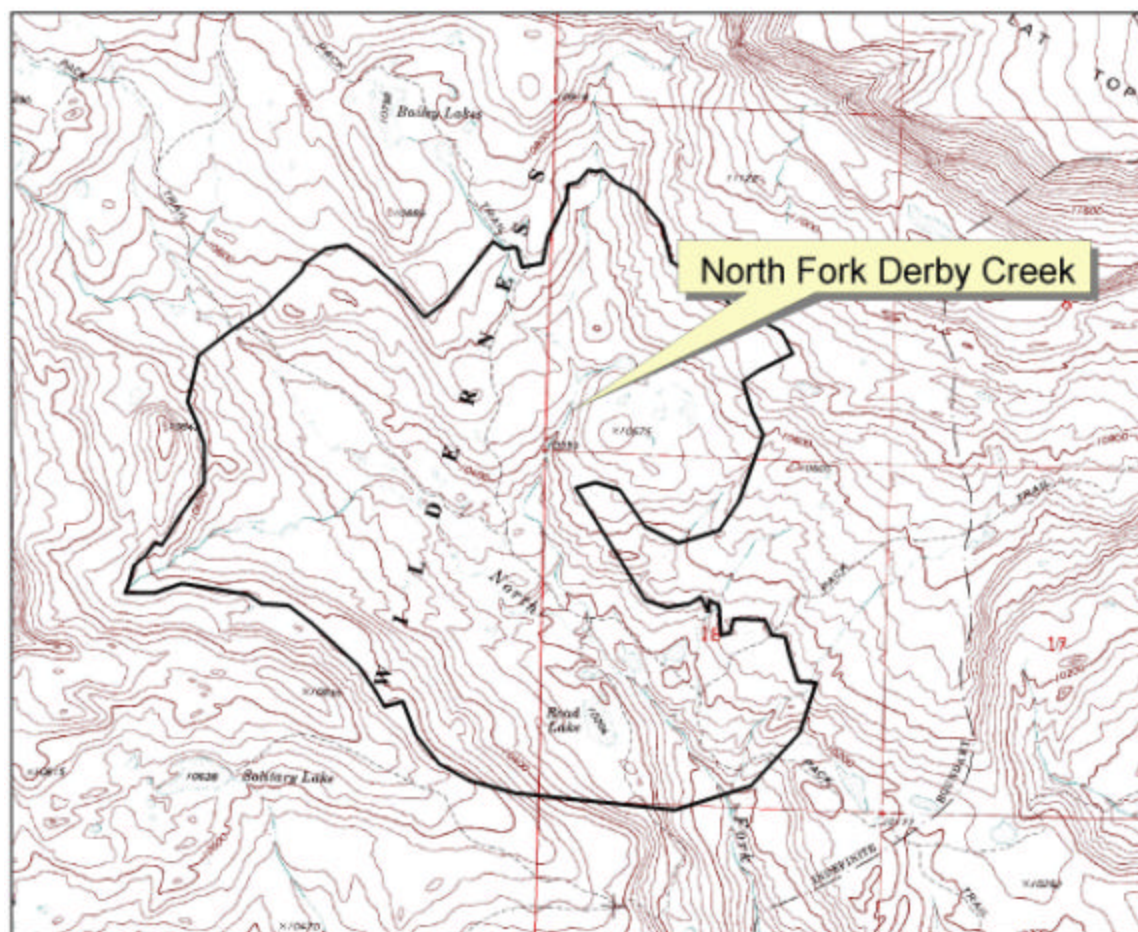
**Protection Rank Comments:** The site is managed by the White River National Forest. The site is currently managed for the City of Glenwood Springs' water supply.

**Management Rank Comments:** There is heavy recreation along the lower reach of the creek, where hiking and horseback riding are prevalent. Non-native species are abundant in this area due to these activities. Upstream, recreational use such as hunting and camping occurs.



# North Fork Derby Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

□ PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Dome Peak, 39107-II1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## North Fork Derby Creek Potential Conservation Area

**Biodiversity Rank: B3** High Biodiversity Significance.

**Protection Urgency Rank: P5** This PCA is entirely contained within the Flat Tops Wilderness Area and protection is complete.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This PCA is located approximately 14.5 miles southwest of Yampa, Colorado and approximately 0.5 miles south of Bailey Lakes.

**Legal description:** U.S.G.S. 7.5 minute quadrangle: Dome Peak. T1S R86W, S7, 18; T1S R87W, S12-14.

**Size:** 1,354 acres

**Elevation:** 9,970 to 10,732 feet

### General Description:

This PCA lies within the Flat Tops Wilderness Area of the White River National Forest approximately 1.5 miles from the nearest trailhead at Stump Park. The remoteness of this PCA leaves it free of disturbance. The site encircles a high altitude wet meadow and totals 1,354 acres, lying between 9,970 and 10,732 feet.

The wetland occupies a level floodplain terrace along North Fork Derby Creek and the PCA boundary includes forested areas upslope of the meadow and creek. The meadow includes a rich assemblage of grasses, sedges and rushes common to mesic alpine meadows. The slopes rising from the meadow are forested with spruce-fir (*Picea* sp.-*Abies lasiocarpa*) and aspen (*Populus tremuloides*).

The substratum of the area consists of unconsolidated colluvial deposits from the Quaternary period formed by landslides. Sedimentary rock including sandstone and siltstone dating to the Tertiary period are found at higher elevation.

The sole species responsible for this PCA's designation is the boreal toad (Southern Rocky Mountain population). A single boreal toad was observed here in August 2000, without evidence of breeding.

Natural Heritage elements at the North Fork Derby Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<i>Bufo boreas</i> <i>population 1</i>	<b>Boreal toad (Southern Rocky Mountain population)</b>	<b>G4T1Q</b>	<b>S1</b>	<b>C</b>	<b>E</b>	<b>FS</b>	<b>D</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** This PCA includes the boreal toad (Southern Rocky Mountain population), an amphibian that is critically imperiled in the state and imperiled on a global scale (G4T1QS1). The actual occurrence, however, is rated poor (D). Determination of the size and breeding status of the population is essential. This lack of knowledge contributes to the low ranking of the boreal toad occurrence.

A single adult boreal toad was observed in the wetlands along Derby Creek here in 2000. There were approximately 206 historic localities for the Boreal Toad in Colorado. Presently, only three to four healthy populations exist in Colorado, composed of less than 20 high priority breeding occurrences. None of these breeding sites are known from Garfield County and there are only 4 historical records of boreal toads in Garfield County, the most recent observation dating to 1994. Populations have declined precipitately or disappeared over the past 20 years, and continue to decline. The reasons for the decline are unknown; however, the chytrid fungus, a fungal skin infection, has recently been implicated in present declines.

**Boundary Justification:** The boundary rings the ponds and wetlands of the area, encompasses downstream riparian communities, and includes buffers on the adjacent slopes. This is intended to protect riparian and wetland vegetation and adjacent forests for the toads. The current hydrologic processes are necessary to allow persistence of the toads and hydrologic modifications to the wetland and the upper watershed supplying it should be avoided. Forces outside of the boundary, however, are likely to impact site quality. In addition, dispersing individuals may travel outside of the boundaries.

**Protection Rank Comments:** The PCA is managed by the U.S. Forest Service and protected as wilderness.

**Management Rank Comments:** Further survey work is required to determine the size, reproductive status and trend of the population. Should populations show significant signs of decline, mitigating measures may become necessary. Without monitoring, however, knowledge of whether disease or management is impacting the population is impossible. Logging is not a concern; however, future revisions of the forest management plan directing hiker activities at the meadow away from the wetlands would limit disturbance and the opportunity for introduction of disease.

# Northwater Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Glenwood Springs, 39107-E1  
Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Northwater Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Nine miles northwest of Rifle, Colorado, and five miles southeast of Rio Blanco

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Anvil Points, Forked Gulch, Rio Blanco. T5S R94W Sections: 8-11, 14-21, 29; T5S R95W Sections: 11-14.

**Size:** 4,162 acres

**Elevation:** 7,800 to 9,000 feet

**General Description:** Northwater Creek is one of three prominent drainages on the southeastern portion of the Roan Plateau. It is a major tributary to East Middle Fork Parachute Creek, a tributary of the Colorado River. It begins as a small stream on the eastern edge of the Roan Plateau and joins Trapper Creek approximately 7 miles later. The first several miles are in an open valley with Aspen forests and Mountain sagebrush/Snowberry shrublands. In the more open gentle gradient areas of upper Northwater Creek, graminoid wetlands, e.g., tufted hair grass (*Deschampsia cespitosa*) and sedges (*Carex* spp.) are common.

The headwaters are too small to support trout but are nonetheless important to the health of the trout population downstream. Approximately 3 miles from the headwaters the stream gains more volume and begins to cut through the Green River Formation. The stream develops a pool/drop character which creates excellent habitat for the native Colorado River cutthroat trout. The last 2 miles of Northwater is in a narrow canyon with difficult access. This section harbors a dense population of Colorado River cutthroat trout. Part of this canyon is walled on both sides with beautiful cliffs and numerous seeps.

The surrounding landscape is very similar to East Fork Parachute Creek and has slopes of contrasting vegetation. The south-facing slopes are sparsely vegetated on the steep sections right above the creek and more densely vegetated on the more gentle slopes above, dominated by mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and snowberry (*Symphoricarpos rotundifolius*). The north-facing slopes are characterized by spruce-fir forests on the steep mesic slopes adjacent to the stream and aspen forests above them on the more gentle terrain.

Natural Heritage elements at the Northwater Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plant communities</b>					
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca thurberi</i>	Western Slope sagebrush shrublands	GU	S1S2		B
<i>Salix monticola</i> / <i>Carex utriculata</i>	Montane riparian willow carr	G3	S3		D
<b>Plants</b>					
<i>Argilochloa dasyclada</i>	Utah Fescue	G3	S3		E
<b>Birds</b>					
<i>Aegolius funereus</i>	Boreal owl	G5	S2	FS	B
<b>Fish</b>					
<i>Oncorhynchus clarki pleuriticus</i>	Colorado river cutthroat trout	G4T3	S3	SC, FS/BLM	A

**Biodiversity comments:** The Northwater Creek PCA supports nine elements tracked by the Colorado Natural Heritage Program, including four natural communities, the rare (G4T3S3) endemic Colorado River cutthroat trout, and the state-rare (G5S2) Boreal Owl.

The Northwater Creek PCA has an excellent (A ranked) example of a Colorado River cutthroat trout population with estimates of over 1,000 fish in less than 1.5 miles of stream. The primary reasons for conservation concern for the cutthroat at the global and state levels are long-term trend prognoses and threats. Populations continue to decline in many streams (Young *et al.* 1996). Hybridization between this subspecies and non-native trout species poses the greatest threat to the elimination of pure populations. Due to hybridization only 26% of the remaining populations of this trout are considered genetically pure (Young *et al.* 1996).

The populations of cutthroats in Northwater, East Middle Fork Parachute Creek and Trapper's Creek are not isolated by barriers and are free to interbreed, comprising one large population (Jay Thompson pers. comm.). In 1998, 5 Colorado River cutthroat trout were collected from each of Trappers Creek and Northwater Creek. Genetic analysis of these fish suggest a pure population of Colorado River cutthroat trout (Kanda and Leary 1998). The small sample sizes, however, cannot reasonably exclude the possibility that this population may be hybridized with rainbow trout. There are plans for summer 2001 to collect more samples from this population for additional genetic testing. Until the outcome of those tests are known this population should be managed as pure Colorado River cutthroat trout. Such pure populations are rare and the conservation value of this population is high.

A breeding Boreal Owl pair was recorded from this PCA in 1996. The Boreal Owl is a rare to locally uncommon resident of the high mountains of Colorado. Surveys by the U.S. Forest Service in the late 1990s have identified 20 breeding pairs in Colorado. The species' apparent low population size and sensitive breeding status are factors that contribute to the imperiled status (S2) in Colorado.

An unranked (E) occurrence of Utah fescue was found in the PCA at 8,300 ft. There are a total of fifty five documented occurrences of Utah fescue, with approximately 23,000 individuals estimated (NatureServe 2000). The grass is restricted to Colorado and Utah. In Colorado, 54 of the 55 occurrences are in Garfield and Rio Blanco counties.

**Boundary Justification:** The preliminary conservation boundaries for this site include Northwater Creek and its tributaries. The boundary is intended to represent the area needed to protect the occurrences of the elements of concern and the ecological processes affecting these elements. The most significant natural process to the stream is believed to be flooding and maintaining a natural hydrologic regime. The most significant natural processes for the slopes are believed to be rainfall, herbivory, and fire. Buffers to the site are narrow and generally include the headwaters of the side tributaries. Riparian areas were included because of their importance in maintaining bank stability to protect water quality essential for the cutthroat trout.

**Protection Rank Comments:** This site, previously owned by the United States Department of Energy, was transferred to the BLM in 1999. Although oil and gas leases will continue, the Glenwood Springs Resource Area management plan for oil and gas leasing and development requires special protection for riparian areas and sensitive species. No surface occupancy is allowed within the area with riparian vegetation, except if granted by the authorizing officer (USDI 1999).

**Management Rank Comments:** The primary use of the site is livestock grazing. Over 100 years of cattle and sheep grazing have had an impact on Northwater Creek, especially on the headwater region. The primary noticeable adverse effects of livestock grazing in this area are degradation of the riparian vegetation, and of the stream banks and bottoms. Nearly all Northwater Creeks riparian plant communities have a high abundance of non-native species or increasers, and in some areas the abundance of willows has been drastically reduced. In addition to altering the plant composition of the riparian vegetation, grazing has increased soil erosion. The increase is due primarily to overutilization of the streamside vegetation, resulting in compaction and an abundance of bare ground. The result of the above is accelerated stream bank downcutting, eventually resulting in terraces without water and a new floodplain without vegetation. The site would benefit from a management plan which would include monitoring and improving the riparian vegetation.

We recommend, regardless of ownership, that the biological significance of this conservation site be recognized with a special area designation (for example an Area of Environmental Concern (ACEC) if it were to become BLM land.)

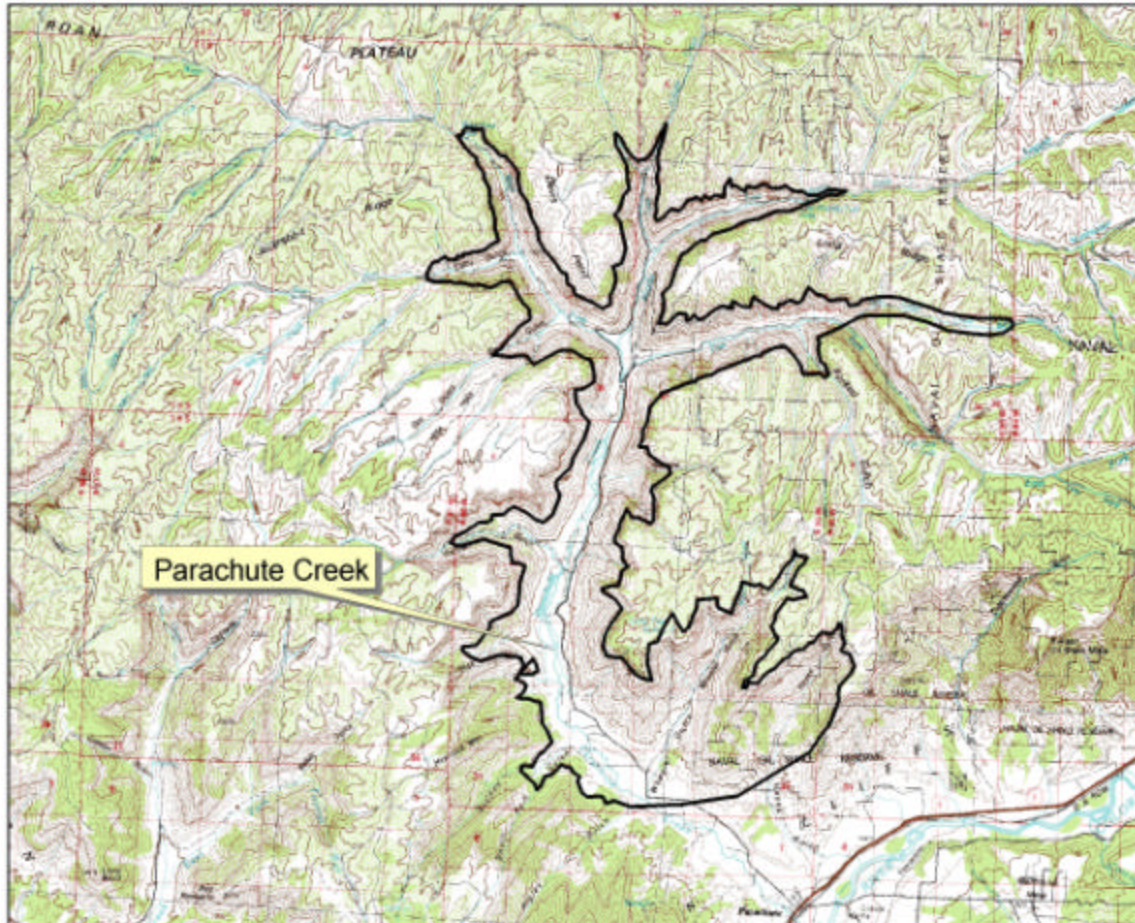
An extensive program of electro-shocking would assist in determining species composition, identifying non-native fish and determining the need for and proper location of fish barriers to prevent migration of non-native fishes into the trout habitat. Streamside grazing by livestock is intense in this area. Grazing by livestock can change stream hydrology by increasing sedimentation and reducing streamside shrub cover, stream shade, and ultimately increasing water temperatures. Restricting grazing along Northwater Creek would benefit the cutthroat trout population. Cutthroat trout are susceptible to overharvest if angling is unrestricted, so Colorado has instituted restrictive angling regulations. Strict enforcement of these regulations will help to ensure survival of this population of cutthroats.



Management strategies to benefit Boreal Owls include preservation of snags for nesting cavities, and maintenance of aspen groves with large diameter trees. Uneven-age timber management may be compatible, but clear-cuts are not considered suitable habitat for foraging Boreal Owls (Hayward and Hayward 1993). Long-term stewardship needs include furnishing nesting cavities and forest structure necessary for foraging.

# Parachute Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
EIS department: lab

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Carbondale, 39107-A1  
Glenwood Springs, 39107-E1  
Grand Junction, 39108-A1  
Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Parachute Creek Potential Conservation Area

**Biodiversity Rank: B2** Very high Biodiversity Significance. This PCA contains good occurrences of several globally vulnerable plant communities and multiple excellent occurrences of rare plants.

**Protection Urgency Rank: P2** Threat is expected within five years. This PCA is nearly all private land and the area is currently threatened by oil shale and gas development, haying operations and intense grazing along Parachute Creek.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences. Current grazing intensity is degrading some community and plant element occurrences.

**Location:** This PCA is located 3 miles northwest of Parachute, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Grand Valley, Red Pinnacle, Forked Gulch, Circle Dot Gulch, McCarthy Gulch and Cutoff Gulch. T5S R95W, S15-22, 25-31; T5S R96W, S10-15, 21-27, 35, 36; T6S R95W, S18, 19, 30; T6S R96W, S3-5, 7-10, 12-29, 32-36.

**Size:** 19,185 acres

**Elevation:** 5,305 to 8,415 feet

**General Description:** This PCA contains parts of the Parachute Creek drainage, a drainage that is roughly 144,000 acres in size. The PCA contains the riparian areas of Parachute Creek, side-drainages, and surrounding cliff tops of the Roan Plateau. Tributaries lying within the PCA include the East, West, and Middle Forks of Parachute Creek and Garden, Hayes and Wheeler Gulches. Each tributary makes a dramatic plunge off the Roan Plateau over 100 to 200 foot shale cliffs. Parachute Creek and its tributaries cut through sedimentary rocks of the Tertiary period, leaving a geologic timeline exposed from cliff top to valley bottom. Going from top to bottom, found exposed are the lower part and Parachute Creek member of the Green River formation; Wasatch formation claystone, mudstone and sandstone; and finally there are unconsolidated gravel and alluvial deposits of the Quaternary period along Parachute Creek. The gradient remains fairly steep after falling off the plateau, forming a pool-drop creek system with steep south and north-facing slopes.

Sagebrush (*Artemisia tridentata*), serviceberry (*Amelanchier utahensis*), and mountain spray (*Holodiscus dumosus*) dominate the south-facing slopes, while Douglas fir/spruce-fir forests (*Pseudotsuga menziesii*/*Picea* spp.) dominate the north-facing slopes. There is lush riparian vegetation in the box canyons where narrowleaf cottonwood (*Populus angustifolia*), box elder (*Acer negundo*), chokecherry (*Prunus virginiana*), skunkbrush (*Rhus trilobata*), and red-osier dogwood (*Cornus sericea*) are

common. The gentle slopes dropping off the Roan Plateau support high quality grasslands and sagebrush shrublands.

Two old mining sites, one on Exxon, one on UNOCAL land, have left large scars easily visible on aerial photographs. Neither of these sites appears to be recoverable, although the site on East Fork Parachute Creek has been reseeded with exotic grasses. Portions of West Fork Parachute Creek, near the confluence of Parachute Creek are used as hay meadows and for cattle grazing. The East and Middle Fork tributaries are not grazed in the canyon sections of the creeks.

The high quality riparian habitats support four rare riparian plant communities including cottonwood forests (*Populus angustifolia/Rhus trilobata*, *Populus angustifolia/Cornus sericea*), foothills riparian shrubland (*Cornus sericea*), and montane riparian deciduous forest (*Acer negundo-Prunus virginiana*). The riparian habitats and associated creeks also support four rare animal species including the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), Great Basin spadefoot (*Spea intermontana*), western yellowbelly racer (*Coluber constrictor mormon*) and midget faded rattlesnake (*Crotalus viridis concolor*). A rare hanging garden community dominated by Mancos columbine (*Aquilegia micrantha*), hanging garden sullivantia (*Sullivantia hapemanii* var. *purpusii*), and monkeyflower (*Mimulus* sp.) occurs at East Middle Fork Falls. At higher elevations the south-facing slopes of the shale exposures provide important habitat for four rare plant species including Arapien Stickleaf (*Nuttallia argillosa*), Utah Fescue (*Argillochloa dasyclada*), Sun-Loving Meadowrue (*Thalictrum heliophilum*) and Utah Mountain Lilac (*Ceanothus martinii*).

#### Natural Heritage elements at the Parachute Creek PCA

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens	EO* Rank
<b>Plant communities</b>							
<i>Acer negundo/Prunus virginiana</i>	Montane Riparian Deciduous Forest	G3	S2				B
<i>Acer negundo/Prunus virginiana</i>	Montane Riparian Deciduous Forest	G3	S2				B
<i>Acer negundo/Prunus virginiana</i>	Montane Riparian Deciduous Forest	G3	S2				B
<i>Acer negundo/Prunus virginiana</i>	Montane Riparian Deciduous Forest	G3	S2				C
<i>Populus angustifolia/Rhus trilobata</i>	Narrowleaf cottonwood/Skunkbrush	G3	S3				B
<i>Populus angustifolia/Rhus trilobata</i>	Narrowleaf Cottonwood/Skunkbrush	G3	S3				B
<i>Populus angustifolia/Rhus trilobata</i>	Narrowleaf Cottonwood/Skunkbrush	G3	S3				C
<i>Cornus sericea</i>	Foothills Riparian Shrubland	G4	S3				A
<i>Populus angustifolia/Cornus sericea</i>	Cottonwood Riparian Forest	G4	S3				A
<i>Populus angustifolia/Cornus sericea</i>	Cottonwood Riparian Forest	G4	S3				B
<i>Pinus edulis/Cercocarpus montanus</i>	Mesic Western Slope Piñon-juniper Woodlands	G5	S4				E

<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos</i> <i>rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4				E
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos</i> <i>rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4				E
<b>Plants</b>							
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	<b>Arapien Stickleaf</b>	<b>G3</b>	<b>S2</b>			<b>BLM</b>	<b>A</b>
<i>Nuttallia argillosa</i>	Arapien Stickleaf	G3	S2			BLM	B
<i>Nuttallia argillosa</i>	Arapien Stickleaf	G3	S2			BLM	E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				A
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				B
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				B
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				B
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				B
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				C
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				A
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				A
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				A
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				B
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				C
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Thalictrum heliophilum</i>	Sun-Loving Meadowrue	G3	S3				E
<i>Sullivantia hapemanii</i> var <i>purpusii</i>	Hanging-Garden Sullivantia	G3T3	S3			FS	A
<i>Sullivantia hapemanii</i> var <i>purpusii</i>	Hanging-Garden Sullivantia	G3T3	S3			FS	A
<i>Ceanothus martinii</i>	Utah Mountain Lilac	G4	S1				C
<b>Fish</b>							
<i>Oncorhynchus clarki</i> <i>pleuriticus</i>	Colorado River cutthroat trout	G4T3	S3		SC	FS/BLM	H
<b>Amphibians</b>							
<i>Spea intermontana</i>	Great Basin spadefoot	G5	S3		SC	BLM	H

Reptiles							
<i>Crotalus viridis concolor</i>	Midget faded rattlesnake	G5T4	S3?		SC	BLM	H
<i>Coluber constrictor mormon</i>	Western yellowbelly racer	G5T5	S3				H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The high quality and undisturbed nature of the plant communities at this PCA are unique, and the area supports a diverse assemblage of rare plant communities. There are numerous occurrences of the globally vulnerable (G3S3) plant species, Arapien stickleaf, sun-loving meadowrue, and Utah fescue, all of which are oil-shale endemic species. The PCA also supports upland and riparian plant communities such as the globally vulnerable Mancos columbine/monkeyflower hanging garden, box elder/chokecherry montane riparian deciduous forest, and narrowleaf cottonwood/skunkbrush riparian forest.

This site contains eight occurrences of Arapien stickleaf, of which six are ranked excellent (A ranked). Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado (NatureServe 2000), where it may be locally common. The 21 documented occurrences in Colorado all are found on Green River shale on the Roan Plateau in Garfield County.

Hanging garden sullivantia is endemic to Colorado, in Garfield, Gunnison, Montrose, Pitkin, and Rio Blanco counties, where there are 45 documented occurrences and approximately 40,000 individuals (NatureServe 2000).

Thirteen occurrences of Utah fescue are known from this PCA, including one ranked excellent (A), and four ranked good (B). Altogether, there are only fifty five documented occurrences of the species in the world, with approximately 23,000 individuals estimated (NatureServe 2000). The grass is restricted to Colorado and Utah. In Colorado, 54 of the 55 occurrences are in Garfield and Rio Blanco counties.

The site contains twelve occurrences of the globally vulnerable (G3S3) sun loving meadowrue, including three ranked excellent (A). The sun-loving meadowrue grows on sparsely vegetated, steep shale talus slopes of the Green River Formation. It is restricted to Colorado, in Garfield, Mesa and Rio Blanco counties, with 36 known occurrences and approximately 130,000 individuals.

Utah mountain lilac occurs from eastern Nevada to southwest Wyoming, south to northwest Arizona and east to Colorado. It is known from five locations in Colorado, in Garfield and Rio Blanco counties. The Garfield County populations represent the eastern extent of its range, giving them added importance for genetic diversity.

Cutthroat trout are a sensitive species that are native to the Colorado River basin, and have recently been in decline. A population of cutthroat was reported from Parachute Creek in the early 1980s; however, brook trout were also present at a ratio of 20 brook trout to each cutthroat trout. The cutthroat trout occupying Parachute Creek have a high probability of being replaced by the brook trout.

The Great Basin spadefoot, as its name implies, is endemic to the Great Basin. There is a historical record of this amphibian from 1972 at this PCA; however, attempts to relocate this population were unsuccessful. This species is considered vulnerable (S3)



because of its small range in Colorado and the limited number of occurrences.

An adult midget faded rattlesnake was observed here in 1973, but could not be documented during this survey. There are approximately 40 localities of the midget faded rattlesnake documented from Colorado (Hammerson 1999), and many individual populations are highly threatened from human encroachment, warranting a vulnerable ranking for this subspecies in Colorado.

The subspecies of the racer (*Coluber constrictor*) is known from counties along Colorado's western edge (Livo *et al.* 1996, Hammerson 1999) including a record from this PCA in Garfield County in 1973. There are 30 known occurrences in Colorado totaling over 1000 individuals. Conservation concern stems from threats associated with road mortality and human residential expansion.

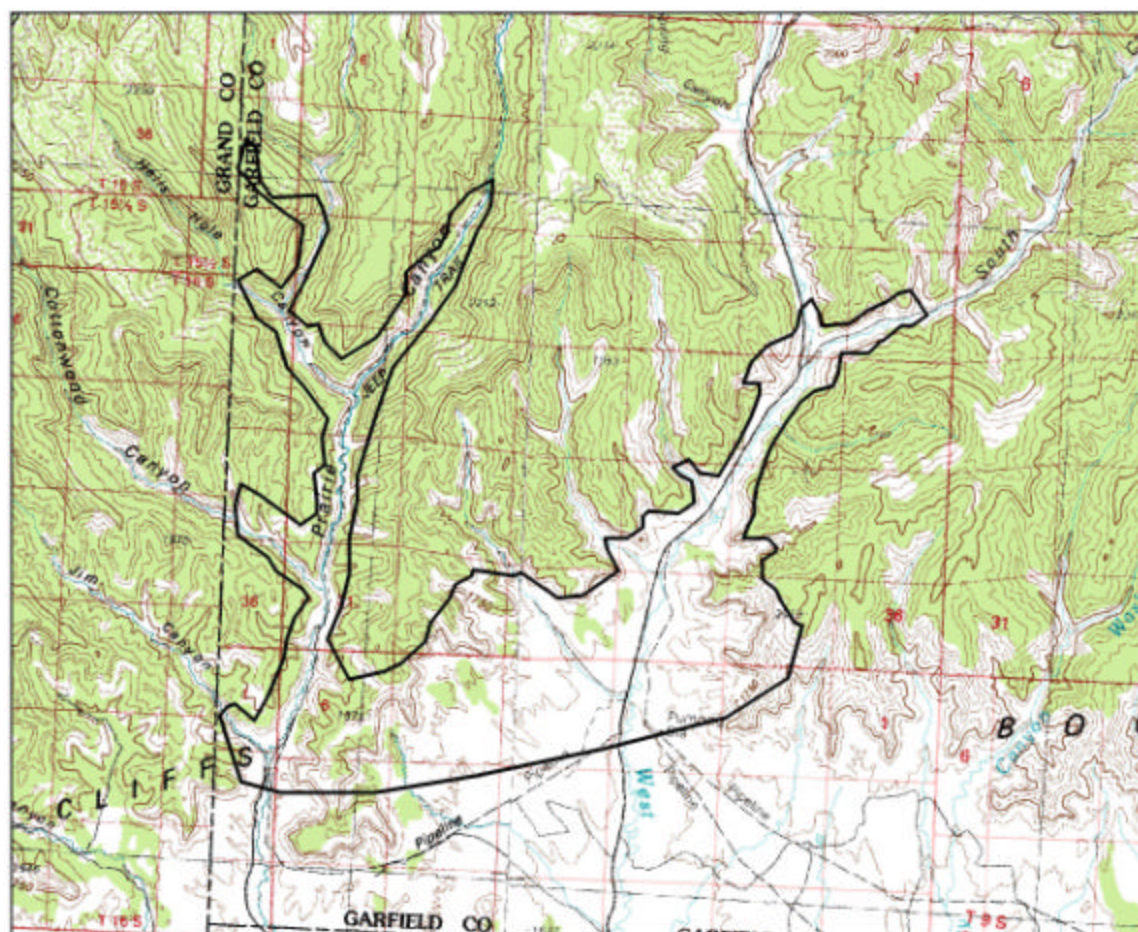
**Boundary Justification:** The site boundaries for Parachute Creek include most of the creek's watershed, including upland slopes and the major tributaries: West Fork, Middle Fork, East Middle Fork, and East Fork. These boundaries will ensure continued natural surface flow and maintain a natural hydroperiod through Parachute Creek, which will maintain a dynamic distribution of riparian plant communities along the drainage and support fish populations. These boundaries also include all rare plant occurrences on the shale barrens, with a buffer to protect the occurrences from indirect and direct disturbances. The long-term integrity of the upland plant communities are also encouraged by the site boundaries by allowing natural disturbances, such as fire and insects, to maintain the mosaic of communities found within this PCA.




**Protection Rank Comments:** Most of this PCA is private land that has no protection status. Oil shale and gas development, haying operations and intense grazing along Parachute Creek currently threaten the area. Mining oil shale at present is not economical due to high production costs. This area has the highest gas well density in the world and the Colorado Oil and Gas Conservation Commission on October 31, 2000, gave approval to increase well density to 32-wells per square mile on 1,900 acres of private land within this PCA. Element occurrences falling within the affected area include the midget faded rattlesnake, Great Basin spadefoot, Arapien stickleaf, Utah fescue, and two natural communities. None of these elements has any legal protection on private land.

**Management Comment:** A management plan regulating grazing intensity and fencing element occurrences where cattle can easily walk would reduce impacts from grazing which have the potential to destroy the element occurrences. Weeds are becoming problematic in some limited areas and recovery of native grasses and forbs would benefit continued existence of both the rare flora and fauna of the PCA. Implementation of a monitoring program for the rare plants and plant communities would assist in identifying how grazing might affect long-term viability of the occurrences. Monitoring of the rare animals would assist in identifying population trends for species that lack good trend data.

# Prairie and South Canyons

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangles*</p> <p>Westwater, 39109-A1          Grand Junction, 39108-A1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Prairie and South Canyons Potential Conservation Area

**Biodiversity Rank: B5:** General Biodiversity Significance. This PCA contains two occurrences of the kit fox, a mammal that is imperiled in the state, although apparently secure globally.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** This PCA is located 8.5 miles northwest of Fruita, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Carbonera and Jim Canyon. T7S R104W, S7, 8, 13, 14, 17-20, 22-35; T7S R105W, S12, 13, 24, 27, 36; T8S R104W, S2-8; T8S R105W, S1, 12.

**Size:** 7,242 acres

**Elevation:** 1,549 to 2,223 feet

**General Description:** This PCA lies in the broad open area between the Bookcliffs and the Uncompahgre uplift known as the Grand Valley. It includes the riparian habitats of South and Prairie Canyons within the West Salt Creek drainage, where the vegetation consists of shrublands dominated by big sagebrush (*Artemisia tridentata* ssp. *tridentata*). Boundaries of the PCA extend for a short distance upslope of the canyon bottoms, capturing the lower reaches of the piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodlands. The PCA continues south from the canyon mouths into the saltbush fans and flats characteristic of areas south of the Bookcliffs. Here the vegetation consists of medium to tall shrubs including fourwing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*) and greasewood (*Sarcobatus vermiculatus*), with an understory of perennial grasses including galleta (*Hilaria jamesii*) and salina wildrye (*Leymus salinus*), and annual forbs.

Approximately 40% of this PCA is privately owned, and the remainder is BLM land. All is intensively grazed. The southern saltbush fans and flats contain recent unconsolidated alluvial and gravel deposits of the Quaternary period, while the northern areas are characterized by older sedimentary deposits of sandstone and shale from the Tertiary and Cretaceous periods.

There are recent observations of kit foxes in this PCA and a record of breeding Sage Sparrows from the early 1990s.

Natural Heritage elements at the Prairie and South Canyon site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Vulpes macrotis</b>	<b>Kit fox</b>	<b>G4</b>	<b>S1</b>				<b>D</b>
<b>Vulpes macrotis</b>	<b>Kit fox</b>	<b>G4</b>	<b>S1</b>				<b>D</b>
<i>Amphispiza belli</i>	Sage Sparrow	G5	S3B,SZN				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** Accurate abundance data are not available for the kit fox, and its known range in Colorado is highly restricted. It occurs only in the lower Colorado River basin and in Montezuma County (Armstrong 1972; Fitzgerald *et al.* 1994). The known Colorado range is approximately 3% of the state territory and there are fewer than 5 known locations for this species in Colorado. A verified specimen was taken in the Colorado National Monument in 1999 and a small colony is currently being studied in the vicinity of Delta, Colorado (Fitzgerald *et al.* 1994). Agricultural conversion, urban encroachment into low elevation native habitats, trapping, shooting, poisoning, and coyote predation, are all factors thought to have negative impacts on kit fox populations (Fitzgerald *et al.* 1994).

A nesting group of Sage Sparrows totaling approximately 10 pairs was documented here in 1994. This is one of only five known occurrences in Garfield County. There are also at least 12 occurrences of Sage Sparrows in Mesa County and perhaps more than 50 in Moffat County (Ron Lambeth pers. comm.). Breeding populations of this sparrow are listed as vulnerable within Colorado because of the loss of sagebrush habitat occurring throughout its range and the species' relatively small numbers.

**Boundary Justification:** The boundaries of this PCA include the semi-desert shrub communities and margins of piñon-juniper woodlands that are habitats of the kit fox (Fitzgerald *et al.* 1994). The boundaries are also mapped to include the Sage Sparrow occurrence and over 30 acres of the surrounding big sagebrush habitat. Sage Sparrows require big sagebrush parks of over 30 acres for nesting (Lambeth 1998).

**Protection Rank Comments:** Most of this PCA is BLM land that has no special designation. Grazing is the predominant land use. The area's lack of aesthetic qualities may help to safeguard it from threats of development, and lack of irrigation water will probably protect this PCA from conversion to agricultural uses. Conversion of natural landscapes to agricultural uses has caused kit fox population loss (Fitzgerald *et al.* 1994), and agricultural croplands to the south probably separate populations at this PCA from those in Mesa County. No known populations of the kit fox are protected, and any viable kit fox populations should be considered for immediate protection to ensure continued existence of this species in Colorado. Oil and gas leases are in place and could be developed.

**Management Rank Comments:** The kit fox is considered a fur-bearer in Colorado and liberal hunting and trapping is allowed by the Colorado Division of Wildlife. The primary food item is usually the most abundant nocturnal rodent or lagomorph in the area

(e.g. kangaroo rats and hares). Kit fox may also feed opportunistically on birds, reptiles, and insects. Restrictions on trapping and hunting in this area would benefit the kit fox here, and educating ranchers on kit fox prey habits to discourage killing and poisoning of the fox would be beneficial.

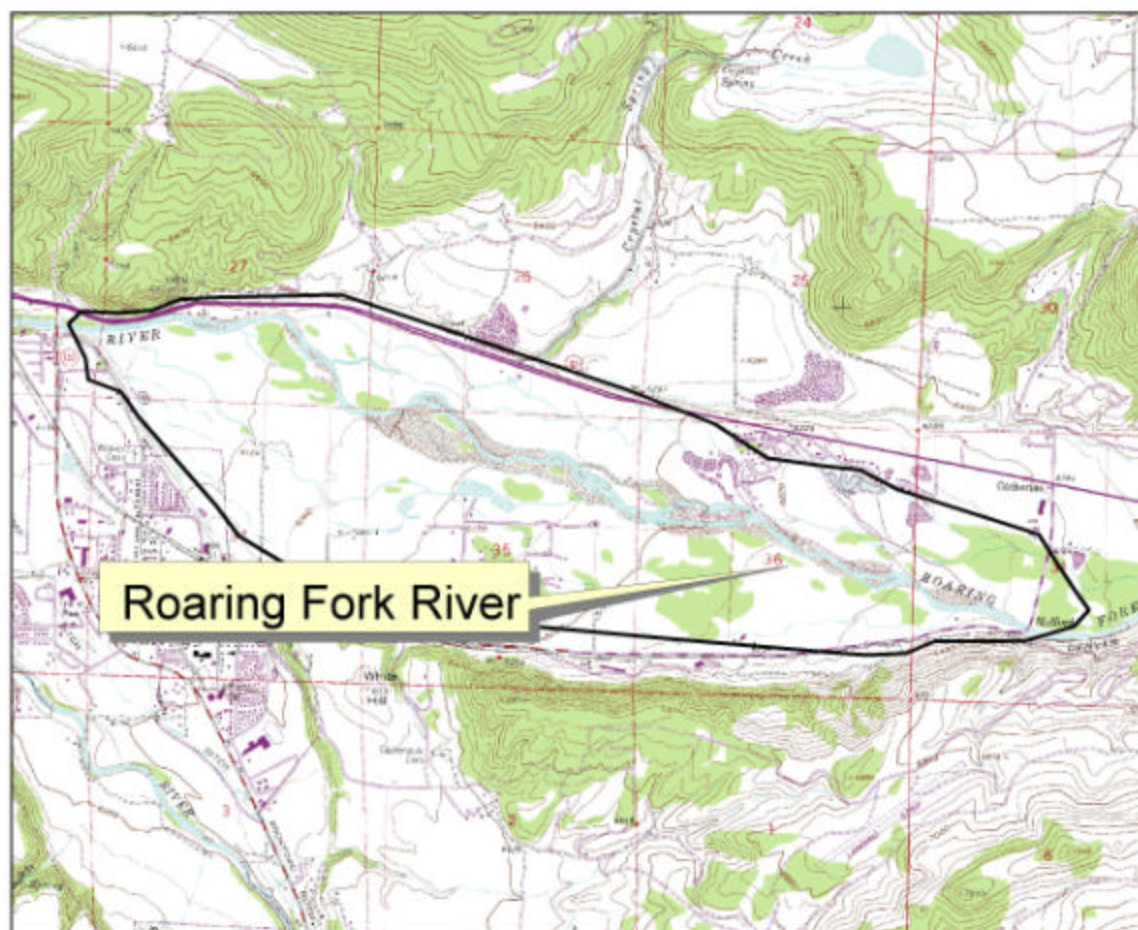
ATV use has increased in this area in recent years. Although they are restricted to existing roads and trails, this is difficult to enforce. Increased human presence and ATV use would reduce habitat and cause stress for kit foxes.




Sage Sparrows are vulnerable to loss and fragmentation of sagebrush habitat and may require sagebrush parks in excess of 100 acres (NatureServe 2000). Range improvement programs removing sagebrush and invasion by cheatgrass have the potential to destroy this Sage Sparrow population. Cheatgrass alters the natural fire regime by increasing the frequency, intensity, and size of range fires. Fire kills sagebrush and where non-native grasses dominate, the landscape can be converted to annual grassland as the fire cycle escalates, removing habitat for the Sage Sparrow (Paige and Ritter 1998). Sage Sparrows can persist with moderate grazing and other land management activities that maintain sagebrush cover and the integrity of native vegetation, but they respond negatively to heavy grazing (Saab *et al.* 1995). Recovery of native grasses, management of fire to prevent loss of sagebrush cover and implementing moderate grazing practices would benefit Sage Sparrows.



# Ranch at the Roaring Fork

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangle*</p> <p>Carbondale, 39107-D2</p> <p><small>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</small></p>	<p>Location in Project Area</p> 
---	--	--



## Ranch At The Roaring Fork Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences.

**Location:** This site is located directly east of Carbondale, CO, along the Roaring Fork River.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale. T7S R87W Section 31; T7S R88W Sections 25-28, and 34-36.

**Size:** 1,808 acres

**Elevation:** 6,100 – 6,300 feet

**General Description:** The site includes approximately a three-mile stretch of the Roaring Fork River and its floodplain and is one of the most intact sites along the lower reaches of this river. The riparian vegetation includes a continuous mosaic of narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus incana*), black twinberry (*Lonicera involucrata*), red-osier dogwood (*Cornus sericea*), silverberry (*Shepherdia argentea*), and sandbar willow (*Salix exigua*). In a few small patches, a rare orchid, yellow lady's slipper (*Cypripedium calceolus* ssp. *parviflorum*), is found associated with false-Solomon's seal (*Maianthemum stellatum*). In similar habitats, but distinct locations, another rare orchid, canyon bog-orchid (*Limnorchis ensifolia*), was documented. Cattail (*Typha latifolia*) marshes and a mosaic of wet meadows dominated by woolly sedge (*Carex lanuginosa*), water sedge (*C. aquatilis*), beaked sedge (*C. utriculata*), reed canary grass (*Phalaris arundinacea*), checkermallow (*Sidalcea candida*), and a variety of rushes (*Juncus* ssp.) are found near a series of ponds in the north-central part of the site. These ponds also support a diverse mix of native bird species. On the south side of the river there are private homes scattered within the historic floodplain. Islands in the river are covered by dense stands of sandbar willow. The adjacent upland areas rise 200 feet above the floodplain and support piñon-juniper (*Pinus edulis-Juniperus osteosperma*) communities and mixed shrublands.

Natural Heritage element occurrences at the Ranch at the Roaring Fork PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Populus angustifolia</i> / <i>Alnus incana</i>	Montane riparian forest	G3?	S3				C

Plants							
<i>Cypripedium calceolus</i> ssp. <i>parviflorum</i>	Yellow lady's slipper	G5	S2				B
<i>Limnorchis ensifolia</i>	Canyon bog-orchid	G4G5T3	S3				C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This is the largest, intact riparian area observed in the lower Roaring Fork Valley. It supports a fair (C-ranked) example of the globally vulnerable (G3?/S3) narrowleaf cottonwood/thinleaf alder (*Populus angustifolia*/*Alnus incana*) montane riparian forest. This site also supports one globally vulnerable (G4G5T3/S3) orchid, canyon bog-orchid, and one state imperiled (G5/S2) orchid, yellow lady's slipper. A small rookery of great blue herons (*Ardea herodias*), including approximately four nests, is found within this site. Great blue heron rookeries often include several hundred pairs of birds. There are approximately 100 great blue heron rookeries in Colorado. This colonial bird species appears to be increasingly common in the state but is quickly being threatened by habitat alteration (Pague *et al.* 1997). The mountain whitefish (*Prosopium williamsoni*) is also known to occur in the Roaring Fork River from Glenwood Springs and Woody Creek. There are few rivers in Colorado known to contain this species as it is mostly restricted to the northwestern portion of the state.

**Boundary Justification:** The site boundary encompasses a large portion of the Roaring Fork River's floodplain east of Carbondale to south of Catherine. The site boundaries incorporate an area that will allow natural hydrological processes such as seasonal flooding, sediment deposition, and new channel formation to maintain viable populations of the elements. The boundary also provides a buffer from nearby agriculture fields, roads, and houses where surface runoff may contribute excess nutrients, sediment, and herbicides/pesticides. The site also contains old oxbow lakes, sloughs, and ponds that could provide a source of recruitment for native wetland and riparian plant species. It should be noted that the hydrological processes necessary to the elements are not fully contained by the site boundaries. Given that the elements are dependent on natural hydrological processes associated with the Roaring Fork River, any upstream activities such as water diversions, impoundments, and development could potentially be detrimental to the elements.

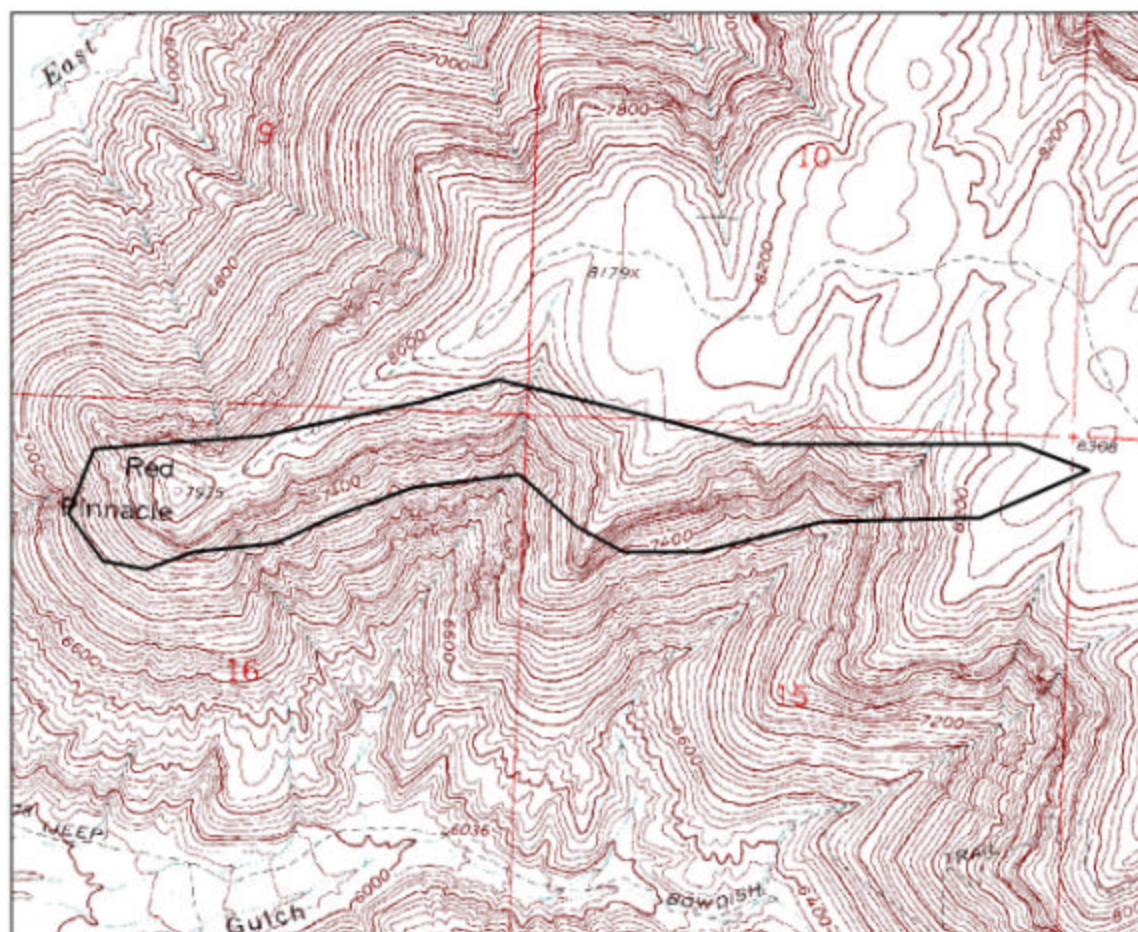
**Protection Rank Comments:** The Ranch at the Roaring Fork is a private housing community which has chosen to leave this large stretch of the river's floodplain intact and to allow low impact recreational uses such as hiking and birding.

**Management Rank Comments:** Historically, horse ranching and coal mining occurred within this site. Horse grazing, housing developments, nearby pastures and hay meadows, and close proximity to an urban area have resulted in the spread of non-native plant species such as hound's tongue (*Cynoglossum officinale*), cheatgrass (*Bromus tectorum*), sweetclover (*Melilotus officinale*), oxeye-daisy (*Leucanthemum vulgare*), plumeless thistle (*Carduus acanthoides*), Canada thistle (*Cirsium arvense*), and tansy (*Tanacetum vulgare*) throughout the site. Tansy is the most aggressive non-native

species found at the site and should be controlled. Russian olive (*Elaeagnus angustifolia*) extends in a narrow band for about 50 feet along the Roaring Fork River and its removal should also be considered. The elements should be protected from road, ditch, powerline and railroad maintenance activities. The roads within the site's riparian areas should be closed and maintained as trails. Additional information is needed about the reproduction ecology of the yellow lady's slipper and the canyon bog-orchid to enhance management objectives. Great blue herons are known to abandon nests and colonies with increased encroachment by human activities. A minimum buffer of 300 meters, where no human activity should take place during courtship and nesting seasons, is recommended (Butler 1992).

# Red Pinnacle

## Potential Conservation Area



The Colorado Natural Heritage Program  
 Colorado State University  
 254 General Services Bldg  
 Fort Collins, CO 80523  
 Fax: (970) 491-3349



map date: 15 December 2000  
 vintage of data: 01 December 2000  
 GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Red Pinnacle, 39108-D2

\*Digital Raster Graphics (DRGs) produced  
 by the U. S. Geological Survey, 1996

Location in Project Area



## Red Pinnacle Potential Conservation Area

**Biodiversity Rank: B4** Moderate Biodiversity significance. The PCA contains fair occurrences of two vulnerable plant species.

**Protection Urgency Rank: P2** Threat is expected within five years. Oil Shale development could threaten the element occurrences; however no threat is expected within the next two years.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences. No serious management needs are known at this time.

**Location:** The Red Pinnacle PCA is located approximately 7 air miles due east of Parachute, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Red Pinnacle. T7S R97W Sections: 9, 10, 14-16.

**Size:** 205 acres

**Elevation:** 7,400 to 8,200 feet

### General Description:

This PCA comprises the south facing slopes below a long ridge leading to Red Pinnacle, a prominence that is a landmark visible from the Conn Creek area. It is characterized by sparsely vegetated slopes of the Parachute Creek member of the Green River Formation. Common species within the site include Osterhout's penstemon (*Penstemon osterhoutii*), Dragon milkvetch (*Astragalus lutosus*), Utah serviceberry (*Amelanchier utahensis*), Colorado bedstraw (*Galium coloradense*) and Twinpod species (*Physaria* spp.). Other scattered trees and shrubs include Douglas Fir (*Pseudotsuga menziesii*), rock spirea (*Holodiscus dumosus*), and Gambel's oak (*Quercus gambellii*).

Natural Heritage element occurrences at the Red Pinnacle PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Nuttallia argillosa</i>	Arapien stickleaf	G3	S3	BLM	C
<i>Argillochloa dasyclada</i>	Utah Fescue	G3	S3		C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The PCA contains fair (C ranked) occurrences of two Green River shale endemics, Arapien stickleaf and Utah Fescue. Both species are considered globally vulnerable (G3). These plants are found exclusively on Green River shale

barrens in Colorado and adjacent Utah. The primary threat to these species is the extraction of oil and natural gas, as Green River shale holds the largest reserve of oil shale in the U.S..

Utah Fescue (*Argillochloa dasyclada*) is one of a few endemic grasses in the United States. It is restricted to Colorado and Utah. Of the 85 occurrences known in Colorado, 37 are in Garfield County, 57 in Rio Blanco County, and one in Mesa County. The occurrence at this location was found on the eastern half of the site.

Arapien stickleaf is restricted to two distinct and widely separated regions: central Utah and west-central Colorado. Its range is only about 30 square miles in Colorado, where it may be locally common. The 21 documented occurrences in Colorado all occur in Garfield County on Green River shale on the Roan Plateau.

Dragon Milkvetch (*Astragalus lutosus*) also occurs at this site, and while not tracked by CNHP, this species is on the Bureau of Land Management sensitive list.

This site contains potential habitat for Parachute Penstemon (*Penstemon debilis*) on its south facing slopes, but a search of the area in 2000 resulted in no new populations of that species.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of Arapien stickleaf and Utah fescue in this site. It includes the steep south-facing slopes below Red Pinnacle, where the two rare plants were found. It also includes adjacent similar habitat to allow for movement or expansion of the populations over time as landslides open up new sites, and existing sites become more heavily vegetated.

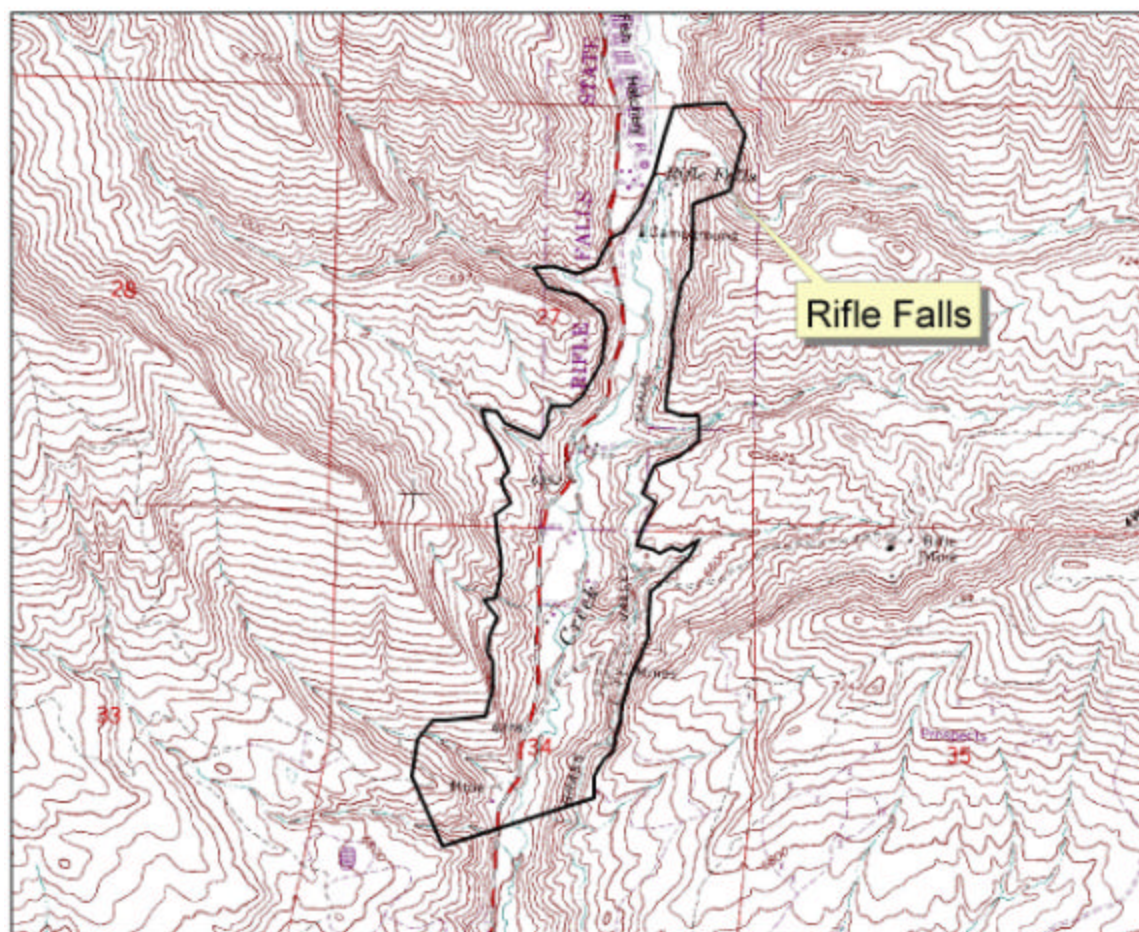
**Protection Rank Comments:** Ownership of this PCA is about 50% BLM and 50% private, owned by Shell Oil Company. It is generally inaccessible, as access is controlled by a locked gate. Oil shale development could threaten these vulnerable plant species. Development of oil and gas resources, including new roads or pipelines on BLM would require an Environmental Assessment, at which time the BLM sensitive Arapien stickleaf should be considered and protected from disturbance. The private land has no protection.

**Management Rank Comments:** This site has a very low percentage of exotic species. Grazing occurs in the area but does not appear to be affecting the plants on the steep shale slopes. No special management is needed at this time.



# Rifle Falls State Park

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

□ PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Rifle Falls, 39107-F6

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Rifle Falls State Park Potential Conservation Area

**Biodiversity Rank: B5** General Biodiversity Significance. This PCA contains a marginal occurrence of an animal species that is apparently secure globally.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M2** Ongoing, recurrent management action would help to prevent loss of the element occurrences.

**Location:** This PCA is located approximately 6.7 miles northeast of Rifle, Colorado just northeast of Rifle Gap Reservoir on Colorado Highway 325.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Rifle Falls. T4S R92W, S27, 34

**Size:** 326 acres

**Elevation:** 6,237 to 6,857 feet

### **General Description:**

The valley within which this PCA lies is bordered on both sides by ridges over 6700 feet in height that drop steeply over 450 feet to the valley along East Rifle Creek. The south boundary of the PCA captures an unnamed mine used by pale lump-nose bats (*Corynorhinus townsendii*). This mine is located in piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodland lying approximately 1/8 mile west of the riparian area of East Rifle Creek. The PCA includes the slopes on both sides of the creek, with the boundary climbing to approximately the elevation of the mine. The boundary continues north along the riparian corridor where patches of boxelder (*Acer negundo*) and willows (*Salix* sp.) are found. The area upslope of the creek is dominated by piñon pine- juniper woodland with a shrub understory that includes sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Gambel's oak (*Quercus gambelii*), serviceberry (*Amelanchier utahensis*) and mountain mahogany (*Cercocarpus montanus*). The boundary terminates at the waterfalls in Rifle Falls State Park. The falls are braided with three chutes that drop approximately 80 feet to a rocky pool. The cliffs over which the water falls are the result of calcium carbonate deposition from East Rifle Creek. Over geologic time the cliffs have formed from this deposition. The cliff face behind the falls is covered with scattered pockets of moss and is ideal nesting habitat for Black Swifts (*Cypseloides niger*).

Rifle Falls State Park and BLM land comprise approximately 60% of the PCA. The remaining 40% includes privately owned land along East Rifle Creek at the PCAs south end. This area of the PCA is hayed and used for livestock grazing.

The entire PCA lies within what is known as the Piceance Basin, which extends from approximately Maybell to Palisade, Colorado. Here the substratum of the Piceance Basin consists of sedimentary rock of the Cenozoic and Paleozoic eras including Jurassic, Triassic, Permian and Pennsylvanian sandstones.

There are recurring records from the late 1990s of Black Swifts and pale lump-nosed bats at this PCA. There is also a historic account of a wolverine from this PCA, but given the current level of human activity it is unlikely that wolverines have occurred here for many years.

Natural Heritage elements at the Rifle Falls State Park PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Birds</b>							
<i>Cypseloides niger</i>	Black Swift	G4	S3B			FS	C
<b>Mammals</b>							
<i>Corynorhunis townsendii</i>	Pale lump-nose bat	G4T4	S2			FS/BLM	C
<i>Gulo gulo</i>	wolverine	G4	S1		E	FS	H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Black Swift and pale lump-nose bat records represent a traditional nesting site for the swift and a traditional roosting location of the bat. It is estimated that over 200 nesting pairs of Black Swifts occur in Colorado, representing between 10% and 20% of the total nesting population of the species (Boyle 1998). This makes Colorado's population an important component of this bird's total population. This species' low population size, few occurrences, and lack of local trend data are all reasons for its vulnerable ranking in the state. Historical sites of the pale lump-nosed bat in Colorado seem to be abandoned or greatly reduced in size (Kirk Navo, pers. comm.). This species is considered imperiled in Colorado (S2) because of the low number of individuals encountered for a colonial species, low population size, and high threats.

There are few recent records of wolverines in Colorado; most localities were documented in the early nineteenth century. In 1973, three biologists from the Rifle Falls Fish hatchery observed a wolverine here. The wolverine is considered critically imperiled (S1) in Colorado due to the low number of locations, lack of verifiable recent records, low population density in any remaining pockets of habitat, and habitat fragmentation by roads (Fitzgerald *et al.* 1994).

**Boundary Justification:** The site boundary was drawn to include the specific habitat supporting ecological processes essential to the survival of both the swifts and bats. The site includes a mine utilized as a roosting site by the pale lump-nosed bat. This roosting site is of particular importance because human disturbance at caves, deforestation, and urban and agricultural practices leave few alternatives for bats and they can not change roosts in the time permitted by current rates of mine closures. The area at Rifle Falls encompasses a Black Swift nesting site. Black Swifts restrict their nesting to areas near or behind waterfalls. Because waterfalls are uncommon, any that support breeding swift populations are important to protect.

**Protection Rank Comments:** Protection is adequate for the Black Swifts (Rifle Falls State Park), but there is some concern surrounding the pale lump-nosed bat. The mine associated with this species is privately owned.




**Management Rank Comments:** There are few obvious threats to Black Swifts, except where development alters nesting habitat. The falls at Rifle Falls State Park are a popular tourist attraction, but the Black Swift nest is inaccessible and free of direct human disturbance. Protecting stream flows and the present physical state of the falls from alteration, and limiting direct access to the falls through the design and placement of trails would ensure continued nesting by the swifts. Diversion of stream water causing reduced flow at the falls could cause swifts to abandonment the site. Closure of the mine entrance would eliminate its further use by pale lump-nose bats; however, access to the mine is unrestricted and the bats are sensitive to human disturbance. Construction of a bat gate to restrict human access, but allowing use by the bats, would ensure that the population is conserved. A monitoring program would aid in better defining the size and productivity of the elements, and would assist in defining future management needs.



# Rifle Hogback

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	---

## Rifle Hogback Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** The Rifle Hogback is located 3 air miles north of Rifle, Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Horse Mountain, Rifle, Rio Blanco. T4S R93W Sections: 30-32; T4S R94W Sections: 25, 36; T5S R92W Sections: 18, 19, 30; T5S R93W Sections: 2-6, 8-15, 23-25.

**Size:** 6,974 acres

**Elevation:** 5,600 to 8,600 feet

**General Description:** The Rifle Hogback PCA includes the southwest facing slopes of the Grand Hogback north of Rifle, where Wetherill milkvetch is sparsely scattered in many dry, eroded washes. In this PCA, the hogback is formed of uplifted Wasatch and Ohio formations. Soils are composed of sand and clay, with some barren shale outcrops.

Dominant species include saltbush (*Atriplex confertifolia* and *Atriplex brandegei*), scattered Utah juniper (*Juniperus osteosperma*), big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus nauseosus*), cactus species, (including *Opuntia polyacantha*, *O. fragilis*, *O. phaeocantha* *O. erinacea*, and *Echinocereus triglochidiatus*). Common grasses included Indian rice grass (*Oryzopsis hymenoides*), and galleta grass (*Hilaria jamesii*), while Moffatt's beardtongue (*Penstemon moffattii*), shaggy fleabane (*Erigeron pumilus*), lobeleaf groundsel (*Senecio multilobatus*), and cushion buckwheat (*Eriogonum ovalifolium*) are also common.

Wetherill milkvetch, a plant which is restricted to Colorado, was known from this area. Surveys in 2000 yielded a new population. The plants occur in dry washes, on bare eroded soil.

In general the site is in good condition, there are few exotic species and it is relatively free from disturbance. There is development on top of the Mesa but this does not seem to be affecting the rare plant populations.



Natural Heritage element occurrences at the Rifle Hogback PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Astragalus wetherillii</i>	<b>Wetherill milkvetch</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		B
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		C
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		D
<i>Astragalus wetherillii</i>	Wetherill milkvetch	G3	S3		E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site includes six occurrences, including one ranked excellent (A), of Wetherill milkvetch, a globally vulnerable (G3S3) plant found only in Colorado and Utah. The species is known from seven western Colorado counties. There are thirty-eight known occurrences, with an estimated total of 9000 individuals.

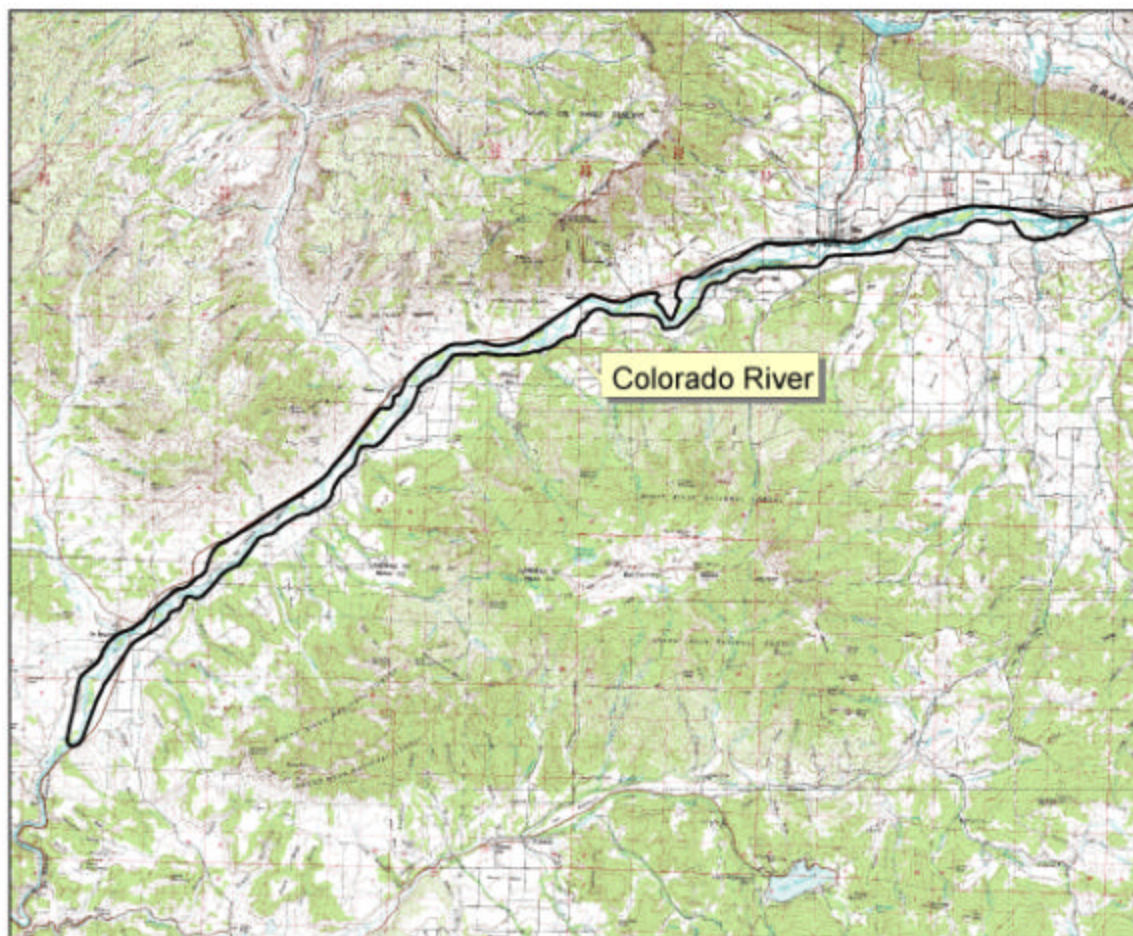
**Boundary Justification:** This site includes six occurrences of the Wetherill milkvetch, and the contiguous suitable habitat between them. It is bounded on the southwest by the base of the Grand Hogback and Colorado Highway 13.

**Protection Rank Comments:** This PCA includes Bureau of Land Management and private lands. Most of the land along road is private, with BLM land on the hillsides where the rare plants were found. New residential developments along the top of the hill could affect the site.

**Management Rank Comments:** No management needs are known. The area does not appear to be grazed at present. Exotic species were not affecting the rare plants at the time of this survey, but the site should be monitored for changes.

# Rifle Stretch Colorado River

## Potential Conservation Area



0 5 10 Miles



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

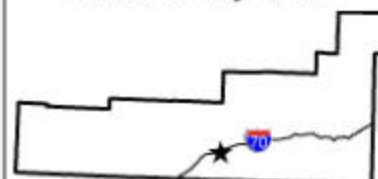
 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Grand Junction, 39108-A1  
Douglas Pass, 39108-E1  
Carbondale, 39107-A1  
Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Rifle Stretch Colorado River Potential Conservation Area

**Biodiversity Rank: B2** Very High Biodiversity Significance. This PCA contains multiple good and fair ranked occurrences of a globally imperiled plant community and an unranked occurrence of a fish species that is critically imperiled on a global scale.

**Protection Urgency Rank: P2** A definable threat is expected in this PCA within the next five years.

**Management Urgency Rank: M2** Ongoing, recurrent management action would help to prevent loss of the element occurrences.

**Location:** This PCA stretches along the Colorado River between Silt, Colorado and DeBeque Canyon

**Legal description:** U.S.G.S. 7.5 minute quadrangles: North Mamm Peak, Rulison, Silt, Rifle, DeBeque Canyon, Grand Valley, Red Pinnacle and Anvil Points. T6S R92W, S7-11, 15; T6S R93W, S10-20; T6S R94W, S13, 14, 22-24, 26-31, 33, 34; T6S R95W, S25, 33-36; T7S R95W, S2-8, 18; T7S R96W, S12-14, 23, 24, 26, 27, 32-34; T8S R96W, S4-7, 18; T8S R97W, S12-14, 22-24, 26-28, 32-34; T9S R97W, S4, 5, 8, 9, 17.

**Size:** 12,100 acres

**Elevation:** 4,928 feet to 5,689 feet

### General Description:

The Colorado River winds through the center of this long narrow PCA that starts at Silt, Colorado and ends at the head of DeBeque Canyon. The river here flows down a wide valley dropping at a very low grade for approximately 40 miles from the north to the south boundaries of the PCA. The PCA is bordered on the north by the Grand Hogback and further downstream, by the steep sandstone cliffs of the Roan Plateau. The southern boundary mainly consists of a series of low elevation mesas, such as Hunter, Grass, Flatiron, Holms, Morrisania, and High Mesas while Battlement Mesa looms further south. The area historically contained numerous wetlands and extensive riparian forests, but the I-70 corridor, Rio Grande-Southern Pacific Railroad, and agriculture practices have modified and/or destroyed many of these areas. Irrigated pastures are interspersed along the river's floodplain with cottonwood galleries composed of narrowleaf cottonwood (*Populus angustifolia*), Fremont's cottonwood (*Populus deltoides* subsp. *wislizenii*), skunkbrush (*Rhus trilobata*), tamarisk (*Tamarix ramosissima*), and Russian olive (*Elaeagnus angustifolia*). Small patches of the rare Fremont's cottonwood riparian forest (*Populus deltoides* ssp. *wislizenii*/*Rhus trilobata*) dot the islands and portions of the floodplain. Most of these patches are only in fair condition due to the influx of non-native shrubs such as tamarisk and Russian olive and improper grazing. There are also sporadic marshes dominated by cattail (*Typha* sp.) and hardstem bulrush

(*Scirpus acutus*) and alkaline meadows dominated by Baltic rush (*Juncus balticus*), common threesquare (*Scirpus pungens*), and saltgrass (*Distichlis spicata*) throughout the floodplain.

Human habitation has left its mark on this PCA in the presence of numerous exotics including cheatgrass, Japanese brome, quackgrass, Kentucky bluegrass, tamarisk, Russian olive, and knapweed, to name only a few. In certain areas the shrub component has been reduced or completely eliminated as a result of grazing. In areas where the PCA extends upslope for short distances it captures small amounts of sagebrush shrubland and piñon-juniper woodland.

The substratum consists of unconsolidated surficial deposits of Quaternary gravel and alluvium in the valley bottom, and talus and rock-glacier at slightly higher elevation. At still higher elevation is found sedimentary rock of the Tertiary period including Wasatch formation claystone, mudstone and sandstone.

This reach of the river from New Castle into Debeque Canyon supports populations of roundtail chub (*Gila robusta*), flannelmouth suckers (*Catostomus latipinnis*), and mountain whitefish (*Prosopium williamsoni*). In addition, a recovery program for razorback suckers (*Xyrauchen texanus*) stocked 3,498 fish upstream of Parachute, Colorado in 1999. A total of 29,377 juvenile and adult razorback suckers have been released into the Upper Colorado River near Parachute from October 1999 to November 2000; an additional 14,322 suckers have been released into the Gunnison River between April 1994 and November 2000 (Pfeifer and Burdick 2000). In 1999, 174 of these fish were recaptured during electroshocking surveys. Fish disbursement from stocking has been predominately downstream of release sites (Pfeifer Burdick 2000). There are also records of Bald Eagles attempting to nest here in the early 1980s and recent observations of feeding Peregrine Falcons (*Falco peregrinus anatum*) and Sandhill Cranes (*Grus canadensis tabida*). The cottonwood communities found within this PCA should support nesting Bald Eagles, and in time eagles should repopulate this PCA as populations continue to expand after the DDT induced declines of the 1970s and 80s. This is, of course, if the fishery can support them and if the current quality of the area is maintained or improved upon.

#### Natural Heritage elements at the Rifle Stretch Colorado River PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens	EO* Rank
<b>Fish</b>							
<i>Xyrauchen texanus</i>	<b>Razorback sucker</b>	<b>G1</b>	<b>S1</b>	<b>LE</b>	<b>E</b>		<b>C</b>
<i>Gila robusta</i>	Roundtail chub	G2G3	S2		SC	BLM	B
<i>Catostomus latipinnis</i>	Flannelmouth sucker	G3G4	S3		SC	BLM	A
<i>Prosopium williamsoni</i>	Mountain whitefish						C
<b>Plant communities</b>							
<i>Populus deltoides</i> ssp. <i>Wislizenii</i> / <i>Rhus trilobata</i>	<b>Fremont's Cottonwood Riparian Forest</b>	<b>G2</b>	<b>S2</b>				<b>B</b>

<b>Birds</b>							
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4T?Q	S1B,S3N	LT	T		D
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T3	S2B,SZN				D
<i>Grus canadensis tabida</i>	Greater Sandhill Crane	G5T4	S2B,S4N		SC	FS	C
<b>Amphibians</b>							
<i>Spea intermontana</i>	Great Basin spadefoot	G5	S3		SC	BLM	H
<i>Rana pipiens</i>	Northern leopard frog	G5	S3		SC	FS/BLM	B

**Biodiversity Comments:** This site supports numerous occurrences of the globally imperiled (G2S2) Fremont's cottonwood/skunkbrush riparian forest. This association has only been documented from river floodplains of the lower Colorado, Yampa, and San Miguel rivers in extreme western Colorado (Keammerer 1974, Kittel and Lederer 1993). The community has also been reported to occur in degraded stands along the Rio Grande in northern New Mexico (Durkin 1997, personal communication). Nearly all the existing stands are considered to be in decline due to altered hydrology from upstream impoundments and the long-term effects of livestock grazing. Sexual regeneration is poor at all sites, and tamarisk is invading stands of this type on many of the aforementioned rivers.

The Colorado River has been stocked with razorback suckers along the stretch containing this PCA. Razorbacks are not abundant in the Colorado River and this population probably is not self-sustaining. Razorbacks are considered critically imperiled at the global (G1) and state levels (S1). Primary factors justifying the ranks include a greatly reduced range, very low number of breeding occurrences, and high threats as a result of current water and fisheries management, i.e. competition from and predation by, non-native game species (Behnke and Benson 1980). The razorback sucker is listed as endangered by the USFWS and Colorado Division of Wildlife.

In Colorado, the roundtail chub is considered vulnerable at the global (G3) level and very vulnerable at the state (S2) level because of its restricted range and continued threats to its habitat. A reproducing population of roundtails occupies the Colorado River from approximately Rifle to Grand Junction.

Flannelmouth suckers are found in the large rivers of western Colorado, though they have disappeared from some water systems like the Gunnison River above Blue Mesa, where they were displaced by white and longnose suckers (Woodling 1985).

Mountain whitefish are known from relatively few occurrences in Colorado, on the western slope in the Yampa and White rivers, but are considered common in Lodore Canyon on the Green River (Kevin Bestgen, pers. Comm.). The mountain whitefish is considered vulnerable (S3) in Colorado because of its limited range and relatively few documented occurrences.

Currently there are approximately 20 breeding pairs of Bald Eagles in Colorado (Colorado Bird Observatory 1997). Although now in recovery, populations of Bald eagles declined during the 1980s because of high pesticide use, poisoning, and poaching (feathers are valuable on the black market). The bald eagle nests at this PCA have not been active since the 1980s.

Though there are more than 70 known Peregrine Falcon pairs breeding in Colorado, there are fewer than 300 individuals estimated as breeding in Colorado (CNHP

2000). The Peregrine Falcon record from this PCA is of a feeding adult bird that was probably nesting somewhere in the cliffs nearby. Human disturbance of nests by recreational rock climbers, illegal capture by falconers, and uncertain breeding status across the state are factors considered important in the conservation of this imperiled (S2B) species in Colorado.

**Boundary Justification:** The site boundary encompasses the mainstem of the Colorado River and its floodplain, including the adjacent highway and railroad, which are unavoidably parts of this site. The boundaries incorporate an area that will allow natural hydrological processes such as seasonal flooding, sediment deposition, and new channel formation to maintain viable populations of the elements. The boundaries also provide a small buffer from nearby agriculture fields, roads, and houses where surface runoff may contribute excess nutrients, sediment, and herbicides/pesticides. The site contains old oxbow lakes, sloughs, and ponds that could provide a source of recruitment for native wetland and riparian plant species. It should be noted that the hydrological processes necessary to the elements are not fully contained by the site boundaries. Given that the elements are dependent on natural hydrological processes associated with the Colorado River, any upstream activities such as water diversions, impoundments, and development could potentially be detrimental to the elements. This boundary indicates the minimum area that should be considered for any conservation management plan. The boundary is also drawn to include the canyon cliffsides that provide important nesting habitat for Peregrine Falcons.

**Protection Rank Comments:** Most of this PCA is privately owned except for a few patches of BLM land. The aesthetic qualities of the PCA may encourage increased development as populations expand in the Rifle area. Because the land along the Colorado River here is privately owned, realization of this threat is highly probable.

**Management Rank Comments:** Threats to this PCA include invasion of weedy exotics, water control, gravel pits, and encroachment from human population expansion. A majority of the area is irrigated and grazed, and parts are maintained as a hunting preserve, but grazing is allowed on these areas to sustain the agricultural tax status. Exclosures to eliminate grazing in the rare plant communities and along the river edge would aid in sustaining the broadleaf community, the native fish population and support regeneration of native grasses and forbs. Monitoring these communities would assist in understanding how release from grazing pressures influences regeneration of native plants. Also, proper management and maintenance of riparian zones are essential to the native fish population.

Change from a broadleaf riparian community to a riparian scrub community can affect leaf fall, energy flow, water flow, natural cover, water temperature and deposition of eroded materials in rivers (Baltz and Moyle 1984); in turn influencing native fisheries. Cattle browsing is a major factor causing the replacement of broadleaf riparian communities with riparian scrub communities (Rucks 1984) and excluding cattle from the riverbank would assist in conserving the native fishery. Restoration of natural river flows would benefit the recovery of all the rare fish found here, which require low winter flow, high spring flow, cool to warm river temperatures, and flooding. Restoration of

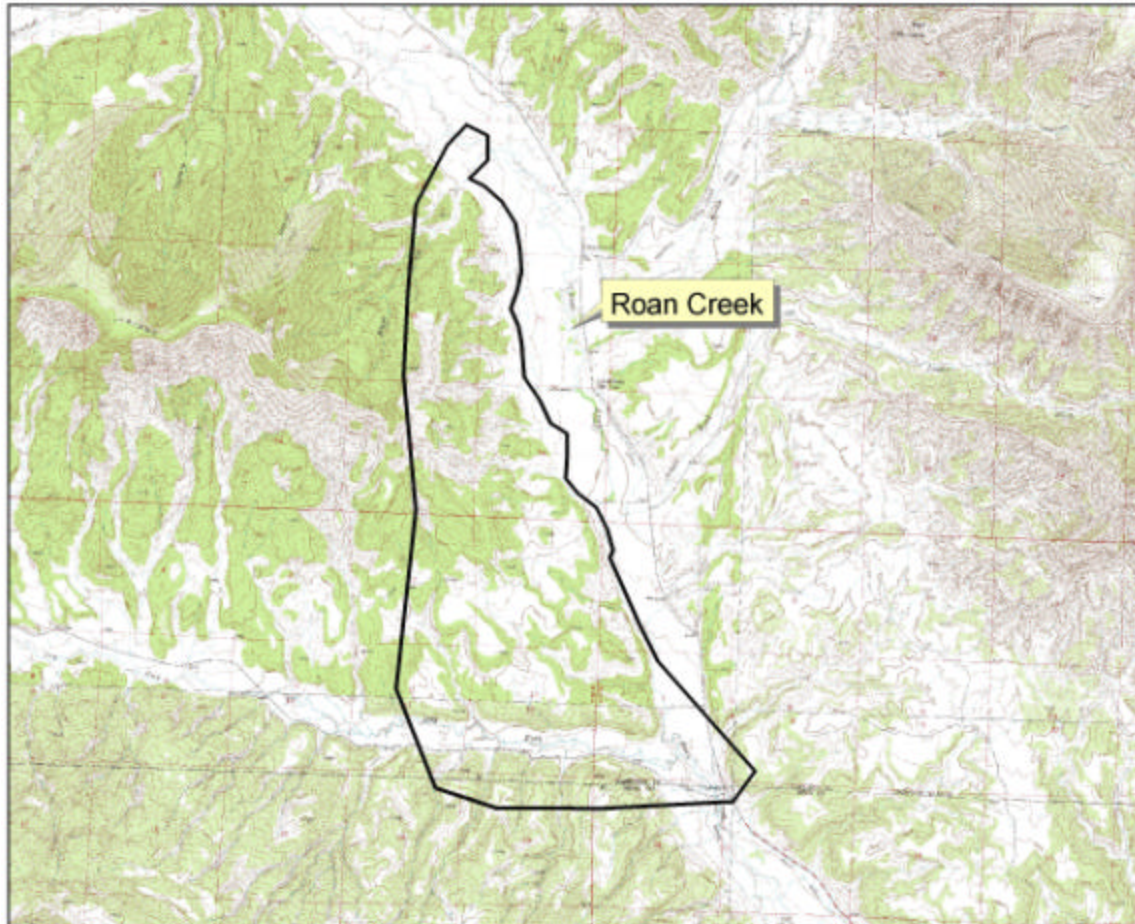





natural flows by eliminating channel diversion structures and riprap hindering natural meanders would aid recovery of the rare native fish. These fish require large stream areas (in the scale of kilometers) that incorporate diverse habitats including pools, riffles, runs, backwaters, adequate substrate and current diversity. Monitoring these populations biannually in the spring during the breeding season and in late autumn would aid in detecting their presence, abundance, recruitment and presence of non-native species that could significantly impact the native fish through predation and competition. Adoption of standardized techniques would assure that data is comparable over locations and time. Data on population trends are needed to distinguish between natural fluctuations in abundance and population decline due to human-caused perturbation. Choice of monitoring locations to ensure that all drainages and morphological variants are represented would aid in interpretation of the data.

With the enduring popularity of waterfront development, loss of nesting habitat may remain the biggest threat to Bald Eagles. Bald Eagles avoid areas with nearby human activity and development (Buehler et al. 1991), so maintaining mature tree stands that are in close proximity to water with limited human presence would benefit this species.

# Roan Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Long Point, 39108-D3          Wagon Track Ridge, 39108-C3          Red Pinnacle, 39108-D2          De Beque, 39108-C2</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Roan Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About 3.5 miles northwest of DeBeque, Colorado

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Long Point, Wagon Track Ridge, DeBeque. T7S R98W S23-26, 35, 36; T8S R98W S1, 2, 11, 12; T8S R97W S7, 6-8, 13, 14, 17, 18.

**Size:** 5,204 acres

**Elevation:** 5,100 to 6,500 feet

**General Description:** The Roan Creek PCA comprises the lower valley bottom and low elevation hills to the west of Roan Creek and along the Dry Fork. The valley bottom is privately owned, and is mostly irrigated agricultural land. As the hills rise to the west, they provide habitat for three rare plants. Soils are derived from the Wasatch and Ohio formations. Vegetation of the area is piñon-juniper woodland and sagebrush meadows. Condition of the PCA varies from pristine to degraded. There is much oil and gas development throughout the area. Naturita milkvetch was found growing on shallow soils in pockets of exposed sandstone along the north facing rim of a dry wash. The piñon-juniper community there included mountain mahogany (*Cercocarpus montanus*), spiny horsebrush (*Forsellesia meionandra*), Easter daisy (*Townsendia incana*), snakeweed (*Gutierrezia sarothrae*), many-lobed groundsel (*Senecio multilobatus*), cat's-eye (*Cryptantha flavoculata*), and large-flower breadroot (*Pediomelum megalanthum*). There was a well-developed soil crust in place along the rim, indicating a lack of disturbance. However, in deeper soils adjacent to the rim, the crust is absent, and exotic species such as cheatgrass (*Bromus tectorum*), alyssum (*Alyssum* sp.) and purple mustard (*Chorispora tenella*) have invaded.

Natural Heritage element occurrences at the Roan Creek PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plants</b>					
<i>Phacelia scopulina</i> var. <i>submutica</i>	DeBeque phacelia	<b>G4T2</b>	<b>S2</b>	<b>C, FS</b>	<b>A</b>
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	<b>G3</b>	<b>S3</b>	<b>LT</b>	<b>A</b>
<i>Astragalus naturitensis</i>	Naturita milkvetch	G3	S3	BLM	B
<i>Phacelia scopulina</i> var. <i>submutica</i>	DeBeque phacelia	G4T2	S2	C, FS	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	C
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	D
<i>Phacelia scopulina</i> var. <i>submutica</i>	DeBeque phacelia	G4T2	S2	C, FS	E
<i>Phacelia scopulina</i> var. <i>submutica</i>	DeBeque phacelia	G4T2	S2	C, FS	E
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	E
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus	G3	S3	LT	E
<b>Birds</b>					
<i>Amphispiza belli</i>	Sage sparrow	G5	S3B, SZN		H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** The Roan Creek PCA includes an excellent (A ranked) occurrence of DeBeque phacelia, a globally imperiled (G4T2) plant, and an excellent occurrence of the globally vulnerable (G3S3) Uinta Basin hookless cactus, as well as a good (B ranked) occurrence of the globally vulnerable Naturita milkvetch.

The DeBeque phacelia is limited to a very small area around DeBeque, and this PCA is the only Garfield County site. These occurrences represent the northern extent of its entire world range. This easily overlooked plant blooms in late May through June when moisture conditions are favorable. It is found on sparsely vegetated, steep slopes, in clay soils on the Atwell Gulch and Shire Members of the Wasatch Formation. The seeds germinate in cracks created by the shrinking and swelling of the clay soils. The plants often shrivel and blow away by the end of the summer, or in drought years like 2000, even by May. No evidence of this annual plant remains from one year to the next. We were unable to locate the plants this year, and it may be that they never germinated.

Garfield County represents the northeastern extent of the range of the Uinta Basin hookless cactus, as well. This species is more widespread than the DeBeque phacelia, but is considered threatened throughout its range, and is the only plant in Garfield County that is listed (threatened) under the Endangered Species Act. The Uinta Basin hookless cactus is a regional endemic of western Colorado and adjacent Utah, with about 96 occurrences in Colorado and an estimated 7600 individuals (NatureServe 2000). It occurs in Delta, Garfield, Mesa, and Montrose counties. It is found in smaller numbers, and more sparsely distributed here than in Mesa and Delta counties. However, the edge of a species' range has additional biological significance. The Uinta Basin hookless

cactus was found widely scattered in the lower elevations of the site, on barren clay soils with hard-packed gravel on top.

Naturita milkvetch was found for the first time in Garfield County during this survey (2000). It occurred both in this PCA, and on the east side of Roan Creek in the Mount Logan Foothills PCA. It was found in habitat very similar to that it occupies in Mesa, Montrose and San Miguel counties, i.e., canyon rims with shallow soils. Other canyon rims in this PCA, which appeared to be suitable habitat for the milkvetch, were also searched, but the plants were not found.

In Colorado there are at least 118 occurrences of Sage Sparrows, including the five known from Garfield County. There are 12 in Mesa County and perhaps more than 50 in Moffat County (Ron Lambeth pers. comm.). Breeding Bird Survey data indicate a stable continental population (Mike Carter, pers. comm.). Breeding populations of this sparrow are listed as vulnerable within Colorado because of the loss of sagebrush habitat occurring throughout its range and the species' relatively small numbers.

**Boundary Justification:** The boundary is drawn to include the occurrences and the potential habitat between them. The eastern boundary follows the border between the irrigated agricultural land and the uncultivated low hills. However, activities on the adjacent cultivated land could affect the PCA, for example by acting as a source of exotic species invasion.

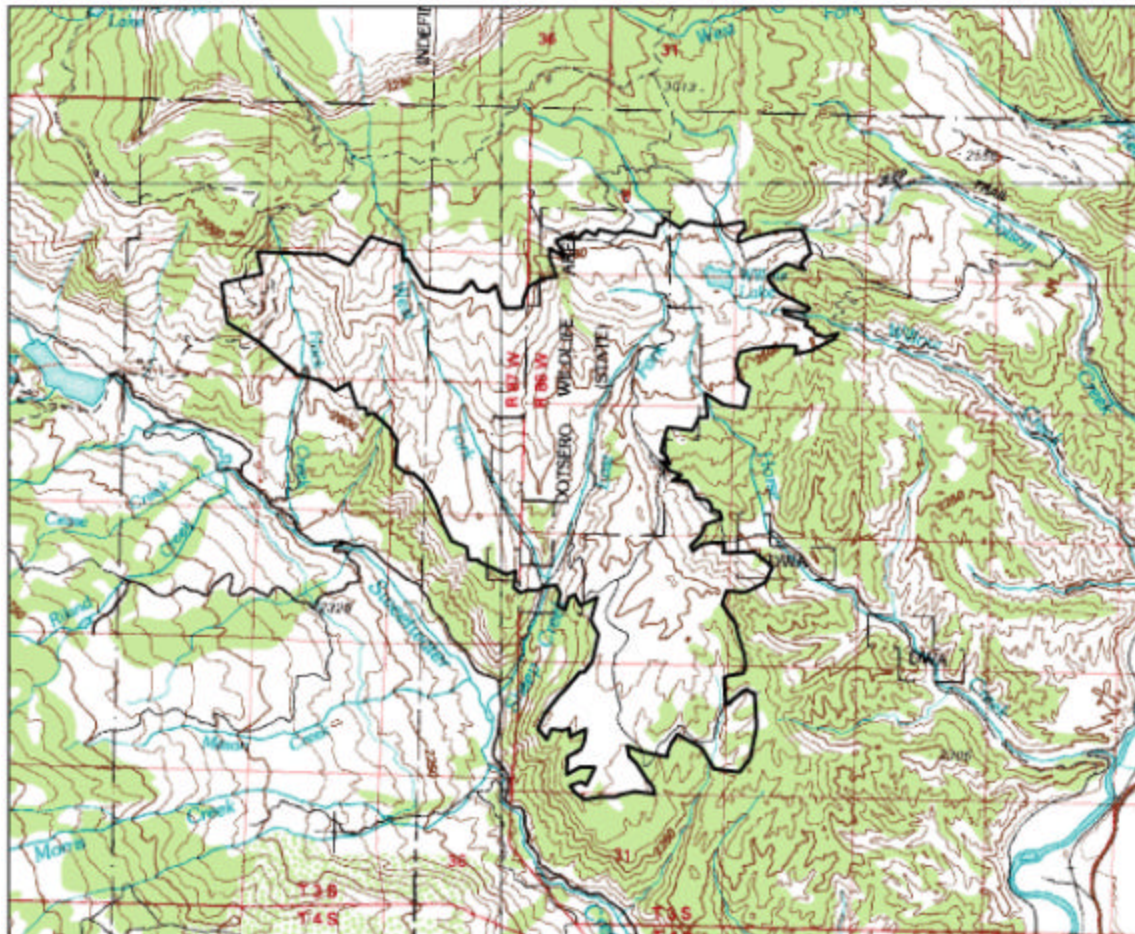
**Protection Rank Comments:** The majority of this PCA is located on BLM land, managed by the Grand Junction Resource Area, with no special protection in place. Part of the site was at one time considered for a dam. It has not been built, and it is unknown what the present plans are. If it were built, it would probably destroy at least part of a Uinta Basin hookless cactus population. The Uinta Basin hookless cactus is protected by federal law, and any direct disturbance to the cacti on BLM land would at the least require some kind of mitigation. As a candidate for listing, the DeBeque phacelia should receive the same protection. Naturita milkvetch is considered a sensitive species by BLM, and policy states that "significant known sites (of sensitive plants) will be protected from surface disturbance (USDI 1984). Any new development of BLM land will require an Environmental Assessment, at which time all listed and sensitive species will be considered. It is usually possible to make minor adjustments in location of surface features to avoid direct impacts to plants. Careful survey of proposed sites of oil or gas development is critical.

**Management Rank Comments:** Although the rare plants in this PCA tend to be found in areas that are not affected by cattle, e.g. canyon rims and shale barrens, cattle do use adjacent areas, and may contribute to the introduction of exotic species.



# Sheep Creek Uplands

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Glenwood Springs, 39107-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area





## Sheep Creek Uplands Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance. This PCA has a excellent occurrence of a globally vulnerable plant species.

**Protection Urgency Rank: P4** No threat known for foreseeable future.

**Management Urgency Rank: M4** Elements do not appear to be currently threatened.

**Location:** The Sheep Creek Uplands PCA is located 10 air miles northwest of Gypsum Colorado in Garfield and Eagle Counties.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Sweetwater Lake, Sugarloaf Mountain. T3S R86W Sections: 5-8, 18-20, 29-31; T3S R87W Sections: 1, 2, 10-14, 24.

**Size:** 6,020 acres

**Elevation:** 7,200 to 9,200 feet (in Garfield County portion)

**General Description:** This PCA is located in Garfield and Eagle counties. Sheep Creek Uplands includes the southern portion of West Fork Sheep Creek and the northern portion of Hack Creek.. The dominant vegetation is sagebrush (*Artemisia tridentata*), with scattered snowberry (*Symphoricarpos sp.*), serviceberry (*Amelanchier utahensis*), piñon (*Pinus edulis*) and juniper (*Juniperus osteosperma*).

Harrington beardtongue (*Penstemon harringtonii*) occurs in this PCA. This plant is narrowly endemic to the state of Colorado and prefers sagebrush habitat. Only known from 41 locations, this is one of the best known sites for this globally rare species.

This site is currently managed by the Bureau of Land Management and has some small areas of private land.

Natural Heritage element occurrences at the Sheep Creek Uplands PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	<b>Harrington Beardtongue</b>	G3	S3	FS/BLM	A
<i>Penstemon harringtonii</i>	Harrington Beardtongue	G3	S3	FS/BLM	B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains an excellent (A ranked) occurrence of Harrington beardtongue (*Penstemon harringtonii*) which is a globally vulnerable (G3S3) plant species that is restricted to Colorado. This PCA contains one of the best of the 41 known locations in the world. The largest threat to this species is residential development; however, this particular site does not appear to be currently threatened.

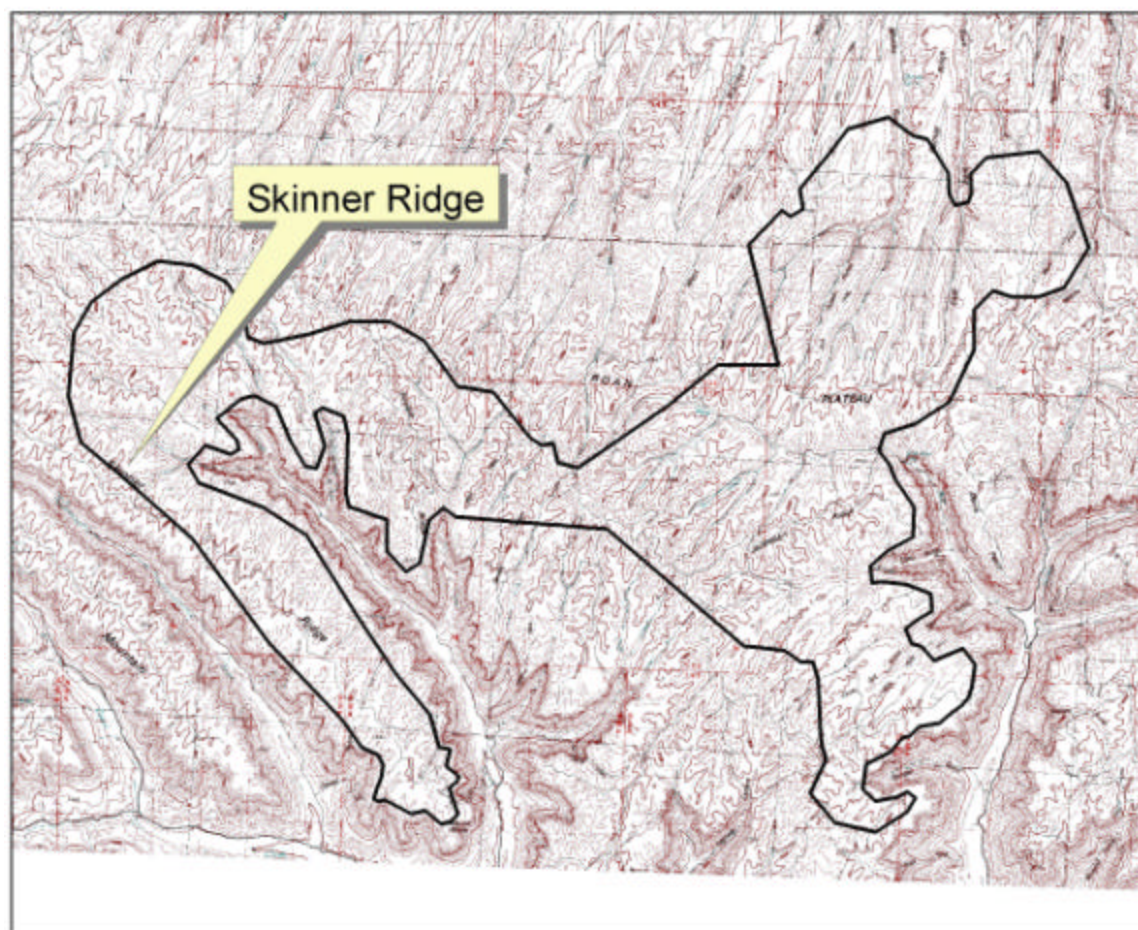
**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of Harrington beardtongue in this site. It includes the occurrences of the rare plant and the unoccupied potential habitat that lies between them. There is additional surrounding potential habitat that is not included.

**Protection Rank Comments:** This site is owned by the Bureau of Land Management, and is primarily undisturbed. Oil and gas potential in this area is believed to be low.

**Management Rank Comments:** This land is managed by the Bureau of Land Management; however some private property is also included. Grazing is the primary land use, and current conditions do not appear to be adversely affecting the occurrences.

# Skinner Ridge

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle\*

Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Skinner Ridge Potential Conservation Area

**Biodiversity Rank: B4** Moderate Biodiversity Significance. This PCA has a fair occurrence of a plant species that is vulnerable both globally and within the state.

**Protection Urgency Rank: P3** There is a definable threat to the occurrence, but not expected within the next five years.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This PCA is located 6.7 miles northwest of New Castle, Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Circle Dot Gulch, Mount Blain, Desert Gulch, McCarthy Gulch, Cutoff Gulch, Bull Fork and Figure Four Springs. T4S R95W, S7, 18, 19; T4S R96W, S1-5, 7-24, 26-35; T4S R97W, S24, 25, 35, 36; T4S R98W, S26, 27, 30-36; T4S R99W, 24-27, 34-36; T5S R96W, S3-9, 15-21, 27-35; T5S R97W, S1-3, 6-18, 22-26, 36; T5S R98W, S1-15, 18-21, 23, 27-34; T5S R99W, S1-3, 10-14, 24; T6S R96W, S5, 6, 18; T6S R97W, S1, 2, 11-14; T6S R98W, S7, 8, 16-21; T6S R99W, S1, 2, 12.

**Size:** 73,949 acres

**Elevation:** 6,539 to 8,576 feet

**General Description:** Skinner Ridge is a high elevation plateau over 6,000 feet in elevation, lying between Brush and Clear creeks in the Parachute Creek drainage. The Parachute Creek PCA overlaps the southeast section of this PCA, covering one third of its entire area. Southern areas of the PCA contain Gambel's oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus*) and serviceberry (*Amelanchier utahensis*) on lower slopes, while upper slopes are forested with spruce-fir (*Picea engelmannii* and *Pseudotsuga menziesii*) and aspen (*Populus tremuloides*). The northern regions of this PCA contain large parks of big sagebrush (*Artemisia tridentata*) to the west and east with a Gambel's oak dominated shrubland lying between them. The majority of this PCA is privately owned and has been ranched for an extensive period of time; however, there are small patches of BLM land spread throughout it. Local ranches utilize the plateau as summer pasture for their livestock.

The PCA lies within the Piceance Basin and consists of sedimentary rocks of the Tertiary age including Uinta siltstone and sandstone, and Green River oil shale, marlstone and siltstone.

Bald Eagles (*Haliaeetus leucocephalus*) and Sage Grouse (*Centrocercus urophasianus*) are known to occur in the PCA, as are the rare Utah fescue (*Argillochloa dasyclada*) and the rare spring wetland community (*Catabrosa aquatica-Mimulus* spp.).

Natural Heritage elements at the Skinner Ridge site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens.	EO* Rank
<b>Plants</b>							
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				C
<i>Argilochloa dasyclada</i>	Utah fescue	G3	S3				C
<b>Plant communities</b>							
<i>Catabrosa aquatica</i> - <i>Mimulus</i> spp.	Spring Wetland	GU	S3				C
<b>Birds</b>							
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B,S3N	LT	T		D
<i>Centrocercus urophasianus</i>	Sage Grouse	G4	S4		SC	BLM	C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** This PCA contains two fair (C ranked) occurrences of Utah fescue, a regional endemic that is narrowly distributed, documented in only four counties in Utah and Colorado, and considered to be globally imperiled (G3S3). Most of the occurrences are underlain by oil shale deposits and owned by private oil companies. Also, this grass appears to be sensitive to domestic livestock grazing. There are 54 known occurrences of the Utah fescue with over 23,000 individuals.

There are many occurrences of Sage Grouse in much of Colorado's sagebrush habitat, including the population occupying Skinner Ridge, and this species is found in much of northwestern Colorado. There is, however, strong evidence of significant declines in Sage Grouse, and a few populations have been extirpated (Braun *et al.* 1991). In addition, this species continues to be hunted, and relatively few populations can be considered protected.

There is a documented Bald Eagle nest in the PCA. According to the Colorado Bird Observatory (1997) there are approximately 20 breeding pairs of Bald Eagles statewide (Colorado Bird Observatory 1997). The small breeding population, the numerous threats that exist, and the varying success of nests from year to year, warrant a critically imperiled rank for breeding birds. Federally downlisted from endangered to threatened, the Bald Eagle is still protected by the Endangered Species Act and the Eagle Protection Act. The Colorado Division of Wildlife also lists the Bald Eagle as threatened.

**Boundary Justification:** Boundaries for the PCA were adapted from Colorado Division of Wildlife Resource Information System GIS maps showing important sage grouse nesting habitat. Nesting habitat was mapped as a buffer zone of 2 miles around active leks which is the recommended standard (Schroeder *et al.* 1999). The random distribution of nests in relation to lek location suggests that Sage Grouse choose nesting sites based on habitat components other than distance from leks. The quantity of habitat necessary to support minimum viable populations is necessarily greater than the 2 mile target. The greatest factors contributing to nest failure are predation of eggs, adults on nests, and young during feeding, as well as food availability. In addition, overwinter survival is compromised when large continuous stands of big sagebrush are absent. The

boundaries of this PCA were drawn to include the lek sites, with two mile buffer zones and areas between the leks, thus effectively connecting all lek sites for what is probably a panmictic population of Sage Grouse. The boundaries effectively include territory accommodating all required seasonal habitats of the grouse.

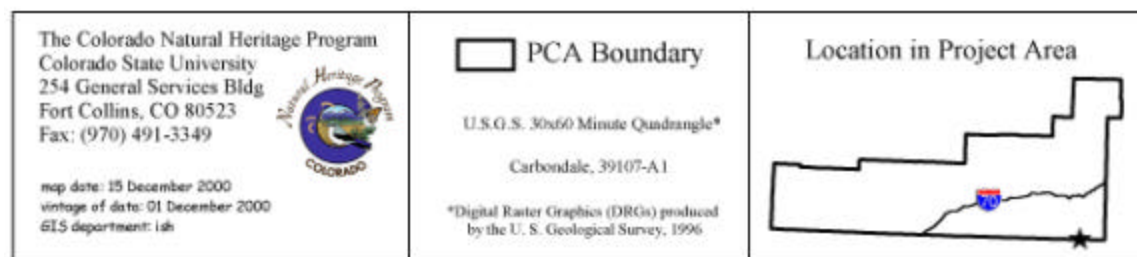
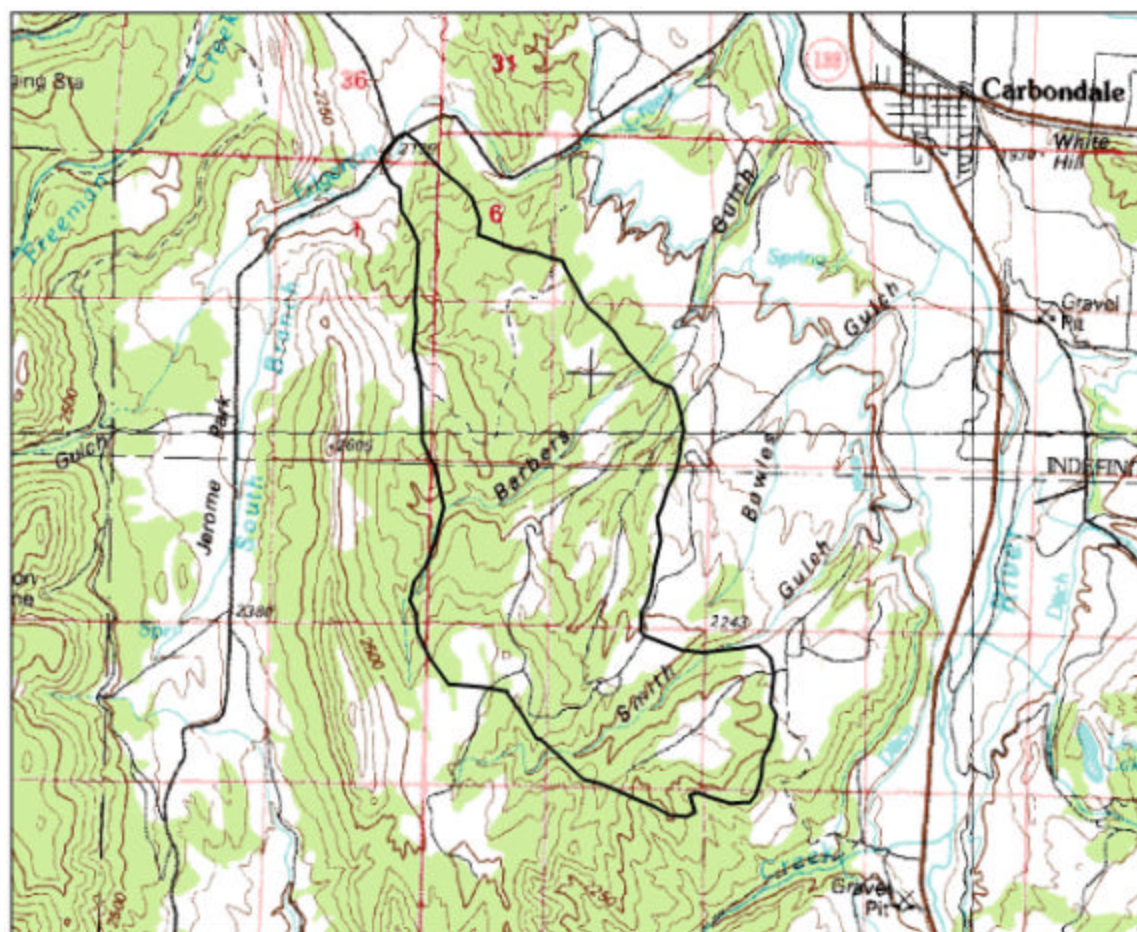
**Protection Rank Comments:** This area is privately owned with only small amounts of BLM land spread within. The potential exists for range improvement programs removing sagebrush to promote forage for livestock. Also, although this area is remote and difficult to access, the development of an improved access road coupled with the area's aesthetic qualities would increase potential threats of development. Finally, this PCA also includes oil shale found in the Green River Formation. Mining of oil shale is a very destructive activity. Large amounts of rock must be processed to produce small amounts of oil. This process takes large quantities of water and also produces large amounts of waste material that must be deposited nearby. Oil shale is not cost effective to extract at this time and the area is not currently mined. However, the possibility exists that extraction activities could be renewed, potentially destroying the area's rare flora and fauna. Protecting the area's natural features from surface mining would help to ensure survival of the PCAs rare elements.

**Management Rank Comments:** Large areas of sagebrush, with a good mixture of grasses and forbs are essential for survival of Sage Grouse. Threats at this PCA include habitat loss and degradation of sagelands through agriculture and grazing. Management of this PCA to maintain areas of big sagebrush and relatively tall and thick grass, forb and shrub cover will improve Sage Grouse habitat. These components supply cover from predation for both adults and chicks and supply adequate food in the form of buds, blossoms, leaves, stems, fruit, and also insects, which are particularly important to juveniles within their first three weeks of life. They also supply winter forage, which consists primarily of big sagebrush. Experts agree that the primary explanations for the rangewide reduction in Sage Grouse populations are cultivation, treatment to remove sagebrush, urbanization, intense grazing, and changes in fire frequency, especially increased fire frequency due to invasion of cheatgrass (*Bromus tectorum*) (Schroeder et al 1999). Therefore, large scale treatments of sagebrush habitats with chaining, spraying, or burning to benefit livestock production on Skinner Ridge will harm this population of Sage Grouse. Management of present grazing activities would benefit the area's rare flora and fauna. Elimination of grazing during the chick-rearing period (May-August) would enhance chick survival by increasing cover. Removal of nearby piñon and juniper trees encroaching upon sagebrush habitat, utility poles, and other perching sites can help to prevent predation of adults on leks by raptors. The element occurrences should be monitored every one to five years to detect changes in size and conditions and threats should also be monitored annually. Controlling cheatgrass (*Bromus tectorum*), which was noted in 1996 in just a few small patches, and recovery of native grasses and forbs would benefit both the Sage Grouse and rare flora.



# Smith Gulch

## Potential Conservation Area



## Smith Gulch Potential Conservation Area

**Biodiversity Rank: B4** Moderate Biodiversity Significance This PCA contains a fair occurrence of a globally vulnerable plant species.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Management action is suggested within the next five years to preserve the integrity of the occurrence.

**Location:** The Smith Gulch PCA is located 1.5 air miles southwest of Carbondale Colorado.

**Legal Description:** U.S.G.S. 7.5 minute quadrangles: Cattle Creek, Carbondale, Mount Sopris, Stony Ridge. T7S R89W Section: 36; T8S R88W Sections: 5-8, 17-21, 28, 29.

**Size:** 3,246 acres

**Elevation:** 6,800 to 7,400 feet

**General Description:** The Smith Gulch PCA is located in extreme southeastern Garfield County and adjacent Pitkin County. Smith Gulch is an intermittent drainage that flows into the Crystal River just above its confluence with the Roaring Fork River. The geology of the area is dominated by the Maroon Formation, consisting of arkosic sandstone and siltstone. The site boundaries extend beyond the Garfield county line, where better occurrences of Harrington beardtongue (*Penstemon harringtonii*) exist.

This dominant vegetation characterized by a combination of piñon-juniper (*Pinus edulis-Juniperus osteosperma*) woodlands, Gambel's oak (*Quercus gambelii*) shrublands, and big sagebrush (*Artemisia tridentata*) shrublands. The sagebrush shrublands support a globally-vulnerable plant species, Harrington beardtongue (*Penstemon harringtonii*).

The land owners include Bureau of Land Management and private land owners. Grazing is the primary land use in this area.

Natural Heritage element occurrences at the Smith Gulch PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	Harrington Beardtongue	G3	S3	FS/BLM	C

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site contains a fair (C ranked) occurrence of Harrington beardtongue (*Penstemon harringtonii*), a globally-vulnerable (G3S3) plant which is restricted to Colorado and is found almost exclusively in sagebrush habitat. This species is known from 41 locations, with its center of distribution near Edwards, in Eagle

County. In general, Harrington beardtongue and its habitat are threatened by residential development.

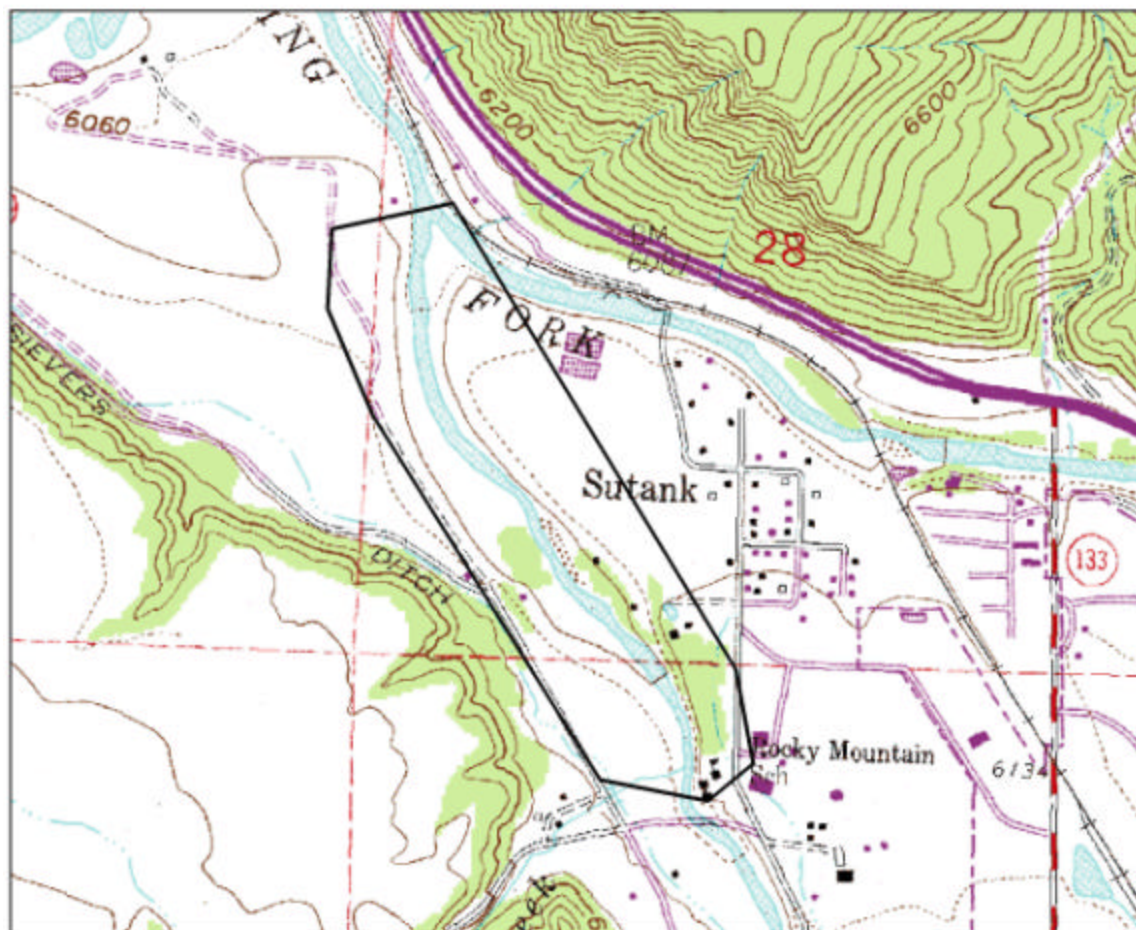
**Boundary Justification:** The PCA boundary includes the occurrences of Harrington beardtongue and additional potential habitat to allow for migration of the rare plants over time.

**Protection Rank Comments:** The PCA includes both private and Bureau of Land Management lands. Cattle grazing is currently the primary land use. This PCA may be impacted in the future by road or housing developments, as there are high development pressures from Carbondale. At least one of the private landowners is interested in preserving the rangeland and the rare plant. Actions could include the development of conservation easements or management agreements with willing private landowners, and specific management plans for the BLM lands that would address the long-term viability of the rare plant at this location. BLM lands may be considered for Area of Critical Environmental Concern (ACEC) or Special Interest Area (SIA) designation.

**Management Rank Comments:** The Harrington beardtongue occurrence appears to be restricted to the roadside. The adjacent land is being grazed and has been planted with hay grasses in some areas. Changes in current road maintenance could affect the integrity of the occurrence. There are several exotic species present in this PCA most of which are associated with hay production and reseeding of road sides. The species of most concern at this time is hound's tongue (*Cynoglossum officinale*), which tends to be aggressive, displace desirable species, and is a threat to livestock, as it is toxic to cattle and horses.

# Sutank

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Carbondale, 39107-D2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Sutank Potential Conservation Area

**Biodiversity Rank: B5** General biodiversity significance . The Sutank PCA contains two orchid species, one vulnerable and the other imperiled in the state, as well as a vulnerable fish species.

**Protection Urgency Rank: P4** Land owners are aware of the occurrences and are interested in their protection.

**Management Urgency Rank: M3** Management of exotic species will help to preserve the orchids.

**Location:** The Sutank PCA is located ¼ of a mile west of Carbondale, Colorado

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale. T7S R88W Sections: 28, 29, 33.

**Size:** 107 acres

**Elevation:** 6,000 feet

**General Description:** The Sutank PCA is a narrow strip of riparian vegetation located along the Crystal River between the confluence of the Roaring Fork River and Edgerton Creek. The geology is characterized by quaternary alluvium. The area is dominated by narrowleaf cottonwood (*Populus angustifolia*), and stands of coyote willow (*Salix exigua*), Rocky Mountain willow (*S. monticola*), alder (*Alnus incana*), and twinberry honeysuckle (*Distegia involucrata*) with an understory of field horsetail (*Equisetum arvense*), false Solomon's seal (*Maianthemum stellatum*), and rush species (*Juncus spp*). This PCA includes good occurrences of two orchid species, the Canyon Bog Orchid, a plant that is vulnerable in the state, and the Yellow lady's-slipper, a plant that is imperiled in the state. The mountain whitefish (*Prosopium williamsonii*), a species vulnerable in Colorado, was also observed in this PCA. The mountain whitefish is also known to occur in the Roaring Fork River from Glenwood Springs to near Woody Creek, and unverified occurrences have been reported between Woody Creek and Aspen. There are few rivers in Colorado known to contain this fish species. It is mostly restricted to the northwestern portion of the state. The land is privately owned and does not seem to be under any direct development pressure. The current landowners are aware of the orchid occurrences and are interested in protecting the species.



Natural Heritage element occurrences at the Sutank PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<b>Plants</b>					
<i>Limnorchis ensifolia</i>	<b>Canyon Bog Orchid</b>	<b>G4G5T3?</b>	<b>S3</b>		<b>B</b>
<i>Cypripedium calceolus</i> <i>ssp. parviflorum</i>	<b>Yellow lady's-slipper</b>	<b>G5</b>	<b>S2</b>		<b>B</b>
<b>Fish</b>					
<i>Prosopium williamsonii</i>	<b>Mountain whitefish</b>	<b>G5</b>	<b>S3</b>		<b>E</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The PCA includes good (B ranked) occurrences of two orchid species, one that is vulnerable (G4G5T3?S3) and the other imperiled (G5S2) in the state, and an unranked (E) occurrence of the mountain whitefish.

Canyon bog orchids grow in moist or wet soil in mountain meadows, marshes, swamps, fens, open or dense forests, on stream banks and open seepage, frequently about springs. The species has a wide range, from Oregon to Mexico, but good habitat is limited. The orchid's survival depends on a reliable year-round supply of moisture.

Yellow lady's-slipper is known from 26 locations throughout Colorado, as well as the continental U.S., Alaska and Canada. However, it is sparsely distributed and uncommon.

The mountain whitefish is a species which is vulnerable in Colorado, and occurs in relatively few rivers in the state.

**Boundary Justification:** The boundary of this PCA was drawn to protect the populations of the orchid species, and to provide additional habitat for new colonization.

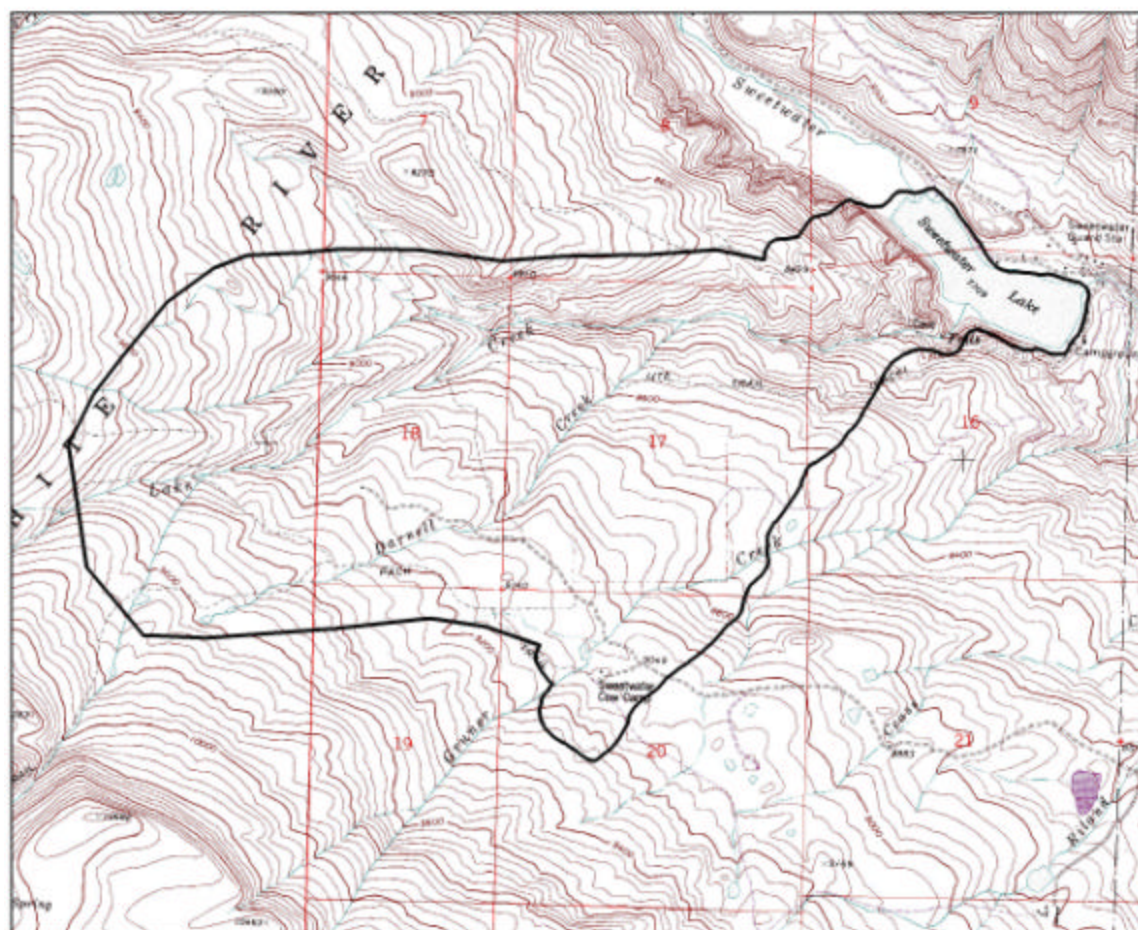
**Protection Rank Comments:** This property is privately owned and is not presently in danger of development. The current landowners are interested in conservation and excited about the elements found on their property.

**Management Rank Comments:** Exotic plant species in the PCA include hound's tongue (*Cynoglossum officinale*), orchard grass (*Dactylis glomerata*), Kentucky blue grass (*Poa pratensis*), tansy (*Tanacetum vulgare*), and Russian olive (*Elaeagnus angustifolia*). Management of these species, especially hound's tongue and Russian olive, are essential to prevent the loss of the element occurrences. Trampling of vegetation was observed, and re-routing of foot paths could preserve the integrity of these occurrences. An irrigation ditch is presently located parallel to the Crystal river. Its impacts on present conditions are unknown; however any changes may be considered for their effect on the orchid species. Orchid species generally have a narrow ecological amplitude and changes to the hydrology may affect the current populations.



# Sweetwater Lake

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Sweetwater Lake, 39107-G2

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Sweetwater Lake Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** Sweetwater Lake is located approximately 15 miles northwest of the town of Gypsum, CO within the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Sweetwater Lake. T3S R87W Sections 7-9, and 16-20; T3S R88W Sections 12, 13, and 24.

**Size:** 2000 acres

**Elevation:** 7,700 to 9,600 feet

**General Description:** This site includes Sweetwater Lake and portions of two of its tributaries, Darnell and Lake Creeks, which actually merge prior to draining into the lake. These creeks are best characterized as steep and narrow with thinleaf alder (*Alnus incana*), aspen (*Populus tremuloides*), subalpine fir (*Abies lasiocarpa*), and mountain willow (*Salix monticola*) dominating the overstory. There is also a fairly large willow carr along Darnell Creek where mountain willow and beaked sedge (*Carex utriculata*) are abundant. The upland slopes are vegetated with spruce-fir forests.

Natural Heritage element occurrences at the Sweetwater Lake PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix monticola</i> / <i>Carex utriculata</i>	Montane riparian willow carr	<b>G3</b>	<b>S3</b>				<b>B</b>
<i>Populus tremuloides</i> / <i>Alnus incana</i>	Montane riparian forest	<b>G3</b>	<b>S3</b>				<b>B</b>
<b>Birds</b>							
<i>Plegadis chihi</i>	White-faced Ibis	G5	S2B, SZN				H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S3) mountain willow/beaked sedge (*Salix monticola*/*Carex utriculata*) montane riparian willow carr. This association is known from thirteen locations in

Colorado, but an additional ten to twenty more are expected in the state. Mountain willow appears to be at the center of its distribution in Colorado, where it frequently forms large thickets with few other willow species present. Literature from Utah, Wyoming, Montana, Idaho, Nevada and Oregon indicate that mountain willow loses importance north and west of Colorado, as it mixes with other willow species. A good (B-ranked) occurrence of the globally vulnerable (G3/S3) aspen/thinleaf alder (*Populus tremuloides/Alnus incana*) montane riparian forest also occurs at this site. This plant association has only been documented in Colorado but is expected to occur in other Rocky Mountain States. A probable breeding record of the White-faced Ibis (*Plegadis chichi*) was documented from this PCA in 1983, but no further observations have ever been reported.

**Boundary Justification:** The boundary encompasses the narrow riparian areas, surrounding slopes, and some upstream drainages to ensure continued surface flow, periodic flooding, and opportunity for the creek's fluvial processes to maintain a dynamic distribution of riparian plant communities. These processes are necessary for the continued viability of the elements and maintenance of ecological functions. However, the entire upstream portion of the watershed was not included in the site boundaries. Thus, these areas need to be considered in order to ensure that hydrological processes remain intact.

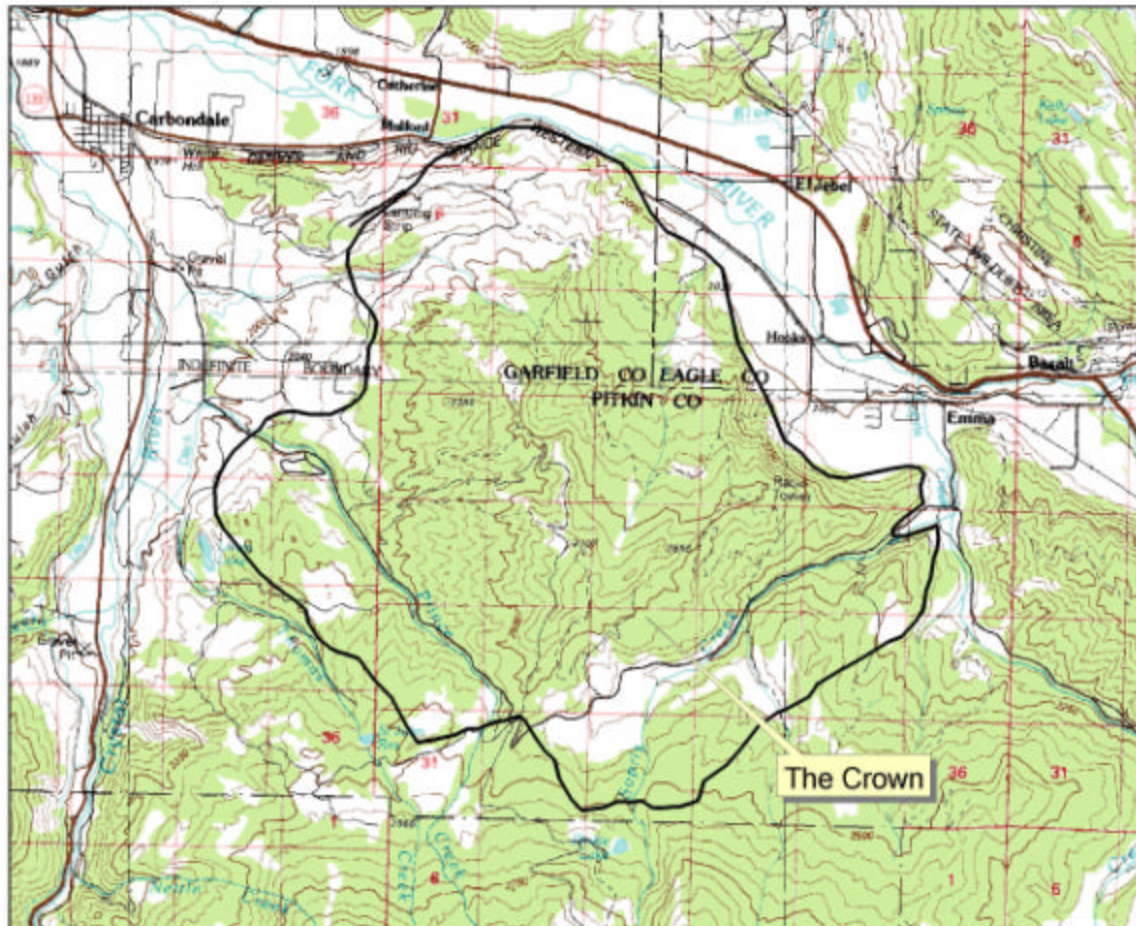
**Protection Rank Comments:** The site is currently managed by the White River National Forest and does not have any special protection status.




**Management Rank Comments:** There is a dense network of pack, game, and human trails throughout the area. Improper grazing and trampling are the main concerns for this site. These activities should be monitored. If they increase, their impacts would likely degrade the elements. Non-native species such as Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale*), and smooth brome (*Bromus inermis*) are present in the area.



# The Crown

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Carbondale, 39107-A1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## The Crown Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance. An excellent occurrence of a globally vulnerable plant species and an excellent occurrence of a plant community are found within this PCA.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future. This PCA is publicly owned and managed by the BLM. There are no threats known for the foreseeable future.

**Management Urgency Rank: M3** Management is needed to maintain the quality of the PCA. Recommended management actions include restrictions regarding hiking, biking, motor vehicles, and grazing, and the implementation of an exotic plant eradication program.

**Location:** Garfield, Eagle and Pitkin counties. About four miles east of Carbondale.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Carbondale. T8S R87W Sections 3-10, 13-34; T7S R87W Sections 31-33; T8S R88W Sections 1, 12-14, 23-25.

**Size:** 3,763 acres

**Elevation:** 6,500 to 8,800 feet

**General Description:** The Crown is a fairly level upland, located in the extreme southeast of Garfield County and extending into Eagle and Pitkin counties. It is bounded by Prince Creek to the west, West Sopris Creek to the east, and the Roaring Fork River to the north. The site ranges in elevation from about 6,500 feet along the Roaring Fork River, to 8,800 feet at the summit of The Crown. Shadowed by Mount Sopris at 12,953 feet, this site is spectacular. The vegetation is characterized by piñon-juniper (*Pinus edulis-Juniperus* sp.) woodlands, and Gambel's oak (*Quercus gambelii*), and big sagebrush (*Artemisia tridentata*) shrublands. Within the large areas of oak shrublands, there is an area which is dominated by oak and snowberry (*Symphoricarpos rotundifolius*). The sagebrush dominated areas support the globally rare Harrington beardtongue (*Penstemon harringtonii*), although a low total number of individuals have been documented for this location. The west-facing slopes from The Crown to Prince Creek are steep with intermittent creeks. In contrast, the slopes above West Sopris Creek are gentle rolling hills. Approximately 7000 acres are included in the site boundaries. This large area is in good overall condition, but scattered roads and trails used by recreationists are creating erosion and weed problems.

Natural Heritage element occurrences at The Crown PCA (Garfield County only).

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Penstemon harringtonii</i>	<b>Harrington beardtongue</b>	<b>G3</b>	<b>S3</b>	<b>FS/BLM</b>	<b>C</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The Garfield County part of this PCA contains a fair (C ranked) occurrence of Harrington beardtongue (*Penstemon harringtonii*), a globally rare (G3) plant species that is endemic to Colorado and is found almost exclusively in sagebrush habitat. The high rank for this PCA is based on excellent (A ranked) occurrences of the beardtongue in the Eagle and Pitkin County part of the PCA. In general, Harrington beardtongue and its habitat are highly threatened due to residential and recreational development. These threats, in addition to its restricted range, create an urgency for protection. Harrington beardtongue populations are known to fluctuate in population numbers from year to year. Although a low total number of individuals have been documented within this site, numbers could increase in a good year.

**Boundary Justification:** The boundary is drawn to include the area that supports the long-term survival of Harrington beardtongue. It includes the mosaic of community types in which the four sub-populations are found. The surrounding high quality habitat is included because of its importance as a buffer to direct disturbances, such as trampling, and indirect disturbances, such as unnatural erosion. The site also provides additional suitable habitat for the elements to establish in over time.

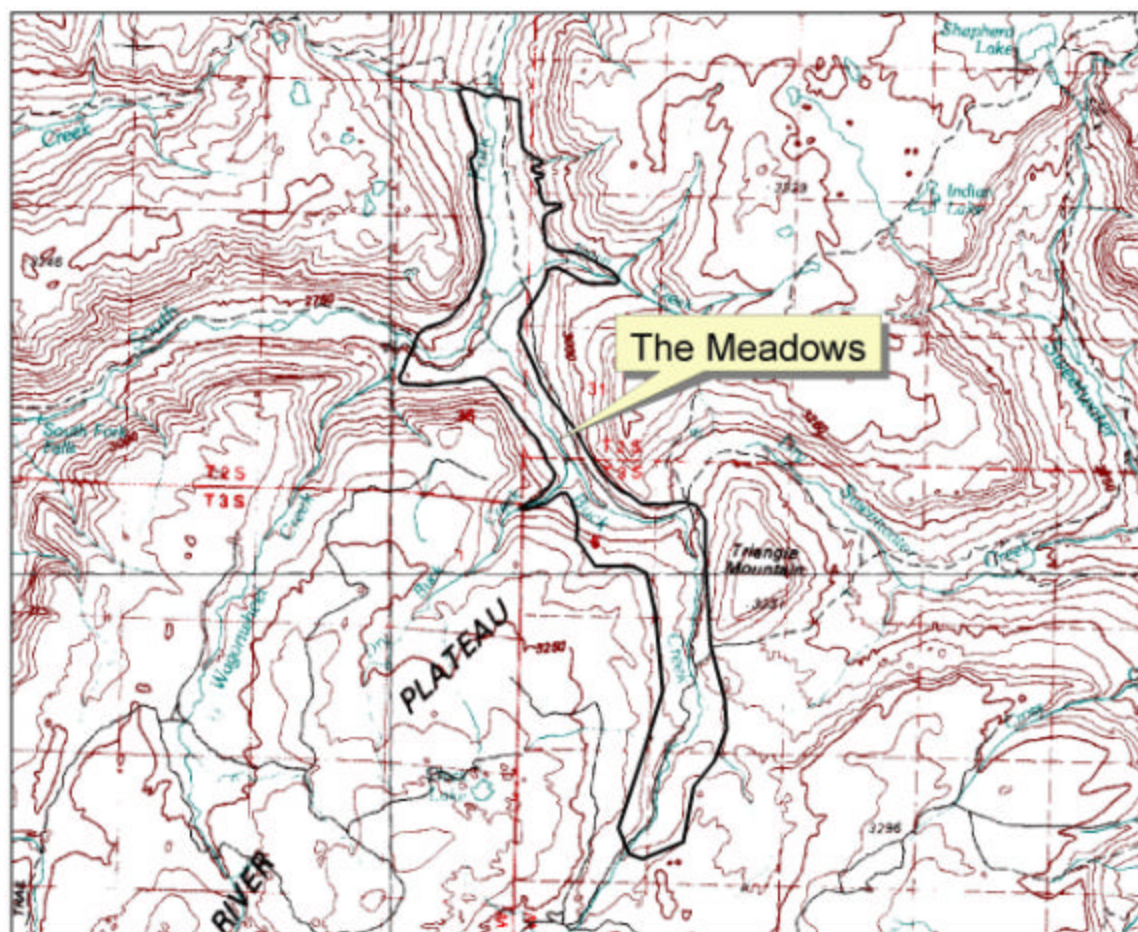
**Protection Rank Comments:** This PCA is publicly owned and managed by the Bureau of Land Management. There is no special protection in place.




**Management Rank Comments:** The Bureau of Land Management is aware of Harrington beardtongue (*Penstemon harringtonii*) at this location, but a management plan for this species in this resource area and also specifically at this location has not been developed. Grazing, motorcycle use, and recreation are currently the main land uses. Grazing has been noted on Harrington beardtongue. There are roads scattered throughout the site which cause erosion problems and are acting as thoroughfares for weeds, such as Kentucky bluegrass (*Poa pratensis*). These exotic plant species should be controlled from spreading into adjacent communities. Future roadways should be discouraged.



# The Meadows

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 30x60 Minute Quadrangle*</p> <p>Glenwood Springs, 39107-E1</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	--

## The Meadows

**Biodiversity Rank: B3** High biodiversity significance. This site contains a good occurrence of a community which is vulnerable on a global scale

**Protection Urgency Rank: P4** Monitoring may reveal a need to specifically designate the area.

**Management Urgency Rank: M2** Ongoing, recurring management must continue to prevent loss of these element occurrences. There is heavy recreational use in this PCA. Timber activity is on-going, both past and proposed. Although much of the timber activity is above the site, potential watershed impacts could occur.

**Location:** This site is located within the White River National Forest, partially within the Flat Tops Wilderness Area, approximately 9 miles south-southwest of Trappers Lake.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Deep Lake. T2S R88W Sections 19, and 30-33; T2S R89W Sections 24, 25, and 36; T3S R88W Sections 4-8, 17, and 18.

**Size:** 1,976 acres

**Elevation:** 9,000 – 10,200 ft.

**General Description:** This is a large site encompassing portions of the Buck Creek and South Fork White River drainages. Headwaters of Buck Creek occur near Heart Lake. This drainage is characterized by open, rocky meadows of various herbaceous and willow species along the valley bottom surrounded by slopes of subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*). Wolf willow (*Salix wolfii*), Drummond's willow (*S. drummondiana*), Geyer willow (*S. geyeriana*), chiming bells (*Mertensia ciliata*), and sedges (*Carex* spp.) dominate a fairly wide and continuous riparian willow carr. Further downstream, Buck Creek narrows as it continues toward its confluence with South Fork White River. Along this long, narrow stretch of the creek (at least a mile in length) subalpine fir, Engelmann spruce, and Drummond's willow dominate the riparian area. At the confluence with South Fork White River is a historic record of the globally critically imperiled boreal toad (*Bufo boreas*). Upstream from this confluence, along the South Fork White River, is a long, wide, open grassland (*Festuca* sp.) on adjacent upland slopes. At higher elevations, aspen (*Populus tremuloides*) and conifers dominate the upland slopes. Booth willow (*Salix boothii*), wolf willow, and various herbaceous species occupy the riparian area.

Natural Heritage element occurrences at The Meadows PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix wolfii</i> /Mesic forb	Subalpine riparian willow carr	G3	S3				A
<i>Salix wolfii</i> /Mesic forb	Subalpine riparian willow carr	G3	S3				B
<i>Salix boothii</i> /Mesic forb	Riparian willow carr	G3G4	S3				AB
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Salix drummondiana</i>	Montane riparian forest	G5	S4				A
<b>Amphibians</b>							
<i>Bufo boreas</i>	Boreal toad	G4T1Q	S1				H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** This site supports an excellent (A-ranked) and good (B-ranked) occurrence of the globally vulnerable (G3/S3) wolf willow/mesic forb (*Salix wolfii*/mesic forb) subalpine riparian willow carr. This community has a widespread distribution but it is never abundant where it is found. Currently, there are less than 30 documented locations of this community in the world but more are expected. There is also a good (B-ranked) occurrence of the state rare (G4G3/S3) Booth willow/mesic forb (*Salix boothii*/mesic forb) riparian willow carr. An excellent (A-ranked) occurrence of the common (G5/S4) subalpine fir-Engelmann spruce/Drummond's willow (*Abies lasiocarpa*-*Picea engelmannii*/*Salix drummondiana*) riparian forest is also found at this site. There are historical records of both the boreal toad (*Bufo boreas*) and Peregrine Falcon (*Falco peregrinus anatum*) at this PCA. The boreal toad was last recorded from here in 1963, the peregrine in 1986. Neither of these species were located during this survey as attempts to access this area during the survey were unsuccessful.

**Boundary Justification:** . The boundary encompasses the floodplain and surrounding slopes to ensure hydrological processes, such as flooding and natural sedimentation of beaver ponds and subsequent new channel formation, continue to maintain a dynamic distribution of aquatic and terrestrial habitat. These processes are necessary for the viability of the elements.

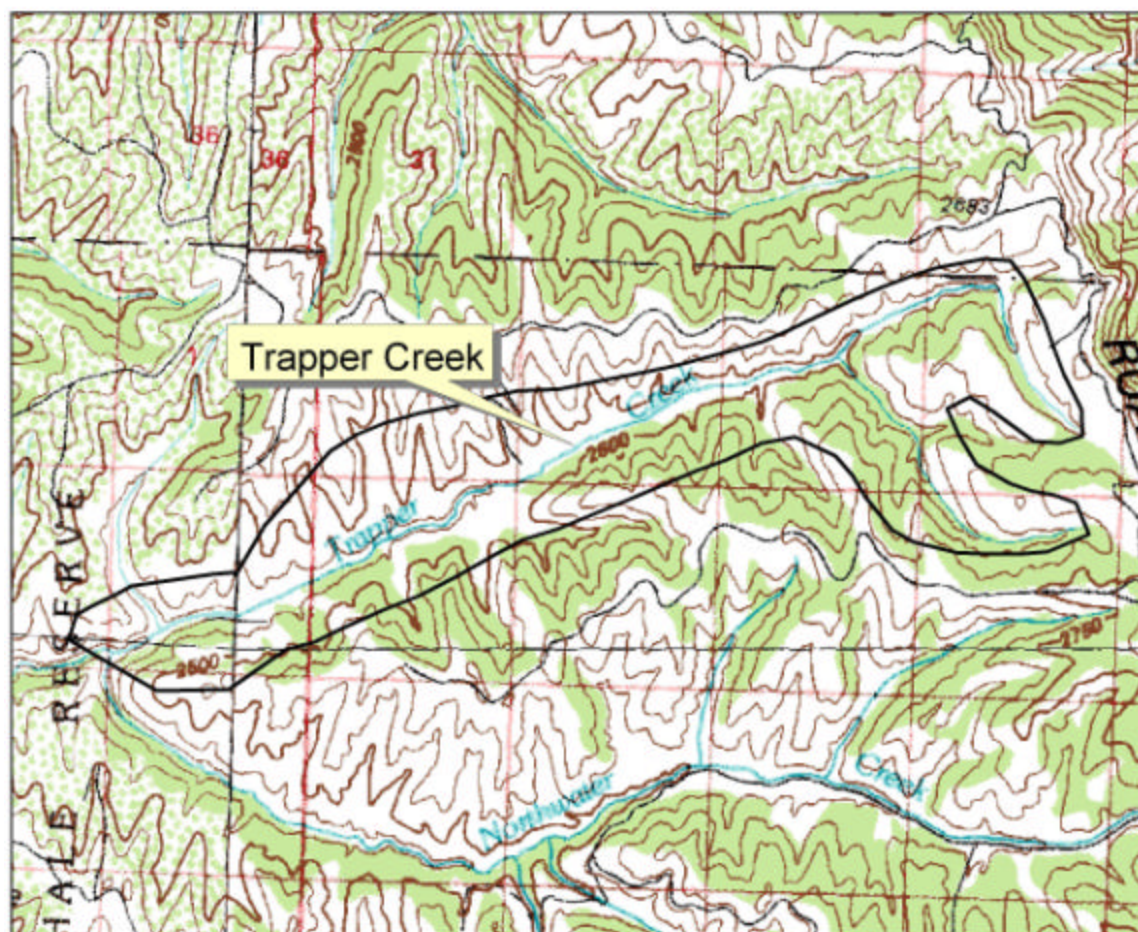
**Protection Rank Comments:** A portion of the site is within the Flat Tops Wilderness Area and is extremely remote.

**Management Rank Comments:** There is heavy recreational use in the area. Timber activity is on-going, both past and proposed. Although much of the timber activity is above the site, potential watershed impacts could occur. Further monitoring and survey work for the boreal toad would aid in determining their status in the area. The solitary nature of this amphibian coupled with an aversion to forming large breeding groups makes detection difficult.



# Trapper Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: lah

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Glenwood Springs, 39107-E1  
Douglas Pass, 39108-E1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Trapper Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance. This PCA contains an excellent occurrence of the globally vulnerable Utah fescue. It also contains occurrences of the Colorado River cutthroat trout, a fish that is vulnerable within the state.

**Protection Urgency Rank: P3** Although there is a definable threat to the area, it is unknown when it will affect the occurrence. This PCA currently has no special protective designation and given that grazing is intense here, consideration for ACEC designation is warranted. Oil and gas development exists as a potential additional threat to this area further justifying ACEC designation.

**Management Urgency Rank: M2** This area is heavily impacted from grazing. In a 1996 report, CDOW notes that "grazing impacts (are) heavy in upper Trapper Creek".

**Location:** This PCA is located 8.7 miles northwest of Rifle, Colorado

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Rio Blanco, McCarthy Gulch, Anvil Points and Forked Gulch. T4S R94W S34; T5S R94W S3-8, 10; T5S R95W S11, 12.

**Size:** 2,411 acres

**Elevation:** 7,680 to 8,400 feet

**General Description:** Trapper Creek originates from the east edge of the Roan Plateau on the former Department of Energy (DOE) Naval Oil Shale Reserve (NOSR) property near Rifle, Colorado. Trapper Creek flows east to west and joins Northwater Creek from the south to form East Middle Fork Parachute Creek. Spruce-fir (*Picea engelmannii*-*Abies lasiocarpa*) and aspen (*Populus tremuloides*) forests on north-facing slopes and mountain sage shrubland (*Artemisia tridentata* ssp. *vaseyana*) on the south-facing slopes characterize the drainage. The creek has formed a canyon through layers of sedimentary rock of the Tertiary period including Green River oil shale, marlstone, and siltstone, and siltstone and sandstone of the Uinta formation. The area is publicly owned and administration was recently transferred to the BLM, which manages the area for livestock grazing. The Roan Plateau is believed to have been hunting grounds for native peoples. Along Trapper Creek can be found arrowheads and prehistoric skeletal remains of mountain bison. These remains show signs of having been altered (worked) by native peoples.

Trapper Creek has a fairly extensive (100+ year) history of grazing use by domestic cattle and sheep. This use was at times rather heavy with large numbers of livestock in the area. Many of the reaches have been severely altered from this long history of grazing. The PCA, however, still contains a large occurrence of the rare Utah

Fescue (*Argillochloa dasyclada*), a rare grass usually associated with deposits of oil shale and that is endemic to eastern Utah and western Colorado. The vegetation along the riparian corridor includes wet meadow communities dominated by tufted hairgrass (*Deschampsia cespitosa*), Nebraska sedge (*Carex nebrascensis*), beaked sedge (*C. utriculata*), and Baltic rush (*Juncus balticus* var. *montanus*).

Trapper Creek is home to a rare endemic subspecies of cutthroat trout (*Oncorhynchus clarki plueriticus*), but long stretches of the creek experience water temperatures too high to support the trout. Much of the willow community along the creek-bank is degraded or completely destroyed, reducing shade cover over the creek.

Natural Heritage elements at the Trapper Creek site.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sens	EO* Rank
<b>Plants</b>							
<i>Argillochloa dasyclada</i>	Utah fescue	G3	S3				A
<b>Fish</b>							
<i>Oncorhynchus clarki plueriticus</i>	Colorado River cutthroat trout	G4T3	S3		SC	BLM	D
<i>Oncorhynchus clarki plueriticus</i>	Colorado River cutthroat trout	G4T3	S3		SC	BLM	H

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** An excellent (A ranked) population of Utah fescue with many reproducing plants and many age classes is found at the Trapper Creek PCA. The Utah fescue has a narrow and restricted distribution and is found in only four counties in Colorado and Utah. The Colorado populations occupy an area totaling approximately 1000 square miles in Garfield and Rio Blanco counties. Most of the populations occur on oil company land and natural gas and oil development is a real threat.

The cutthroat trout population in Trapper Creek was reported in 1996 to number over 500 individuals. Unfortunately the stream habitat has been severely degraded by the indirect effects of livestock grazing. Cutthroat trout are a sensitive species that are native to the Colorado River basin, and have recently been in decline. Remnant populations still remain in Colorado, Wyoming, and Utah, but they continue to decline in many streams (Young *et al.* 1996).

The populations of cutthroats in Northwater, East Middle Fork Parachute Creek and Trapper's Creek are not isolated by barriers and are free to interbreed, comprising one large population (Jay Thompson pers. comm.). In 1998, 5 Colorado River cutthroat trout were collected from each of Trappers Creek and Northwater Creek. Genetic analysis of these fish suggest a pure population of Colorado River cutthroat trout (Kanda and Leary 1998). The small sample sizes, however, cannot reasonably exclude the possibility that this population may be hybridized with rainbow trout. There are plans for summer 2001 to collect more samples from this population for additional genetic testing. Until the outcome of those tests are known this population should be managed as pure Colorado River cutthroat trout. Such pure populations are rare and the conservation value of this population is high.



**Boundary Justification:** The boundary includes the entire watershed of Trappers Creek. These boundaries will ensure continued natural surface flow and maintain a natural hydroperiod through East Fork Parachute Creek, which will maintain a dynamic distribution of riparian plant communities along the drainage and support fish populations. The boundaries also protect the riparian areas from direct disturbances such as trampling of streamside vegetation and subsequent bank instability, which could result in decreased water quality and thus have detrimental affects on the trout population. Habitat for Utah fescue to establish new individuals over time is included, along with the plants' present location.

**Protection Rank Comments:** The site is managed by the BLM and does not have any special protection status. This land was formerly part of the Naval Oil Shale Reserve, and was transferred from ownership by the Department of Defense to the BLM in 1997. BLM holds surface and oil and gas rights, while the status of oil shale is still unclear. There is currently no oil or gas development, and the future status of the mineral rights will be determined by the Resource Management Plan currently in progress.

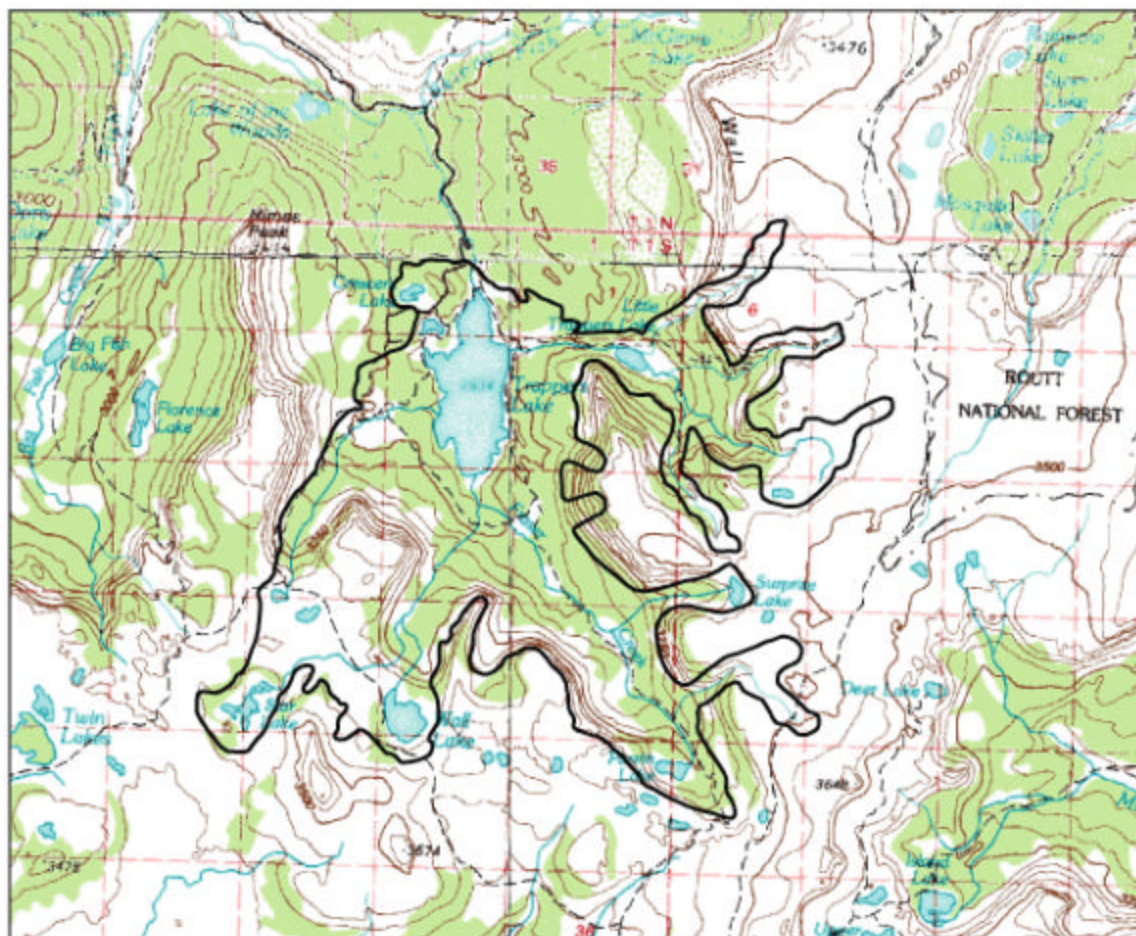
The area has been proposed as wilderness by the Colorado Wilderness Coalition, but found not suitable by BLM. Wilderness could still be one of the alternatives considered in the RMP. Alternatively, ACEC or RNA status would be warranted.

**Management Rank Comments:** Future management of this site will be determined by the Resource Management Plan that is currently in the scoping stage, and is expected to be completed in 2002. Currently, this area is heavily impacted from grazing. In a 1996 report, CDOW notes that "grazing impacts (are) heavy in upper Trapper Creek". The present grazing management plan that affects this PCA is inadequate. Resting the drainage from grazing combined with a management plan restricting domestic livestock from the drainage bottoms would benefit both the cutthroat trout and the rare plant communities. The Utah fescue appears to be easily impacted by domestic livestock grazing (NatureServe 2000) and a rest from grazing would also assure survival of this rare plant population.

For the cutthroat trout, introduction of nonnative trout that hybridize with it is most likely its greatest threat (Young 1995; Behnke and Benson 1980). Monitoring would aid in detecting the invasion of non-native fishes and whirling disease into this population of cutthroat trout. If invasion by non-natives is feared, construction of fish barriers to prevent interbreeding between other trout and the cutthroats would be advantageous. Rehabilitation of streambank willow communities to improve water quality by decreasing erosion, sedimentation, and water temperature would assist in conserving the cutthroat trout (Spahr *et al.* 1991).

# Trappers Lake

## Potential Conservation Area



The Colorado Natural Heritage Program  
Colorado State University  
254 General Services Bldg  
Fort Collins, CO 80523  
Fax: (970) 491-3349



map date: 15 December 2000  
vintage of data: 01 December 2000  
GIS department: ih

□ PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles\*

Glenwood Springs, 39107-E1  
Meeker, 40107-A1

\*Digital Raster Graphics (DRGs) produced  
by the U. S. Geological Survey, 1996

Location in Project Area



## Trappers Lake Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** This site is located approximately 33 miles east of Meeker, CO at Trappers Lake, within the White River National Forest. The site is partially within the Flat Tops Wilderness Area.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Big Marvine Peak; Devils Causeway and Trappers Lake. T1N R87W Sections 31 and 32; T1S R87W Sections 5-8, 17-20, and 30; T1S R88W Sections 1, 2, 10-15, and 21-26.

**Size:** 6,219 acres

**Elevation:** 9,600 – 11,200 feet

**General Description:** This is a very large site composed of numerous subalpine lakes, ponds, willow carrs, and forested streams within a large matrix of a subalpine forest dominated by subalpine fir (*Abies lasiocarpa*), blue spruce (*Picea pungens*), and Engelmann spruce (*P. engelmannii*). Most of the site occurs in a beautiful, wide subalpine basin surrounded by cliffs and escarpments, which form the slopes of an elevated plateau. Numerous lakes atop the plateau drain into the subalpine basin, where smaller lakes are formed in depressions and from beaver activity. Eventually, these small creeks drain into Trappers Lake, which forms the headwaters of the North Fork of the White River. Planeleaf willow (*Salix planifolia*), wolf willow (*S. wolfii*), marsh marigold (*Caltha leptosepala*), water sedge (*Carex aquatilis*), beaked sedge (*C. utriculata*), and bluejoint reedgrass (*Calamagrostis canadensis*) are common along the creeks and edges of beaver ponds and lakes. Short-fruit willow (*Salix brachycarpa*), Ross sedge (*Carex rossii*), small-winged sedge (*Carex microptera*), and tufted hairgrass (*Deschampsia cespitosa*) are common in mesic/wet meadows found throughout the area. A boreal toad (*Bufo boreas*) was observed near the edge of Trappers Lake and much of the wetland/riparian habitat within this site could provide potential habitat for the boreal toad. The numerous subalpine meadows dispersed throughout the site are potential habitat for the Theano alpine (*Erebria theano*). A few of the lakes within the site support a breeding population of Barrow's Goldeneye (*Bucephala islandica*). Fraser Creek, one of the main tributaries draining into Trappers Lake, supports a population of the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*).

Natural Heritage element occurrences at the Trappers Lake PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix brachycarpa</i> /Mesic forb	Alpine willow scrub	G4	S4				A
<i>Salix planifolia</i> / <i>Caltha leptosepala</i>	Subalpine riparian willow carr	G4	S4				A
<i>Salix wolfii</i> / <i>Carex aquatilis</i>	Subalpine riparian willow carr	G4	S4				A
<i>Deschampsia cespitosa</i>	Mesic alpine meadow	G4?	S4				A
<i>Carex utriculata</i>	Beaked sedge montane wet meadow	G5	S4				A
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Mertensia ciliata</i>	Montane riparian forest	G5	S5				A
<b>Fish</b>							
<i>Oncorhynchus clarki pleuriticus</i>	Colorado River cutthroat trout	G4T2T3	S2			FS	E
<b>Birds</b>							
<i>Aegolius funereus</i>	Boreal Owl	G5	S2			FS	B
<i>Bucephala islandica</i>	Barrow's Goldeneye	G5	S2B,SZN		SC	BLM	B
<i>Bucephala islandica</i>	Barrow's Goldeneye	G5	S2B,SZN		SC	BLM	B
<b>Amphibians</b>							
<i>Bufo boreas</i>	Boreal toad	G4T1Q	S1	C	E	FS	D
<b>Insects</b>							
<i>Erebia theano</i>	Theano alpine	G4	S3				E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports six excellent (A-ranked) occurrences of globally common (G4/S4, G4?/S4, G5/S4, and G5/S5) wetland and riparian plant communities. There are also two good (B-ranked) occurrence of the state imperiled Barrow's Goldeneye (*Bucephala islandica*) located within the site. A poor (D-ranked) occurrence of the state imperiled (G4T1Q/S1) boreal toad (*Bufo boreas*) and unranked (E) occurrences of the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) and Theano alpine (*Erebia theano*) are also contained in the site.

**Boundary Justification:** This site supports six excellent (A-ranked) occurrences of globally common (G4/S4, G4?/S4, G5/S4, and G5/S5) wetland and riparian plant communities. There are also two good (B-ranked) occurrence of the state imperiled Barrow's Goldeneye (*Bucephala islandica*) located within the site. A poor (D-ranked)

occurrence of the state imperiled (G4T1Q/S1) boreal toad (*Bufo boreas*) and unranked (E) occurrences of the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) and Theano alpine (*Erebia theano*) are also contained in the site.

**Protection Rank Comments:** Most of the site is within the Flat Tops Wilderness Area. However, there is a popular lodge and campground located downstream of Trapper Lake. The lodge includes many different buildings and cabins. The potential for further development of this area is unknown.

**Management Rank Comments:** There is a high level of recreation throughout the site. Fishing, hiking, and equestrian use are common, especially around Trappers Lake. Sheep grazing also occurs in the area.



# Turret Creek

## Potential Conservation Area



The Colorado Natural Heritage Program  
 Colorado State University  
 254 General Services Bldg  
 Fort Collins, CO 80523  
 Fax: (970) 491-3349



map date: 15 December 2000  
 vintage of data: 01 December 2000  
 GIS department: ih

 PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle\*

Sweetwater Lake, 39107-G2

\*Digital Raster Graphics (DRGs) produced  
 by the U. S. Geological Survey, 1996

Location in Project Area





## Turret Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P5** Land protection is adequate.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** This site is located approximately 17 miles northwest of Gypsum, CO within the Flat Tops Wilderness Area.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle : Sweetwater Lake. T2S R87W Sections 30 and 31.

**Size:** 13 acres

**Elevation:** 9,600 feet

**General Description:** This is a very small site encompassing a subalpine pond surrounded by Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*) and Douglas fir (*Pseudotsuga menziesii*). Two, small, ephemeral inlets lead into the pond while a small outlet drains from a beaver dam. Pondweed (*Potamogeton* sp.) occupies portions of the pond while beaked sedge (*Carex utriculata*) was common around the pond edges. Bluejoint reedgrass (*Calamagrostis canadensis*) was common near the beaver dam and narrowleaf burreed (*Sparganium angustifolium*) was found growing at the mouth of the inlets. Upslope from pond edge, large-leaved avens (*Geum macrophyllum*), Kentucky bluegrass (*Poa pratensis*), wild strawberry (*Fragaria virginiana*), Richardson' geranium (*Geranium richardsonii*), field horsetail (*Equisetum arvense*), brook saxifrage (*Saxifraga odontoloma*), dandelion (*Taraxacum officinale*), and bedstraw (*Galium trifidum*) are common in a wet meadow. The state rare, lesser panicled sedge (*Carex diandra*), is found growing on partially submerged logs within the pond.

Natural Heritage element occurrences at the Turret Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plants</b>							
<i>Carex diandra</i>	<b>Lesser panicled sedge</b>	<b>G5</b>	<b>S1</b>				<b>B</b>

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a good (B-ranked) occurrence of the state critically imperiled (G5/S1) lesser panicled sedge. This species, while globally common, is very rare in Colorado.

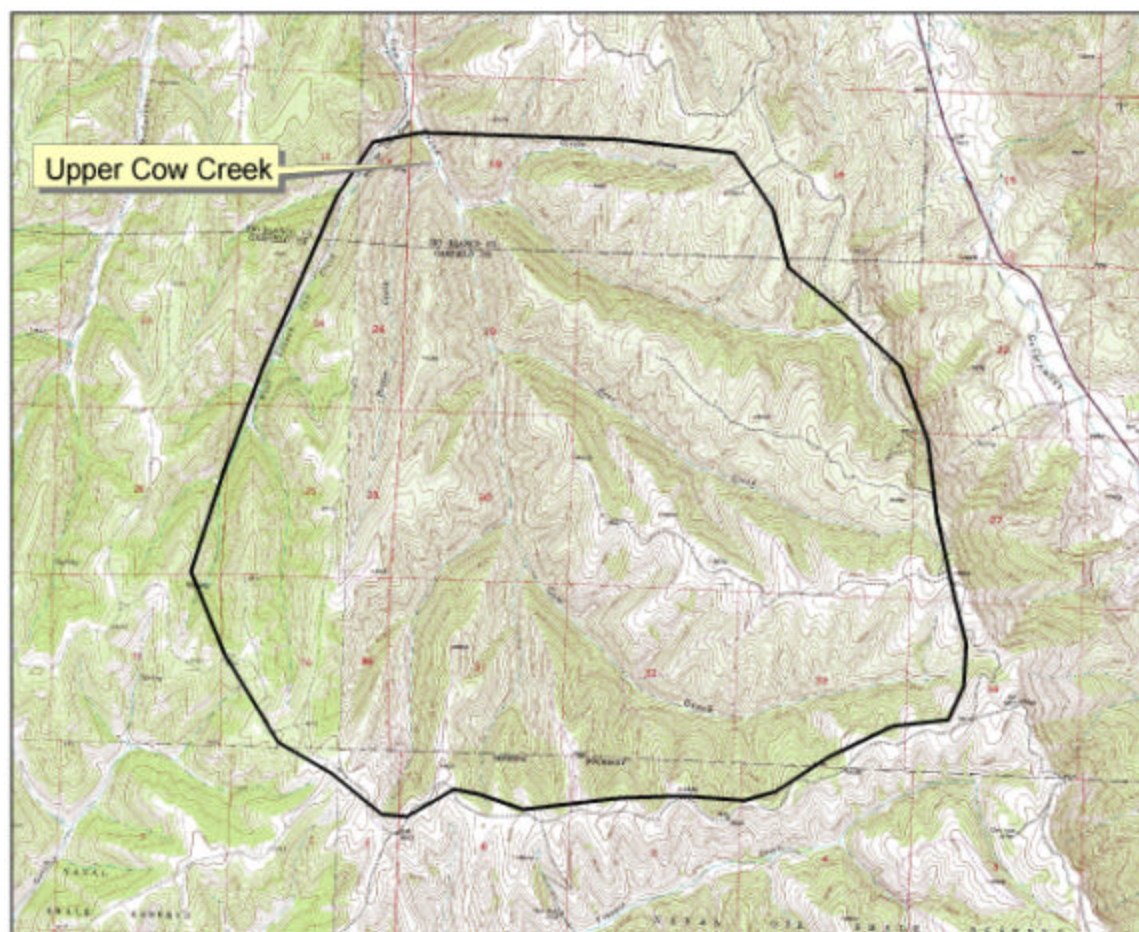
**Boundary Justification:** The site boundaries incorporate the entire pond and most of the two small inlets. This will allow natural hydrological and ecological processes, such as continued beaver activity and dynamic fluctuations in pond levels to sustain viable populations of the lesser panicked sedge.




**Protection Rank Comments:** This site is within the Flat Tops Wilderness Area.

**Management Rank Comments:** There is minimal to no direct disturbances of this site. There are, however, a few non-native species, such as Kentucky bluegrass, dandelion, and redbow (*Agrostis gigantea*) present.

# Upper Cow Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Rio Blanco, 39107-F8          McCarthy Gulch, 39108-F1</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	---	---

## Upper Cow Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance. An excellent occurrence of a globally vulnerable plant community.

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** The Upper Cow Creek PCA is located 11 air miles northwest of the town of Rifle in Garfield and Rio Blanco County Colorado.

**Legal description:** U.S.G.S. 7.5 minute quadrangles: Rio Blanco, McCarthy Gulch. T4S R94W Sections: 16-22, 27-34; T4S R95W Sections: 13, 24-26, 35, 36; T5S R94W Sections: 4-6; T5S R95W Section: 1.

**Size:** 8,875 acres

**Elevation:** 7,400 to 8,800 feet

**General Description:** This PCA is located in the Upper Cow Creek drainage which includes the West Branch of Cow Creek, Bitter Creek, Bear Creek and three unnamed creeks. It is composed of Uinta Formation sandstones and siltstones. The dominant vegetation is composed of big sagebrush (*Artemisia tridentata*), and includes dominant stands of Gambel's oak (*Quercus gambelii*) and mixed stands of Douglas fir (*Pseudotsuga menziesii*). The PCA includes an excellent occurrence of Mixed Mountain Shrublands, a plant community which is globally vulnerable, and two good occurrences of Western Slope Douglas Fir Forests, a plant community which is rare in some parts of its range. Although located in the Rio Blanco part of the PCA, the site contains an excellent occurrence of Utah fescue (*Argillochloa dasyclada*). The occurrence is only ¼ of a mile north of the county border and it is likely that this species does extend into Garfield county in this area. This site includes private land and BLM land managed by two resource areas, White River and Glenwood Springs.

Natural Heritage elements at the Upper Cow Creek PCA.

Element	Common Name	Global rank	State Rank	Federal/State	EO* Rank
<b>Plant Communities</b>					
<b><i>Quercus gambelii</i>- <i>Cercocarpus montanus</i>/ <i>Carex geyeri</i></b>	<b>Mixed Mountain Shrublands</b>	<b>G3</b>	<b>S3</b>		<b>A</b>
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos</i> <i>rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4		B
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos</i> <i>rotundifolius</i>	Western Slope Douglas Fir Forests	G5	S4		B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity Comments:** This PCA contains an excellent (A ranked) occurrence of a globally vulnerable (G3S3) plant community. It also contains good occurrences of a common plant community.

**Boundary Justification:** The boundary represents our best estimate of the primary area supporting the long-term survival of the natural communities found at this site.

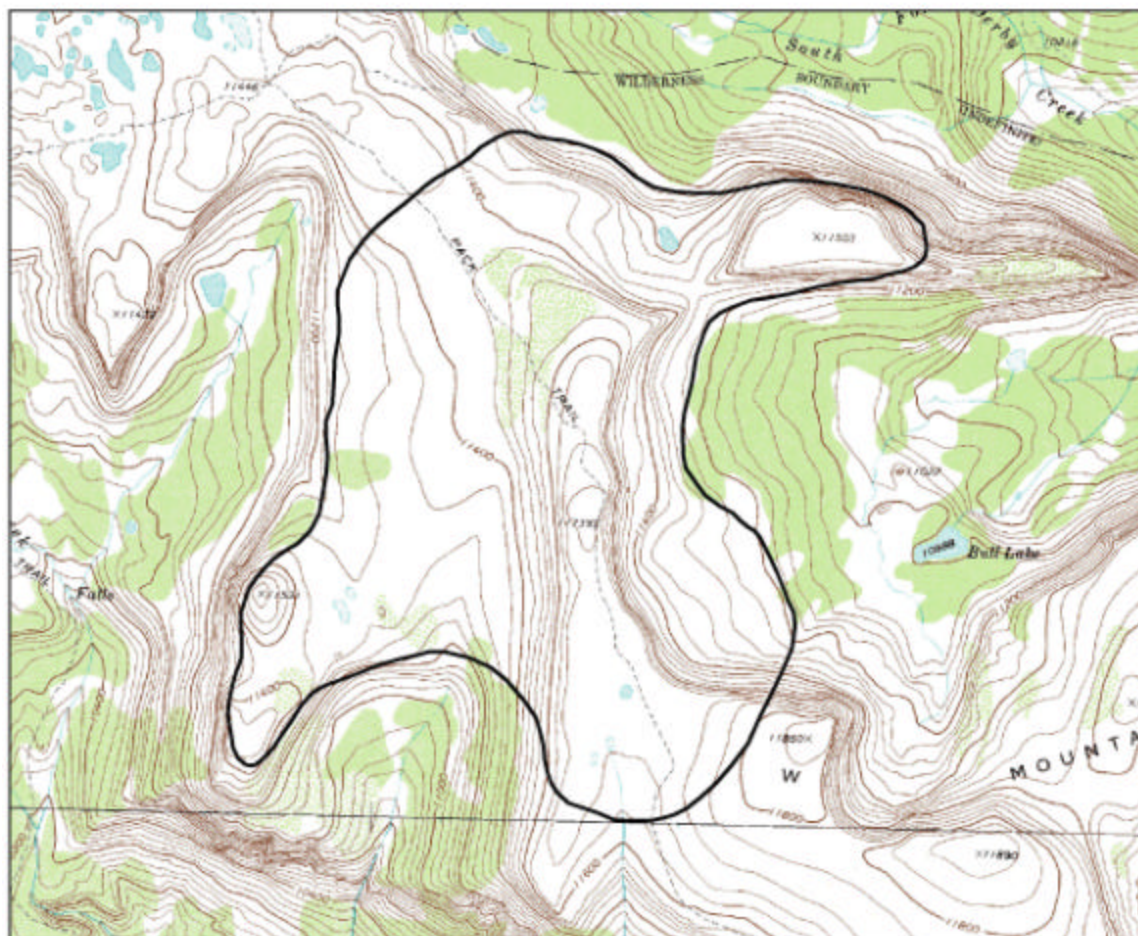
**Protection Rank Comments:** The PCA includes both private and BLM land managed by the White River Resource Area. There is no special protection in place for this PCA; however, it does not appear to be currently threatened.




**Management Rank Comments:** Grazing and wood cutting are current uses of the area and could affect the integrity of the occurrences. However, no urgent management needs are known.



# W Mountain

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: ih</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangle*</p> <p>Trappers Lake, 39107-H2</p> <p>*Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
--	--	--



## W Mountain Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance

**Protection Urgency Rank: P4** No threat is known for the foreseeable future.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** About 25 miles north-northeast of Glenwood Springs, Colorado, in the Flat Tops Wilderness of the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Trappers Lake. T2S R89W Sections 8-10, 16, 17.

**Size:** 1,137 acres

**Elevation:** 11,200 to 11,800 feet

**General Description:** W Mountain is the highest elevation PCA in Garfield County. It is a windswept flat-topped mountain in the Flat Tops Wilderness. There are several small ponds amid tundra-like grasslands. A pack trail runs along the mesa top. Soils are derived from basalt flows. Plants that can grow here have adapted to the harsh, dry, windy conditions by growing close to the ground. The few trees are dwarfed, twisted spruces called “krummholz”. Alpine avens (*Geum rossii* var. *turbinatum*) and alpine clover (*Trifolium dasyphyllum*) occupy some of the harshest habitats where there is little snow accumulation. They are accompanied by spike trisetum (*Trisetum spicatum*), alpine fescue (*Festuca brachyphylla* ssp. *coloradense*), sky pilot (*Polemonium viscosum*), dwarf blueberry (*Vaccinium cespitosum*), false strawberry (*Sibbaldia procumbens*), and cinquefoil (*Potentilla diversifolia*). In more moist, protected areas, tufted hairgrass (*Deschampsia cespitosa*) and low alpine willows (*Salix brachycarpa* and *Salix planifolia*) thrive. Plant communities were found to be in pristine condition when the area was surveyed in 1995 (Lyon 1995).

Natural Heritage element occurrences at the W Mountain PCA.

Element	Common Name	Global rank	State rank	Federal/State status	EO* rank
<i>Geum rossii</i> / <i>Trifolium spp.</i>	Alpine meadows	G3 G4	S3S4		A
<i>Vaccinium cespitosum</i> / <i>Vaccinium scoparium</i>	Alpine scrub	G4	S1?		A
<i>Salix brachycarpa</i> / <i>Deschampsia cespitosa</i> - <i>Geum rossii</i>	Alpine willow scrub	G4	S3S4		A
<i>Geum rossii</i> - <i>Sibbaldia procumbens</i>	Mesic alpine meadows	GU	SU		A

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** The W Mountain PCA contains excellent (A ranked) occurrences of four alpine tundra plant communities. Although classified as separate communities, the mesa top is a complex mosaic of these plant associations, depending on microsite conditions, and they grade into one another. One of the plant associations found here is considered globally vulnerable, and one is rare in Colorado.

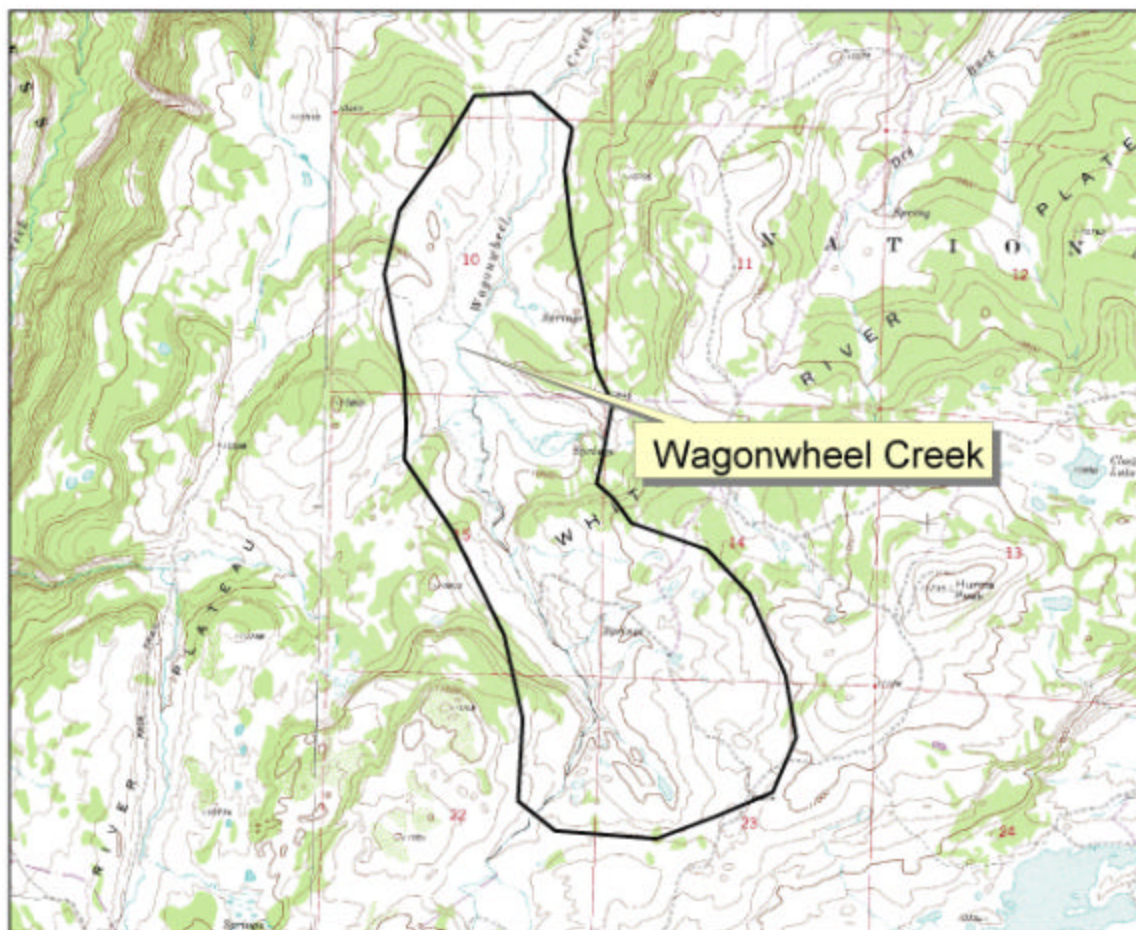
**Boundary Justification:** The boundary is drawn to include the mesa top, and four plant communities that were found to be in excellent condition in 1995. It also includes buffers to the edge of the community type. Additional surveys are warranted to verify the extent of the occurrences.




**Protection Rank Comments:** The PCA should be adequately protected, as it is located in the White River National Forest, in the Flat Tops Wilderness. The site was nominated and evaluated as a Research Natural Area. The White River Forest Plan revision is now in progress, and should address this area.

**Management Rank Comments:** Level of trail use is fairly high. The area supports hunting activity, and there may be sheep grazing. However, no negative impacts of these activities were noted in the PCA.

# Wagonwheel Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Deep Lake, 39107-G3          Blair Mountain, 39107-G4</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--

## Wagonwheel Creek Potential Conservation Area

**Biodiversity Rank: B3** High biodiversity significance.

**Protection Urgency Rank: P5** Land protection is adequate.

**Management Urgency Rank: M4** Although not urgently required, management may be needed in the future to maintain the current quality of element occurrences.

**Location:** The site is located approximately 14.5 miles north of Glenwood Springs, CO within the White River National Forest.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Deep Lake. T3S R89W Sections 3, 10, 14, 15, 22, and 23.

**Size:** 1306 acres

**Elevation:** 10,500 to 10,600 feet

**General Description:** This site consists of a subalpine stream and adjacent spruce-fir covered slopes. Near the upstream portion of the site, there are numerous small ponds that serve as the headwaters of Wagonwheel Creek. Short-fruit willow (*Salix brachycarpa*), planeleaf willow (*S. planifolia*), tufted hairgrass (*Deschampsia cespitosa*), marsh marigold (*Caltha leptosepala*), and arrowleaf groundsel (*Senecio triangularis*) dominate the riparian area downstream from these ponds. Further downstream, there is a large wet meadow created by beaver activity where water sedge (*Carex aquatilis*) and beaked sedge (*C. utriculata*) dominate. Downstream from where a small spring-fed stream enters Wagonwheel Creek, is a willow carr dominated by Wolf willow (*Salix wolfii*), shrubby cinquefoil (*Pentaphylloides floribunda*), tufted hairgrass, water sedge, and alpine timothy (*Phleum alpinum*).

Natural Heritage element occurrences at the Wagonwheel Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Salix wolfii</i> /Mesic forb	Subalpine riparian willow carr	G3	S3				B
<i>Carex aquatilis</i> - <i>Carex utriculata</i>	Montane wet meadows	G4	S4				A
<i>Salix brachycarpa</i> /Mesic forb	Alpine willow scrub	G4	S4				B

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** This site supports a good (B-ranked) occurrence of the globally vulnerable (G3/S3) wolf willow/mesic forb (*Salix wolfii*/mesic forb) subalpine riparian willow carr. This community has a wide-spread distribution, although it is never very abundant where it occurs. The site also supports an excellent (A-ranked) occurrence of the common (G4/S4) water sedge/beaked sedge (*Carex aquatilis*/*Carex utriculata*) montane wet meadow and a good (B-ranked) occurrence of the common short-fruit willow/mesic forb (*Salix brachycarpa*/mesic forb) alpine willow scrub.

**Boundary Justification:** The boundary encompasses the riparian and wetland areas, surrounding slopes, and nearby upstream springs and spring-brooks to ensure that hydrological sources and the ability of the creek's fluvial processes to continue flooding, scouring, and sediment deposition are protected. These processes are necessary for the viability of the elements and maintenance of ecological functions such as a dynamic distribution of aquatic and terrestrial habitat and nutrient cycling.

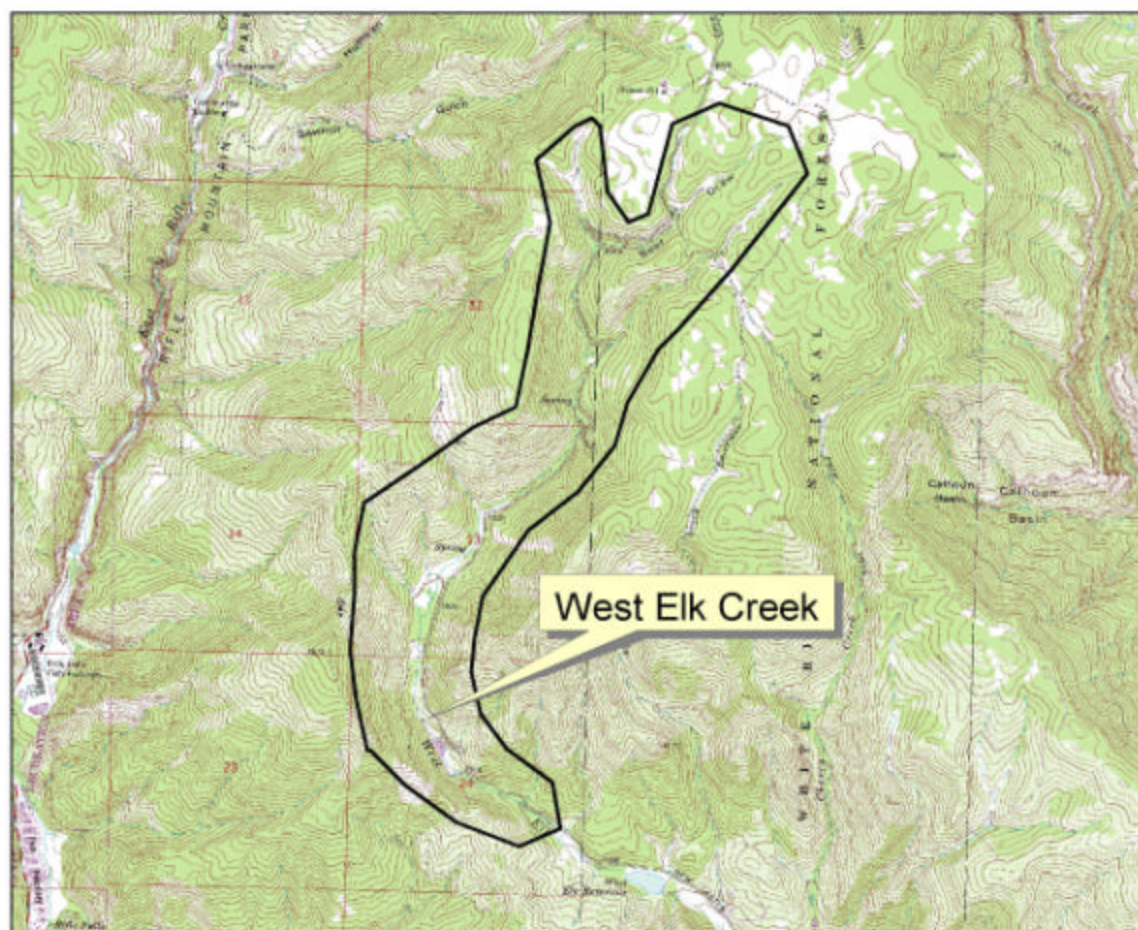
**Protection Rank Comments:** The site is currently under the management of the White River National Forest and is within the Flat Tops Wilderness.




**Management Rank Comments:** There is heavy recreation in the area, especially 4WD vehicular use. Improper grazing has cause some downcutting in the stream, trampling of streamside vegetation, and an influx of non-native species such as Kentucky bluegrass (*Poa pratensis*), dandelion (*Taraxacum officinale*), and curly dock (*Rumex crispus*).



# West Elk Creek

## Potential Conservation Area



<p>The Colorado Natural Heritage Program          Colorado State University          254 General Services Bldg          Fort Collins, CO 80523          Fax: (970) 491-3349</p> <p>map date: 15 December 2000          vintage of data: 01 December 2000          GIS department: lah</p> 	<p> PCA Boundary</p> <p>U.S.G.S. 7.5 Minute Quadrangles*</p> <p>Deep Creek Point, 39107-F5          Rifle Falls, 39107-F6</p> <p>*Digital Raster Graphics (DRGs) produced          by the U. S. Geological Survey, 1996</p>	<p>Location in Project Area</p> 
---	--	--



## West Elk Creek Potential Conservation Area

**Biodiversity Rank: B4** Moderate biodiversity significance.

**Protection Urgency Rank: P2** Threat is expected within five years.

**Management Urgency Rank: M3** Ongoing, recurrent management action would help to maintain the current quality of element occurrences.

**Location:** West Rifle Creek is located approximately 9 miles northwest of New Castle, CO.

**Legal Description:** U.S.G.S. 7.5 minute quadrangle: Rifle Falls. T4S R91W Sections 6, 7, and 18; T4S R92W Sections 1, 12, 13, and 24.

**Size:** 1,289 acres

**Elevation:** 7,300 to 8,800 feet

**General Description:** This site includes the upper portion of West Elk Creek. The creek is dominated by aspen (*Populus tremuloides*), narrowleaf cottonwood (*Populus angustifolia*), river birch (*Betula occidentalis*), chokecherry (*Prunus virginiana*), and a diversity of herbaceous species in the understory. Much of the creek, at least along the lower portions of the creek within the site, has been heavily altered from development and agricultural practices. However, a relatively pristine remnant of the riparian community exists along a small portion of the creek. The canyon bog-orchid (*Limnorchis ensifolia*) was found growing near West Elk Reservoir within this remnant riparian community.

Natural Heritage element occurrences at the West Elk Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank*
<b>Plant Communities</b>							
<i>Populus angustifolia</i> / <i>Betula occidentalis</i>	<b>Montane riparian forest</b>	<b>G3?/S2</b>					<b>C</b>
<b>Plants</b>							
<i>Limnorchis ensifolia</i>	Canyon bog-orchid	G4G5T3	S3				E

\*EO Rank is "Element Occurrence" Rank

\*\* Bold type indicates an element occurrence upon which the PCA rank is based.

**Biodiversity comments:** Near the downstream end of the site is a small, yet pristine remnant of the globally vulnerable (G3?/S2) narrowleaf cottonwood/river birch (*Populus angustifolia*/*Betula occidentalis*) montane riparian forest. This occurrence is surprisingly intact, yet its small size puts into question the viability of this community at this

particular location. There is also an unranked (E) occurrence of the globally vulnerable (G4G5T3/S3) canyon bog-orchid.

**Boundary Justification:** The site boundaries incorporate the entire upstream portion of West Elk Creek and thus encompass upstream hydrological sources.

**Protection Rank Comments:** There are a lot of private homes within the site and many additional lots are currently for sale.

**Management Rank Comments:** There are a lot of direct disturbances within the riparian corridor associated with development and agricultural activities. Impacts from these threats must be minimized to protect the integrity of the elements.

## Literature Cited

- American Ornithologists' Union (AOU) Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. Sixth Edition. American Ornithologists Union, Allen Press, Inc., Lawrence, Kansas.
- Anderson, R. M. 1997. An evaluation of fish community structure and habitat potential for Colorado squawfish and razorback sucker in the unoccupied reach (Palisade to Rifle) of the Colorado River, 1993-1995. Final report, March 1997. Colorado Division of Wildlife. Colorado River Implementation Program Project No. 18.
- Andrews, R. R. and R. R. Righter. 1992. Colorado Birds. Denver Museum of Natural History, Denver. 442 pp.
- Anthony, Steve. 2001. Garfield County Vegetation Manager. Personal communication.
- Arizona Game and Fish Department. 1995. *Catostomus latipinnis*. Unpublished abstract, Arizona Game and Fish Department, Phoenix, AZ. 4 pp.
- Arizona Game and Fish Department. 1996. Wildlife of special concern in Arizona (public review draft). Nongame and Endangered Wildlife Program, Pheonix, Arizona. 40 pp.
- Armstrong, D. M. 1972. Distribution of Mammals in Colorado. Monograph of the Museum of Natural History, University of Kansas. University of Kansas Printing Service, Lawrence. 415 pp.
- Armstrong, D. M., Adams, R. A. and J. Freeman. 1994. Distribution and Ecology of Bats of Colorado. Natural History Inventory of Colorado, No. 15. University of Colorado Museum, Boulder.
- Artz, N., J. Stewart, and C. Scheck. 1997. Field Survey for *Penstemon Harringtonii*.
- Atkins, M. 1984. Field Survey of *Sclerocactus glaucus* by USDI, BLM.
- Bailey, R. G., P. E. Avers, T. King, and W. H. McNab. 1994. Ecoregions and Subregions of the United States. Prepared for the USDA Forest Service by the U. S. Geological Survey, fort Collins, CO.
- Baker, W. L. 1984. A preliminary classification of the natural vegetation of Colorado. Great Basin Naturalist 44 (4): 647-676.
- Barlow, Patricia. 2001. Personal communication.
- Barneby, R. C. 1964. Atlas of North American Astragalus. Memoirs of New York Botanical Garden, vol. 13. New York Botanical Garden, Bronx, NY.
- Bechard, M. J. and J. K. Schmutz. 1995. Ferruginous Hawk (*Buteo regalis*). In, The Birds of North America, No. 172, A. Poole and F. Gill, eds. Academy of Natural Sciences, Philadelphia, and American Ornithologists' Union, Washington, DC. 20pp.
- Bechard, M. J., R. L. Knight, D. G. Smith, and R. E. Fitzner. 1990. Nest sites and habitats of sympatric hawks (*Buteo* spp.) in Washington. *Journal of Field Ornithology* 61:159-170.
- Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. xx + 275 pp.

- Behnke, R. J. and D. E. Benson. 1980. Endangered and threatened fishes of the upper Colorado River Basin. Bulletin 503A. Cooperative Extension Service, Colorado State University, Fort Collins.
- Bent, A. C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. National Museum Bulletin 197. Washington, D.C.
- Bestgen, K. R. 1990. Status review of the razorback sucker, *Xyrauchen texanus*. Colorado State Univ. Larval Fish Lab. Contribution 44.
- Blus, L. J. 1989. Effects of organophosphorus insecticides on sage grouse in southeastern Idaho. Journal of Wildlife Management 53:1139-1146.
- Boyle, S. 1998. Black Swift. In Colorado Breeding Bird Atlas, H. E. Kingery ed. Colorado Bird Atlas Partnership; co-published by Colorado Division of Wildlife.
- Braun, C. E., Giesen, K. M., Hoffman, R. W., Remington, T. E. and W.D. Snyder. 1994. Upland bird management analysis guide, 1994-1998. Division Report 19. Colorado Division of Wildlife. 48 pp.
- Braun, C. E., K. M. Giesen, R. W. Hoffman, T. E. Remington, and W. D. Snyder. 1991. Upland Bird Management Analysis Guide: Draft. Colorado Division of Wildlife, Denver. 90 pp.
- Bridges, D. 1992. Relative abundance of owls in Colorado. Journal of Colorado Field Ornithology 26: 27-28.
- Buckner, D. L. and J. E. Bunin. 1992. Final Report 1990/91 Status Report for *Penstemon harringtonii*. Unpublished report prepared for Colorado Natural Areas Program, Denver, CO by Esco Assoc., Inc., Boulder, CO.
- Buehler, D. A., Mersmann, T.J., Fraser, J.D. and J.K.D. Seger. 1991. Winter microclimate of bald eagle roosts on the northern Chesapeake Bay. Auk 108:612-618.
- Bunin, J.E. 1990. Interim status report for *Astragalus wetherillii* M. E. Jones. Natural Science Associates Inc., Boulder, CO.
- Butler, R. W. 1992. Great Blue Heron (*Ardea herodias*). No. 25 in A. Poole, P. Stettenheim and F. Gill, editors. The Birds of North America. The Academy of Natural Sciences, Philadelphia, and the American Ornithological Union.
- Carter, M., Fenwick, G., Hunter, C., Pushily, D., Petit, D., Price, J. and J. Trapp. 1996. Watchlist 1996: For the future. Field Notes 50(3):238-240.
- Chronic, H. 1980. Roadside Geology of Colorado. Mountain Press Publ., Missoula, MT. 344 pp.
- Coleman J.S. and S.A. Temple. 1994. How Many Birds Do Cats Kill? University of Wisconsin, Department of Wildlife Ecology. Madison, WI.
- Colorado Bird Observatory. 1997. 1996 Reference Guide to the Monitoring and Conservation Status of Colorado's Breeding Birds. Colorado Bird Observatory, Colorado Division of Wildlife, Great Outdoors Colorado Trust Fund, and Partners, March 21, 1997.
- Colorado Bird Observatory. 1997. 1996 Reference Guide to the Monitoring and Conservation Status of Colorado's Breeding Birds. Colorado Bird Observatory, Colorado Division of Wildlife, Great Outdoors Colorado Trust Fund, and Partners, March 21, 1997.

- Colorado Department of Natural Resources. 1998. Planning Trails with Wildlife in Mind: A Handbook for Trail Planners. Colorado State Parks Trails Program, Denver.
- Colorado Division of Wildlife, U. S. Forest Service, National Park Service, U. S. Fish and Wildlife Service, New Mexico Game and Fish Department, and Wyoming Game and Fish Department. 1997. Draft Strategy for the Conservation and Reestablishment of Lynx and Wolverine in the Southern Rocky Mountains.
- Colorado Division of Wildlife. 1984. The Bats of Colorado: Shadows in the Night.
- Colorado Division of Wildlife. 1986. Colorado Stream Data Bank, Second Edition. December 1986. Colorado Division of Wildlife, Denver.
- Colorado Division of Wildlife. 1994. Colorado reptile and amphibian observation database. Colorado Division of Wildlife, Denver.
- Colorado Native Plant Society. 1989. Rare plants of Colorado. Rocky Mountain Nature Association, Colorado Native Plant Society, CO.
- Colorado Natural Heritage Program (CNHP). 1999. Biological and Conservation Data (BCD) System. Colorado Natural Heritage Program, CSU, Fort Collins, CO.
- Corn, P. S. 1994. What we know and don't know about amphibian declines in the West. Pages 59-67 in, Sustainable Ecological Systems: Implementing an Ecological Approach to Land Management, W. W. Covington and L. F. DeBano eds. U.S. Department of the Interior, National Biological Service, Fort Collins.
- W. Stolzenburg and R. B. Bury. 1989. Acid precipitation studies in Colorado and Wyoming: interim report of surveys of montane amphibians and water chemistry. U.S. Fish and Wildlife Service Biology Report 80(40.26). 56 pp.
- and F. A. Vertucci. 1992. Descriptive risk assessment of the effects of acidic deposition on Rocky Mountain amphibians. Journal of Herpetology 26:361-369.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A., Volume 1. Hafner Publishing Co., Inc., New York.
- Dorn, Robert. 1988. Rare Plant Inventory by Mountain West for BLM
- Durkin, P. 1994. A Riparian/Wetland Vegetation Community Classification of New Mexico: Pecos River Basin. New Mexico Natural Heritage Program, Albuquerque, NM.
- Egorova, T.V.1999. The Sedges (*Carex* L.) of Russia and Adjacent States. Missouri Botanical Garden Press, St. Louis, p.642
- Ehrlich, P. R., Dobkin, D. S. and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Shuster, Inc., New York. xxx + 785 pp.
- Ellis, S. 1982. Field survey of Roan Creek of May 13, 1982. Environmental Research and Technology, Fort Collins, CO.
- Faanes, C. A. and G. R. Lingle. 1995. Breeding birds of the Platte River Valley of Nebraska. Online. Available: <http://www.npwrc.org/resource/distr/birds/platte/platte.htm>.

- FEIS. Fire Effects Information Services. Fire Effects Information System [Online] (1996, September). Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station (producer). Available: [www.FEIS](http://www.FEIS).
- Fertig, Walter. 2000. State Species Abstract. Wyoming Natural Diversity Database, Laramie.
- Fitzgerald, J. P., Meaney, C. A. and D. M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado.
- Foerster, K. S. and C. T. Collins. 1990. Breeding distribution of the black swift in southern California. *Western Birds* 21:1-9.
- Forman, Richard T. and Lauren E. Alexander. 1998. Roads and their Major Ecological Effects. *Annual Review of Ecology and Systematics* 29:207-31.
- Giesen, K. M. and C. E. Braun. 1993. Status and distribution of Columbian Sharp-tailed Grouse in Colorado. *Prairie Naturalist* 25(3):237-243.
- Gilmer, D. S. and R. E. Stewart. 1983. Ferruginous Hawk populations and habitat use in North Dakota. *Journal of Wildlife Management* 47(1):146-157.
- Grode, M. R. and L. Renner. 1986. Northwest Colorado black-footed ferret search: annual and interim reports, 1983-1986. Wildlife Research Center Library, Colorado Division of Wildlife, Fort Collins, unpagged.
- Halse, R. R. 1981. Taxonomy of *Phacelia* sect. *Miltitzia* (Hydrophyllaceae). *Madrono* Vol. 28 (3):121-132.
- Hammerson, G. A. 1999. Amphibians and reptiles of Colorado: a Colorado field Guide, second edition. University Press of Colorado. Niwot, Colorado.
- Hammerson, G. A., Valentine, A. L. and L. J. Livo. 1991. Geographic distribution: *Gambelia wislizenii*. *SSAR Herpetological Review* 22(2):65-66.
- Harner & Assoc. 1983. Special Status Species Survey of Conn & Cascade Canyons, Garfield County. unpubl.
- Harner & Assoc. 1984. Special Status Species Survey of Parachute Creek Shale Oil Program, Garfield Cty, Co. unpubl.
- Harrington, H. D. 1954. Manual of the Plants of Colorado. Sage Books, Chicago.
- Hayward, G. D. and P. H. Hayward. 1993. Boreal Owl (*Aegolius funereus*). In, *The Birds of North America*, No. 63, A. Poole and F. Gill, (eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Heil, K.D., and J.M. Porter. 1993. Status report for *Sclerocactus glaucus* (K. Schum.) L. Benson. Prepared for USDI Fish and Wildlife Service. Ecosphere Environmental Services, Inc., Farmington, NM. 68 pp. + appendices.
- Hubbs, C. L. 1954. Establishment of a forage fish, the red shiner (*Notropis lutrensis*), in the lower Colorado River system. *California Fish and Game* 40:287-94.
- Hurd, E.G., N.L. Shaw, J. Mastrogioseppe, L.C. Smithman and S. Goodrich 1998. Field Guide to Intermountain Sedges. Rocky Mountain Research Station, Ogden UT. p.93



- Jankovsky-Jones, Mabel. 1994. Environmental Factors Affecting the Distribution of Riparian Plant Associations in the Roaring Fork River Basin, Colorado. Masters Thesis, University of Wyoming.
- Johnsgard, P. A. 1990. Hawks, eagles, and falcons of North America. Smithsonian Institution Press, Washington, D.C. xvi + 403 pp.
- Johnston, B. C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-Ecol-87-2. 429 pp.
- Kantrud, H. A. and R. L. Kologiski. 1982. Effects of soils and grazing on breeding birds of uncultivated upland grasslands of the Northern Great Plains. U.S. Fish and Wildlife Service, Wildlife Research Report 15. 33 pp.
- Keammerer, W.R. & S.J. Peterson. 1981. Naval Oil Shale Reserves Biological Baseline Report. Unpublished Report for TRW Energy Systems Group. Mcclean, Virginia, Boulder, Co.
- Keammerer, W.R. 1974. Vegetation of Parachute Creek Valley. Pages 4-91 in Environmental Inventory and Impact Analysis of a proposed utilities corridor in Parachute Creek Valley, CO. Unpubl. Report prepared for Colony Dev. Op. , Denver, CO.
- Kingery, Hugh, ed. 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership, co-published by Colorado Division of Wildlife.
- Kinser, M. 1996. Bureau of Land Management, Grand Junction District, Glenwood Springs Resource Area. Personal communication.
- Kittel, G., E. VanWie, M. Damm, R. Rondeau, S. Kettler, and J. Sanderson . 1999. A Classification of Riparian Plant Associations of the Rio Grande and Closed Basin Watersheds, Colorado
- Kittel, G. and D. Randolph. 1993. Riparian Field Survey of Colorado River Basin.
- Kittel, G. and M. Decoursey. 1992. Riparian Field Survey of White and Colorado River Basins.
- Kittel, Gwen and Susan Spackman. 1994. Riparian Field Survey of the Colorado Basin.
- Knorr, O. A. 1961. The geographical and ecological distribution of the Black Swift in Colorado. The Wilson Bulletin 73(2):155-170.
- Knorr, O. A. and M. S. Knorr. 1990. The black swift in the Chiricahua Mountains of Arizona. Southwestern Naturalist 35:559-560.
- Lambeth, R. 1998. Sage Sparrow. In Colorado Breeding Bird Atlas, H.E. Kingery ed. Colorado Bird Atlas Partnership; co-published by Colorado Division of Wildlife.
- Lambeth, Ron. 2001. BLM, Grand Junction Resource Area. Personal communication to P. Lyon and J. Sovell.
- Lardy, M. E. 1980. Raptor inventory and Ferruginous Hawk biology in southeastern Oregon. M.S. thesis. University of Idaho, Moscow, ID. 52 pp.
- Livo, L. J. 1994. Geographic distribution: *Rana pipiens*. Herpetological Review. 25:75.
- Reichard, K., Duncan, T., Smith, H. M. and D. Chizar. 1996. Herpetological microbiogeography of Colorado II: documented and potential county records. Colorado Herpetological Society. 22 pp.

- Lyon, M. J. 1995. Draft Ecological Evaluation for the W Mountain Potential Research Natural Area, White River National Forest, Garfield County, CO.
- Meffe, G. K. 1985. Predation and species replacement in American southwestern fishes: a case study. *Southwestern Naturalist* 30:173-187.
- Meffe, G. K., and W. L. Minckley. 1987. Persistence and stability of fish and invertebrate assemblages in a repeatedly disturbed Sonoran desert stream. *American Midland Naturalist* 117:177-91.
- Michael, C. M. 1927. Black Swift nesting in Yosemite National Park. *Condor* 29:89-97.
- Miller, R. R. 1961. Man and the changing fish fauna of the American Southwest. *Paper Michigan Academy Science, Arts, and Letters* 46:365-404.
- Minckley, W. L. and G. K. Meffe. 1987. Differential selection by flooding in stream-fish communities of the arid American southwest. Pp. 93-104 in W. J. Matthews and D. E. Heins (eds.) *The zoogeography of North American freshwater fishes*. John Wiley and Sons, Incorporated, New York.
- Minckley, W. L. and J. E. Deacon. 1968. Southwestern fishes and the enigma of "endangered species." *Science* 159:1424-32.
- Minckley, W. L., Meffe, G. K. and D. L. Soltz. 1991. Conservation and management of short-lived fishes: the cyprinodontoids. Pages 247-82 in, *Battle Against Extinction: Native Fish Management in the American West*, W. L. Minckley and J. E. Deacon eds. University of Arizona Press, Tucson, Arizona.
- Moyle, P. B. 1976. *Inland fishes of California*. University of California Press, Berkeley, California. 405 pp.
- National Geographic Society. 1987. *Field Guide to the Birds of North America*. National Geographic Society, Washington, D.C.
- Nature Conservancy, Western Regional Office. 2000. *Ecoregions of Colorado*.
- NatureServe: An online encyclopedia of life [web application]. 2000. Version 1.1 . Arlington, Virginia, USA: Association for Biodiversity Information. Available: <http://www.natureserve.org/>.
- Navo, K.W., Gore, J. A. and G.T. Skiba. 1992. Observations on the spotted bat, *Euderma maculatum*, in northwestern Colorado. *Journal of Mammalogy*. 73:547-551.
- Nussbaum, R. A., Brodie Jr., E. D. and R. M. Storm. 1983. *Amphibians and Reptiles of the Pacific Northwest*. University Press of Idaho. 332 pp.
- O'Farrell, T. P. 1987. Kit Fox. Pp. 422-431 in, *Wild furbearer management and conservation in North America*, M. Novak, J. A. Baker, M. E. Obbard, and B. Malloch, eds. Ontario Trappers Association, Toronto, 1150pp.
- O'Kane, S. L. 1988. Colorado's Rare Flora. *Great Basin Naturalist* 48(4): 434-484.
- O'Neal, G. T., Flinders, J. T. and W. P. Clary. 1986. Behavioral ecology of the Nevada kit fox (*Vulpes macrotis nevadensis*) on a managed desert rangeland. *Current Mammalogy* 1:443-481.
- Oxley, D.J., M.B. Fenton, and G.R. Carmoday. 1974. The effects of roads on populations of small animals. *Journal of Applied Ecology*. 11: 51-59.

- Page, L.M. and B.M. Burr. 1991. A Field Guide to Freshwater Fishes: North America North of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.
- Pague, C., L. Grunau, A. Loar, M. Sherman, K. Pague, M. Wunder, D. Shinneman. 197. Conservation status of the Rare and Imperiled Vertebrates of Colorado. CNHP Research Report #8. CSU. 239 pp.
- Pague, C. A. 1996. Colorado Natural Heritage Program. Element state ranking report for *Cnemidophorus velox* plateau striped whiptail.
- Pague, C.A. and M. Sherman. 1995. Field Survey Of Naval Oil Shale Reserve (NOSR1&2) for The Colorado Natural Heritage Program. Partnership, Co-Published By Colorado Division of Wildlife.
- Paige, C. and S.A. Ritter. 1998. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Western Working Group of Partners in Flight, Boise, ID.
- Payson, Edwin. 1915. New and Noteworthy Plants from Southwestern Colorado. The Botanical Gazette 60:37
- Peterson, D. E. and K. D. Fausch. 2000. Effects of brook trout on Colorado River cutthroat trout populations: Second annual report, April 2000. Department of Fisheries and Wildlife Biology, Colorado State University.
- Pfeifer, F. K. and B. D. Burdick. 2000. A five year experimental stocking plan to evaluate survival of various sizes of razorback sucker. Colorado River Recovery Program, Recovery Program FY 2000 Annual Project Report; Project Number 50. U. S. Fish and Wildlife Service, Grand Junction, Colorado.
- Proebstel, D.S. 1994. Taxonomic Identification of Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*) in Colorado--Draft report. Progress Report October 1994.
- Pulliam, W. 1995. How to find a Boreal Owl. Webpage, <http://lamar.colostate.edu/~bbill/borowl.html>.
- Renner, L., Gray, P. and V. Graham. 1991. Greater Sandhill Crane nesting success and recruitment in northwest Colorado, December 1991. Prepared by Colorado Division of Wildlife, Terrestrial Wildlife Section, Grand Junction, Colorado. 56 pp.
- Reynolds, R. T. 1983. Management of Western Coniferous Forest Habitat for Nesting Accipiter Hawks. U.S.D.A. Forest Service. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. General Technical Report. Rm-102. 7 pp.
- Rifle Reading Club. 1973. Rifle shots: story of Rifle, Colorado. Rifle Reading Club of Rifle, CO. 291pp.
- Ritchie, M. E., Wolfe, M. L. and R. Danvir. 1994. Predation of artificial Sage Grouse nests in treated and untreated sagebrush. Great Basin Naturalist 54:122-129.
- Rondeau, R.J., C.A. Pague, and S. Spackman. 1996. Statewide Biological Survey of Naval Oil Shale Reserve No. 1 (NOSR-1) 1995 End-of-season Summary Report.
- Rucks, M. G. 1984. Composition and trend of riparian vegetation on five perennial streams in southeastern Arizona. Pp. 97-107 in California riparian systems, R. E. Warner and K. M. Hendrix eds. University of California Press, Berkeley.
- Ruggiero, L. F., Aubry, K. B., Buskirk, S. W., Lyon, L. J. and W. J. Zielinski. 1994. The Scientific Basis

- for Conserving Forest Carnivores in the western United States. General technical report RM-254. U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station, Fort Collins. 184 pp.
- Ryder, R. A. 1998. Boreal Owl. In, Colorado Breeding Bird Atlas, H.E. Kingery ed. Colorado Bird Atlas Partnership; co-published by Colorado Division of Wildlife.
- and D. E. Manry. 1994. White-faced Ibis (*Plegadis chihi*). No. 120 in, The Birds of North America, A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.
- Saab, V. A., and J. S. Marks. 1992. Summer habitat use by Columbian sharp-tailed grouse in western Idaho. Great Basin Naturalist 52:166-173.
- Saab, V. A., Bock, C. E., Rich, T. D. and D.S. Dobkin. 1995. Livestock grazing effects in western North America. Pages 311-353 in Ecology and management of Neotropical migratory birds, T.E. Martin and D.M. Finch, editors. Oxford University Press, New York, NY.
- Scheck, C. 1994. Special Status Plants Handbook for the Glenwood Springs Resource Area. Unpublished report prepared for the Bureau of Land Management, Glenwood Springs, CO.
- Schmutz, J. K. 1995. Updated status report on the Ferruginous Hawk (*Buteo regalis*) in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario. 15 pp.
- Schroeder, M.A., J. R. Young and C. E. Braun. 1999. Sage Grouse (*Centrocercus urophasianus*). In, The Birds of North America, No. 425 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia. PA.
- Sigler, W. F. and R. R. Miller. 1963. Fishes of Utah. Utah State Department of Fish and Game, Salt Lake City, Utah.
- Sigler, W. F., and J. W. Sigler. 1987. Fishes of the Great Basin: a natural history. University of Nevada Press, Reno, Nevada xvi + 425 pp.
- Slobodchikoff, C. N., Robinson, A. and C. Schaack. 1988. Habitat use by Gunnison's prairie dogs. Pages 403-408 in, Management of Amphibians, Reptiles and Small Mammals in North America, R. C. Szaro, K. E. Severson and D. R. Patton, technical coordinators. General Technical Report, U.S. Forest Service, RM-166:1-458.
- Snow, C. 1974. Habitat Management Services for Endangered Species: Report No. 4, Spotted Bat *Euderma maculatum*. Bureau of Land Management.
- Spackman, S. 1997. CNHP Field Survey For The Summit County Conservation Inventory.
- Spackman, S. 1998. Colorado Natural Heritage Program Field Survey of The Roaring Fork Watershed.
- Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.
- Spackman, S., K. Fayette, and J. Siemers. 1998. Colorado Natural Heritage Program Field Survey of Naval Oil Shale Reserve #3.
- Spahr, R., Armstrong, L., Atwood, D. and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. U.S. Forest Service, Ogden, Utah.

- Squires, J. R. and R. T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). In, The Birds of North America, No. 298, A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.
- Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Second Edition. Houghton Mifflin Company, Boston, Massachusetts. xiv + 336 pp.
- Stiles, F. G. and A. J. Negret. 1994. The nonbreeding distribution of the Black Swift: a clue from Colombia and unsolved problems. Condor 96:1091-1094.
- Stokes, D. W., and L. Q. Stokes. 1996. Stokes Field Guide to Birds: Western Region. Little, Brown & Company Limited, Boston.
- Teller, R. W. a. F. A. W. (1983) *Ground-Water Potential of the Leadville Limestone on the White River Uplift in Garfield and Rio Blanco Counties, Colorado..* Water-Resources Investigations Report 83-4036, U.S. Geological Survey, Lakewood, CO.
- Terres, J. K. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York.
- Tickner, P. A., A. D. Reed, and J. C. Horn. 1996. Final report of the cultural resource inventory of Naval Oil Shale Reserve Lands, Garfield County, CO. Unpublished report prepared for the U. S. Department of Energy, Casper, WY by Alpine Archaeological Consultants, Inc., Montrose, CO.
- Trappett, Dave. BLM, Grand Junction RA, Oil and Gas Specialist. 2001. Personal Communication.
- Tyus, H. M. and C. A. Karp. 1989. Habitat use and streamflow needs of rare and endangered fishes, Yampa River, Colorado. U.S. Fish Wildlife Service, Biological Report 89(14). 27 pp.
- and C. A. Karp. 1990. Spawning and movements of razorback sucker, *Xyrauchen texanus*, in the Green River basin of Colorado and Utah. Southwestern Naturalist 35:427-433.
- USDA, NRCS 1999. The PLANTS database (<http://plants.usda.gov/plants>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA (for common names, distributions) [www.fs.fed.us/database/feis/](http://www.fs.fed.us/database/feis/)
- USDI, BLM. 1992. Grand Junction Resource Area. ACEC Activity Plan and Environmental Assessment. Badger Wash ACEC, Pyramid Rock ACEC, Rough Canyon ACEC.
- USDI, BLM. 1987. Grand Junction Resource Area. Resource Management Plan and Record of Decision. Grand Junction, CO.
- USDI, BLM. 1999. Glenwood Springs Resource Area Oil and Gas Leasing and Development Record of Decision and Resource Management Plan Amendment. March, 1999.
- USFWS (United States Fish and Wildlife Service). December 8, 2000. "International Affairs: *Sclerocactus glaucus* Uinta Basin hookless cactus". <http://international.fws.gov/animals/scleglau.html>
- USFWS (U.S. Fish and Wildlife Service). May 22, 1990. Proposal to determine the razorback sucker (*Xyrauchen texanus*) to be an endangered species. Federal Register 55(99):21154-21161.
- USGS (U.S. Geological Survey) (Tweto) 1985. Map, Geology of Colorado.
- Vanderhorst, James P. 1993. Flora of The Flat Tops, White River Plateau, and Vicinity in Northwestern Colorado. Masters Thesis, University Of Wyoming.

- Vanicek, C. D. and R. H. Kramer. 1969. Life history of the Colorado squawfish, *Ptychocheilus lucius*, and the Colorado chub, *Gila robusta*, in the Green River in Dinosaur National Monument, 1964-1966. Transactions of the American Fisheries Society 98:193.
- Weber, W. A. and R. C. Wittmann. 1992. Catalog of the Colorado Flora: A Biodiversity Baseline. University Press of Colorado, Niwot, Colorado.
- Weber, W.A. and R.C.Wittman. 1996. Colorado Flora: Western Slope. University Press of Colorado, Niwot, CO.
- Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins, Eds. 1993. A Utah Flora. Second Edition, Revised. Brigham Young University, Provo, Utah.
- Western Regional Climate Center. 2001. Prism Regional Precipitation Maps. Website: <http://www.wrcc.dri.edu/precip.html>.
- Wetzel, R. G., Michigan State University. 1983. Limnology, Second ed., Saunders College Publishing.
- Wherry, Edgar. 1938. Colorado Ferns. American Fern Journal. Vol 28 no 4. P. 129.
- Whirling Disease Foundation. 2001. [www.whirling-disease.org](http://www.whirling-disease.org).
- White, D. H. and J. T. Seginak. 1987. Cave gate designs for use in protecting endangered bats. Wildlife Society Bull. 15:445-449.
- Wilson, E. O. 1988. Biodiversity. National Academy Press, Washington D.C. 520 pp.
- Winternitz, B. L. 1998. Bald Eagle. In Colorado Breeding Bird Atlas, H.E. Kingery ed. Colorado Bird Atlas Partnership; co-published by Colorado Division of Wildlife.
- Woodling, J. 1985. Colorado's Little Fish: A Guide to the Minnows and Other Lesser Known Fishes in the State of Colorado. Colorado Division of Wildlife, Denver.
- Young, M.K. 1995. Colorado River cutthroat trout. Pages 16-23 in, Conservation Assessment for Inland Cutthroat Trout, M. K. Young, technical ed. USDA Forest Service General Technical Report RM-GTR-256. iv + 61 pp.
- Young, M.K., Schmal, R. N., Kohley, T. W. and V.G. Leonard. 1996. Conservation status of Colorado River cutthroat trout. General Technical Report RM-GTR-282. U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station, Fort Collins. 32 pp.