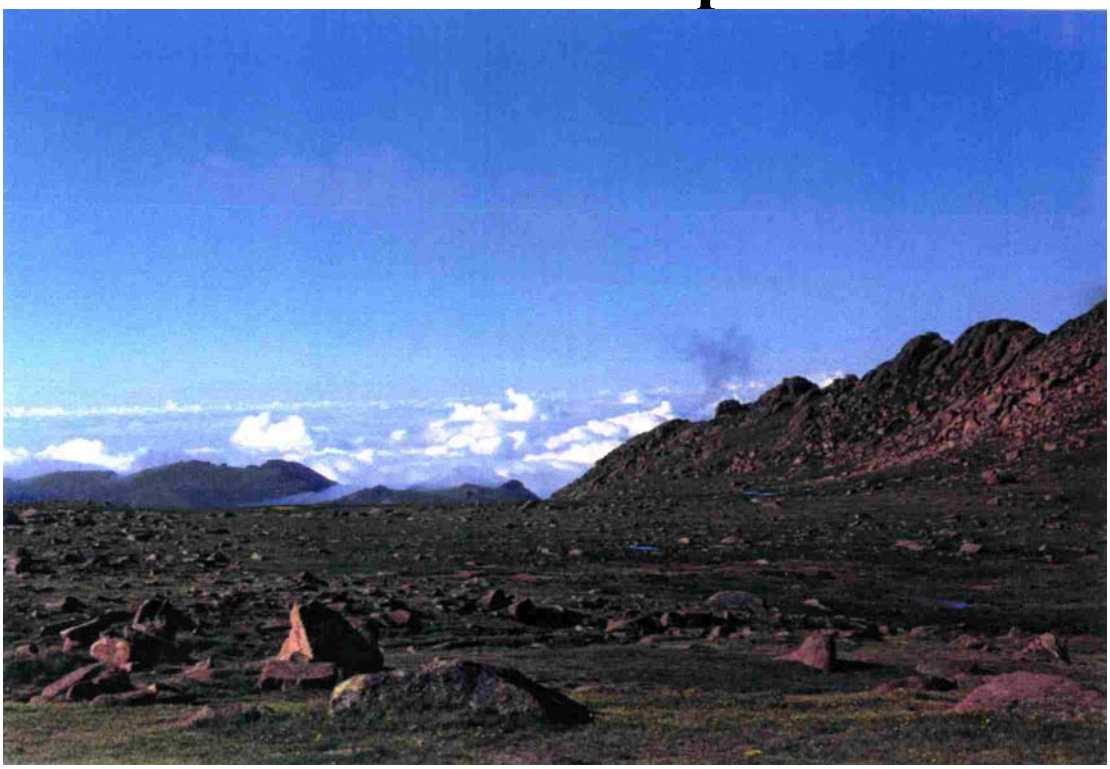
Biological Survey of the Pikes Peak Area 1999 Final Report



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February 1999

The Nature Conservancy

Natural Heritage Program COLORADO

Colorado State University

Biological Survey of the Pikes Peak Area 1999 Final Report

Prepared for
Design Workshop, Inc. and
Colorado Springs Utilities

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Acknowledgements

We would like to acknowledge and thank all the volunteers who participated in this project. Those people are: Liz Klein, Warren Hauk, George Cameron, Mark, Matt and Ingrid Shea, Jay Mann, John Matheson, Jeff Regier, Saxon Brown, Norman Clippinger and Kerri Marshner. The University of Colorado Herbarium staff also provided excellent assistance with the verification of the plant specimens collected.

Several of the CNHP staff members particpated in the successful completion of the project. Lee Grunau, CNHP conservation planner, made great efforts to organize and manage the logistics and provide advice regarding the final product. The zoology field component was completed by Mary Wisz. The information management staff was responsible for integrating the data resulting from the inventory into the Biological Conservation Datasystem and creating a GIS coverage. The following individuals participated in this role: Jill Handwerk, Amy Lavender, and Jeremy Siemers.

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The Natural Heritage Network and Biodiversity

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 biodiversity 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 Wilson (1988) has compared the phenomenon to the great natural catastrophes at the end of the Paleozoic and Mesozoic eras.

The need to address this loss in biodiversity has been recognized for decades in the scientific community. However, many conservation efforts made in this country were not based upon preserving biodiversity; instead, they primarily focused on preserving game animals, striking scenery, and locally favorite open spaces. To address the absence of a methodical, scientifically-based approach to preserving biodiversity, 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 scientifically based upon the number of known locations of the species as well as its biology and known threats. By ranking the relative rareness 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 species such as bacteria, and protists, through multicellular kingdoms of 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. 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 inter-dependence. These communities may be diagnostic 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 elements 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 state-wide conservation priorities. After operating in Colorado for 14 years, the Program was relocated from the State Division of Parks and Outdoor Recreation to the University of Colorado Museum in 1992, and more recently to the College of Natural Resources at Colorado State University.

The 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 locational data on 1:24,000 scale U.S.G.S. maps and store this information in a geographic information system (Arc/INFO and ArcView GIS). The textual information is entered into the Biological and Conservation Data System. The Element Occurrence database can be accessed from a variety of angles, 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 use 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, 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 element of natural diversity enables us to evaluate the significance of each location to the conservation of natural biological diversity in Colorado and in 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

Information is gathered by CNHP on Colorado's plants, animals, and plant communities. Each of these species and plant communities 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 of importance are the size of the geographic range, the number of individuals, trends in both 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 give an instant picture of 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. The Rocky Mountain Columbine which is known only from Colorado, from about 30 locations, is ranked a G3S3. Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1S1. 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.

Table1. 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. **These ranks should not be interpreted as legal**

G/S1	Critically imperiled globally/state-wide because of rarity (5 or fewer occurrences in the world/state; or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction.
G/S2	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.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences).
G/S4	Apparently secure globally/state, though it might be quite rare in parts of its range, especially at the periphery.
G/S5	Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G#T#	Trinomial rank (T) is used for subspecies or varieties and are treated as the next global rank down from the trinomial rank. These species or subspecies are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not permanent residents.
S#N	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used
SZ	Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliable identified, mapped, and protected.

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.

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. 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 2. Federal and State Agency Special Designations.

Federal Status:

1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)

LE Endangered; species or subspecies formally listed as endangered.

E(S/A) Endangered due to similarity of appearance with listed species.

LT Threatened; species or subspecies formally listed as threatened.

P Proposed Endangered or Threatened; species or subspecies formally proposed for listing as endangered or threatened.

CCandidate: species or subspecies for which the 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")

FS Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:

a. Significant current or predicted downward trends in population numbers or density.
b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as "S")

BLM Sensitive: those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.

State Status:

1. Colorado Division of Wildlife

E Endangered

T Threatened

SC Special Concern

Methods

The methods for assessing and prioritizing conservation needs over a large area are necessarily diverse. The Colorado Natural Heritage Program follows a general method which is continuously being developed specifically for this purpose. The Pikes Peak Biological Inventory 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 within The Pikes Peak area. A variety of information sources were searched for this information. The Colorado State University museums and herbarium were searched, as were plant and animal collections at the University of Colorado, Western State, Rocky Mountain Herbarium, and local private collections. The Colorado Division of Wildlife provided data on the fishes of the Pikes Peak area. Both general and specific literature sources were incorporated into CNHP databases, in the form of 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 (reproductive timing), food sources, and substrates. This information was entered into CNHP databases.

Identify Rare Or Imperiled Species And Significant Plant Communities With Potential To Occur In The Pikes Peak Area

The information collected in the previous step was used to refine the potential element list and to refine our search areas. In general, species and plant communities that have been recorded from the Pikes Peak area, or from El Paso and Teller counties, are included in this list. Species or plant communities which 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. Known locations were targeted, and additional potential areas were chosen using available 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, i.e., "headwaters of Cataract Creek." 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. Aerial photography is perhaps the most useful tool in this step of the process.

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.

Conduct Field Surveys

Survey sites 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.

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 would attempt to cover the area as thoroughly as possible in the given time. Some types of organisms require special technique in order to capture and document their presence. Shrew were caught with pit fall traps and bats with mist nets.

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

When a rare species or significant plant 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 quality (size, vigor, etc.) of the population or community, the condition or naturalness of the habitat, the long-term viability of the population or community, and the landscape context of the occurrence. These factors are combined into an element occurrence rank, useful in refining conservation priorities.

Delineate Potential Conservation Area Boundaries

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, proposed conservation planning boundaries were delineated. Such a boundary is an estimation of the minimum area needed to ensure persistence of the targeted species or plant community. The goal 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 such 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.

As the label "conservation planning" indicates, 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 wise land-use planning at all levels.

The proposed boundary does not automatically exclude all activity. It is hypothesized that some activities will prove degrading to the element or the process on which they depend, while others will not. Consideration of 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. These boundaries are considered preliminary and additional information about the site or the element may call for alterations to the boundaries.

Off-Site Considerations

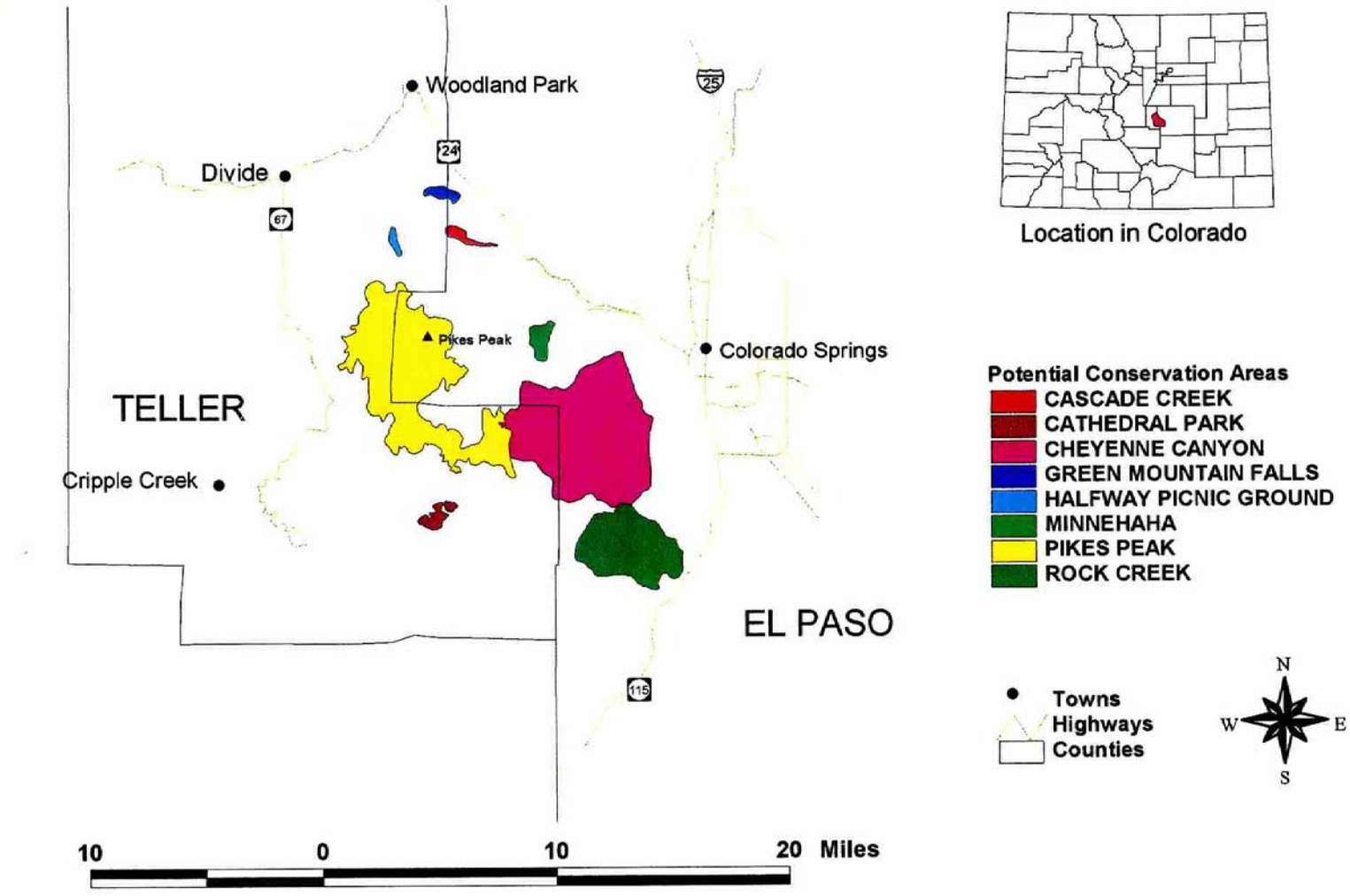
Furthermore, it is often the case that all relevant ecological processes cannot be contained within a site of reasonable size. Taken to the extreme, the threat of ozone depletion could expand every site to include the whole globe. The boundaries illustrated in this report signify the immediate, and therefore most important, area in need of protection. Continued landscape level conservation efforts are needed. This will involve county-wide efforts as well as coordination and cooperation with private landowners, neighboring land planners, and state and federal agencies.

Results

The Pikes Peak area supports a unique set of biodiversity. Fifty significant plants, animals and natural communities are found in a small area approximately 16 x 20 miles surrounding Pikes Peak. Out of this fifty, an astounding number are plants, 31 to count. Included in this number are one plant species which is known from nowhere else in the world, the best known population in the world for another species, and a third subspecies which is endemic to the area.

The Colorado Natural Heritage Program has designed eight Potential Conservation Areas (PCA) (see Figure 1) which are important to the long-term survival of the rare species found here. These PCA's are described below and include specific management issues.

Figure 1: Pikes Peak Potential Conservation Areas



Pikes Peak Potential Conservation Area (Outstanding Biodiversity Significance)

This PCA includes the areas above treeline on Pikes Peak, Almagre Mountain and Sheep Mountain. This large area includes every known location of the Pikes Peak spring parsley (*Oreoxis humilis*) in the world. It is theorized that the geology of the area has created a unique habitat for this species and that it is limited to the Pikes Peak and Windy Point granites. Thousands of individuals were documented this field season. Although the entire site was not visited, the Pikes Peak spring parsley is expected to be found anywhere above timberline within this site.

In addition to this Pikes Peak endemic, there are nine other rare plants found in this site and a reservoir containing the greenback cutthroat trout. The status of the Pikes Peak spring parsley and the overall number of significant plants found here has brought this site to the top of the list.

Above timberline in the tundra, surface disturbances take much longer to restore (Zwinger and Willard 1972). Off trail/road use should be discouraged. Well-marked and carefully constructed trails are important. The backside (west) of Pikes Peak has no current marked trails, but there are several old two-track roads which are still visible and should be used for trail routes if new trails are needed. Erosion from the Pikes Peak highway should be managed. A reservoir, a radio tower, and several dirt roads are found on Almagre Mountain. These roads should be limited to the fewest number of routes possible.

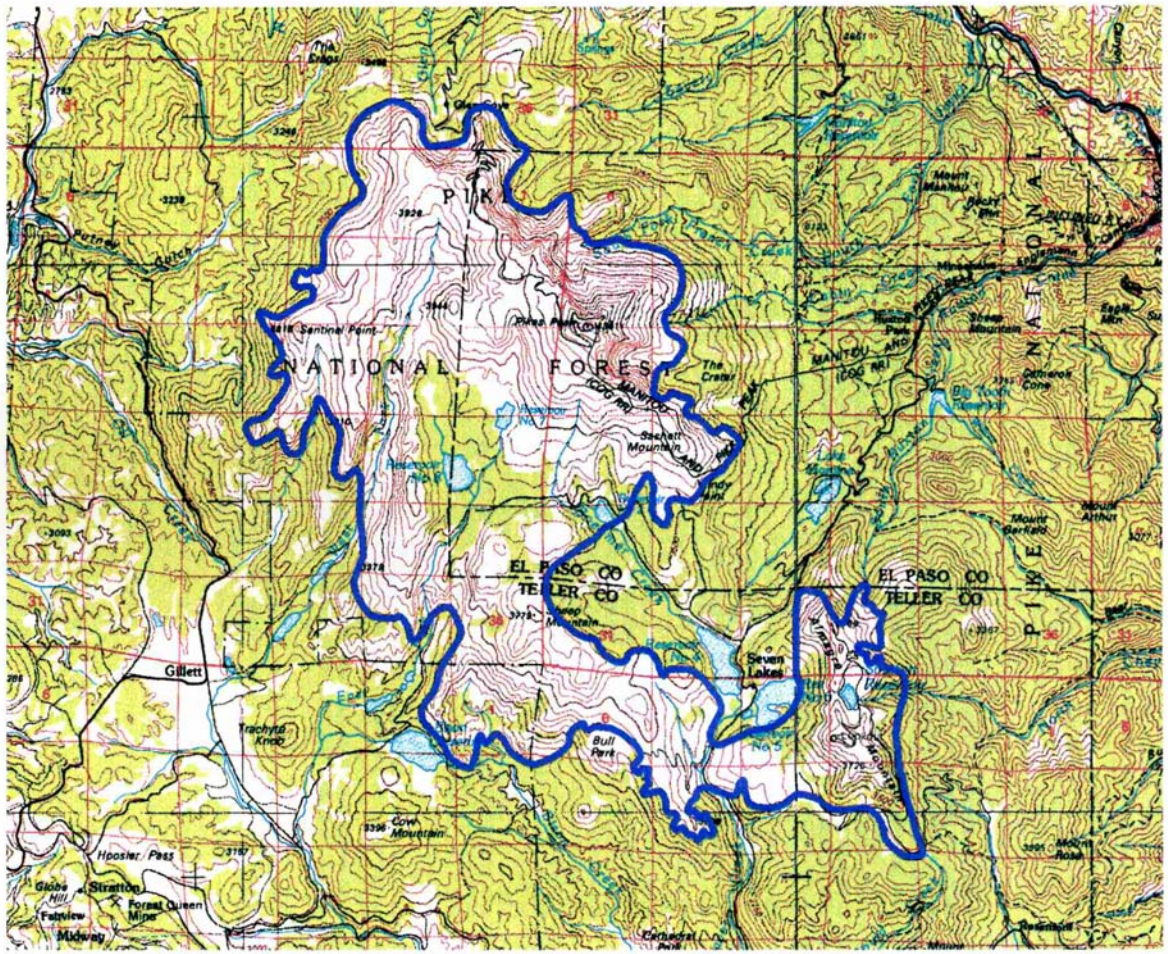
There are several management issues surrounding the greenback cutthroat trout in Boehmer Reservoir (Resevoir No. 2). This species is easily replaced by exotic fish species and needs natural native vegetation and high water quality to support its invertebrate diet (Trotter 1987). Maintenance on the dams, reservoirs and roads in this watershed should be carefully considered before action is taken. Loss of vegetation along the banks of the creek or reservoir may have detrimental affects on this fish species.

Significant plants, animals and plant communities found in the Pikes Peak PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	**Common Name**	**Global Rank**	**State Rank**	**Fed Status**	**State Status**	**Fed Sens**
Oreoxis humilis	Pikes Peak spring parsley	G1	S1			
Pinus aristata/Trifolium dasyphyllum	upper montane woodlands	G2	S2			
Draba exunguiculata	clawless draba	G3	S3			
Aquilegia saximontana	Rocky Mountain columbine	G3	S3			
Draba fladnizensis	arctic draba	G4	S2S3			
Telesonix jamesii	James' saxifrage	G4	S2?			
Mertensia alpina	alpine bluebell	G4?	S1			
Oncorhynchus clarki stomias	greenback cutthroat trout	G4T2T3	S2S3	LT	T	
Papaver lapponicum ssp. *occidentalis*	alpine poppy	G4T5	S2			

Pikes Peak spring parsley (seen here with yellow flowers)

Figure 2: Pikes Peak Potential Conservation Area



Pikes Peak PCA

PCA boundary

Natural Heritage Program
COLORADO

Cascade Creek Potential Conservation Area (Outstanding Biodiversity Significance)

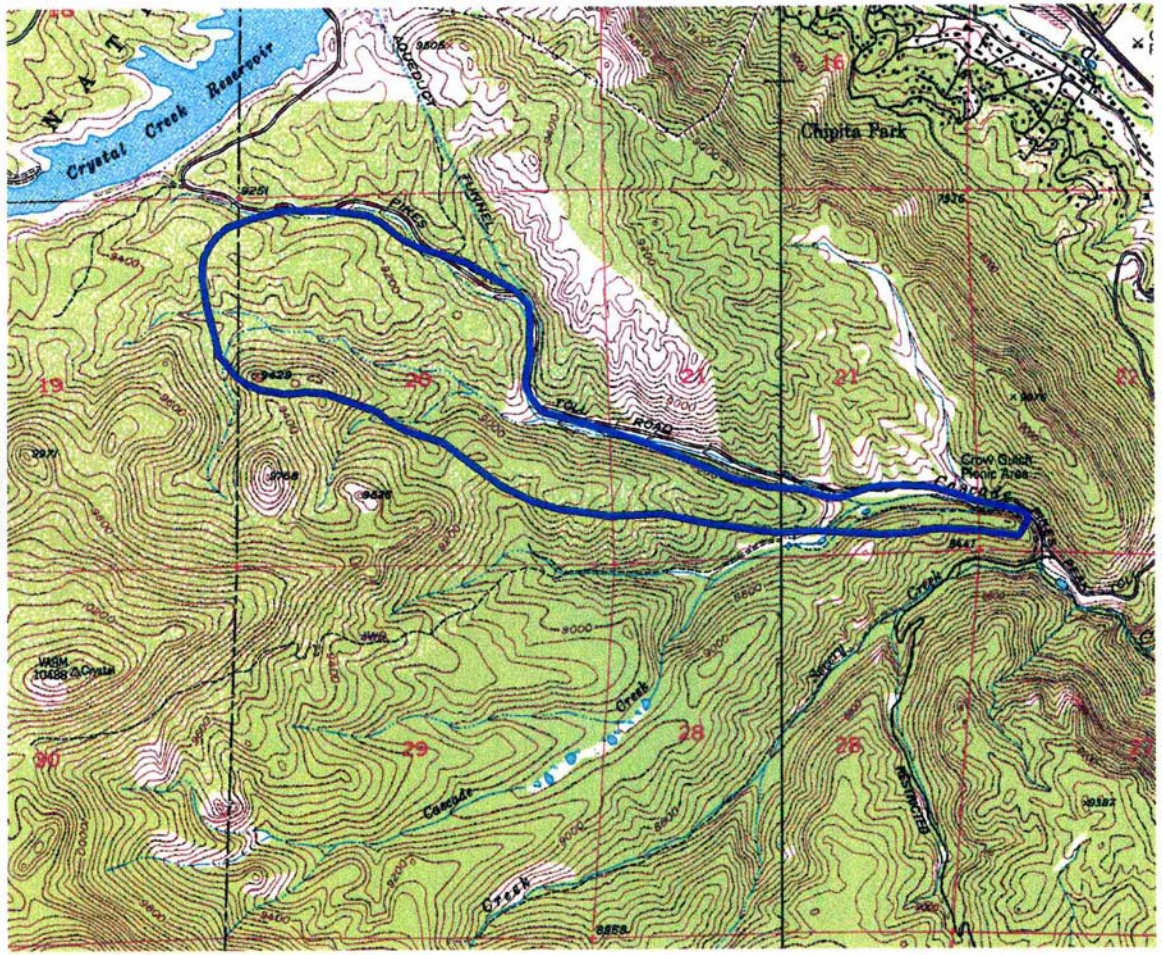
This site includes the small roadside area of occupied habitat for the narrowleaf grapefern (*Botrychium lineare*). This inconspicuous fern ally is known from seven widely scattered locations in Colorado, Oregon, California, Montana, Idaho, Quebec, and New Brunswick. The population along the Pikes Peak highway is the largest (45 individuals) documented in the world. Trampling from recreation and highway maintenance or widening are the potential threats to this location.

Significant plant found in the Cascade Creek PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	**Common Name**	**Global Rank**	**State Rank**	**Fed Status**	**State Status**	**Fed Sens**
Botrychium lineare	narrowleaf grapefern	G1	S1			FS

Narrowleaf grapefern

Figure 3: Cascade Creek Potential Conservation Area



Cheyenne Canyon Potential Conservation Area (Very High Biodiversity Significance)

North Cheyenne and Bear Creek (and likely South Cheyenne Creek) support a plant variety that is endemic to Colorado and is the basis for this site. Rydberg's golden columbine (*Aquilegia chrysantha* var. *rydbergii*) is currently known only from Cheyenne Mountain and Cheyenne/Bear Canyons. This endemic variety is found along the creeks and side drainages in moist areas. The large yellow flower attracts attention and may be in danger of being picked by passers-by.

In addition to this globally rare variety, there are 11 other significant plants, animals and plant communities found within this site.

The riparian areas within this site should be the top priority for management actions. The significant riparian plant communities and several of the rare plants, including Rydberg's golden columbine, rely on these areas. North Cheyenne Canyon has many developments, such as North Cheyenne Canyon road, several picnic areas, parking pullouts and trails. Recreation is high in the Canyon. Below Helen Hunt Falls, the south side of North Cheyenne Creek is less accessible but is still heavily used. Restricting access to this bank would allow the vegetation to remain intact on one side of the creek.

Bear Creek is less used and developed compared to North Cheyenne Canyon. It also supports a much larger number of individuals of Rydberg's golden columbine compared to North Cheyenne Canyon. Due to these factors, Bear Creek should be focused on for the protection of Rydberg's golden columbine. The Bear Creek trail is becoming widened with use and is eroding in a stretch below the falls. These problems should be addressed. Restricting this trail from recreation other than hikers should be considered. Future trails, roads, picnic grounds and other developments should not be constructed in the riparian zones.

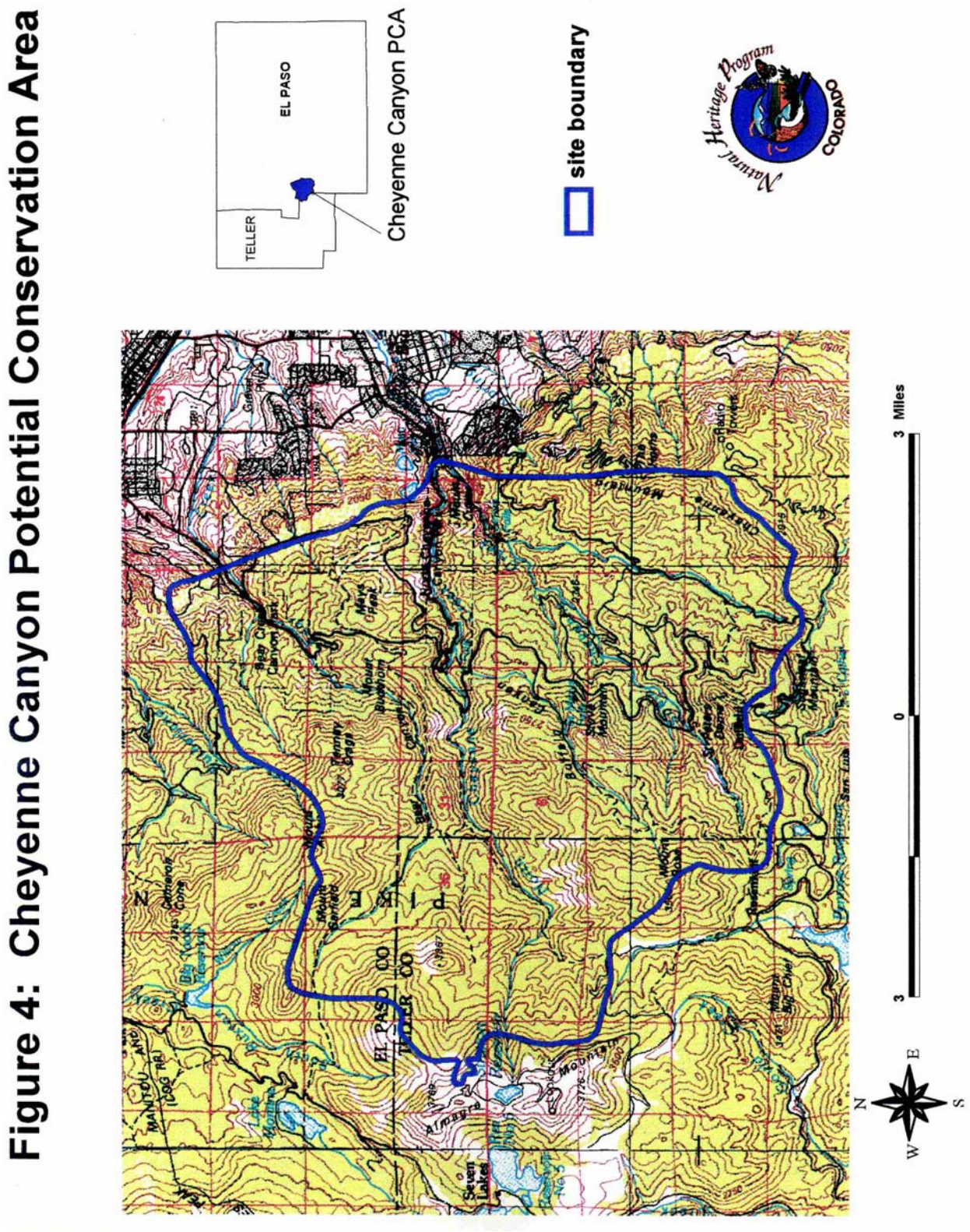
Captain Jacks Trail, off High Drive, is heavily used by mountain bikers. Also Trail 701 at the upper end of North Cheyenne Canyon is heavily used by motor bikes. Both trails are eroding badly and should be stabilized, re-routed or closed. A globally rare plant species, Rocky Mountain columbine (*Aquilegia saximontana*), occurs directly adjacent to Trail 701 and should be worked around very carefully. Protection of the immediate area around the peregrine falcon nest is necessary for its success. Current management is adequate (closed during breeding season).

Significant plants, birds and plant communities found in the Cheyenne Canyon PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Fed Sens
Aquilegia chrysantha var. *rydbergii*	Rydberg's golden columbine	G4T1	S1			
Populus angustifolia/ Prunus virginiana	narrowleaf cottonwood/ common chokecherry	G2G3	S1			
Aquilegia saximontana	Rocky Mountain columbine	G3	S3			
Corylus cornuta	lower montane forests	G3	S1			
Pseudotsuga menziesii/ Betula occidentalis	montane riparian forest	G3?	S3			
Telesonix jamesii	James' saxifrage	G4	S2?			
Falco peregrinus anatum	American peregrine falcon	G4T4	S2B, SZN	LE	T	
Carex leptalea	bristle-stalk sedge	G5	S1			
Lilium philadelphicum	wood lily	G5	S3			
Goodyera repens	dwarf rattlesnake plantain	G5	S2			
Pellaea atropurpurea	purple cliff-brake	G5	S2S3			
Botrychium virginianum	rattlesnake fern	G5	S1			
Cypripedium pubescens	yellow lady's slipper	G5	S2			

James' saxifrage

Figure 4: Cheyenne Canyon Potential Conservation Area



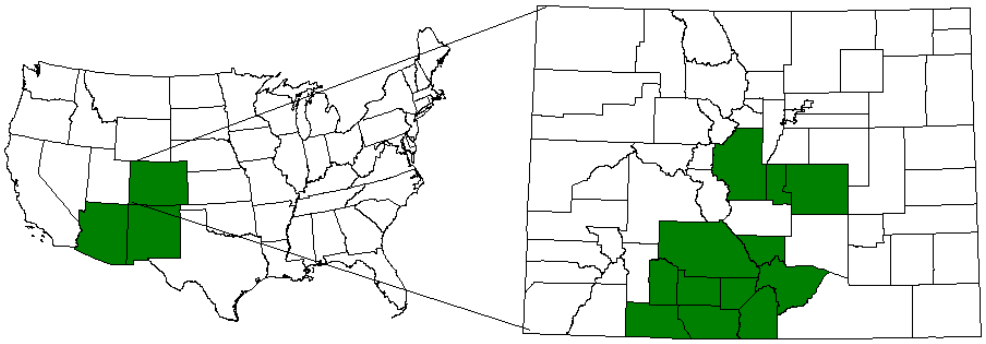
Fi
gure 4: Cheyenne Canyon Potential Conservation Area

Cathedral Park Potential Conservation Area (Very High Biodiversity Significance)

The Cathedral Park PCA includes one of the best known representations of a globally common montane woodland (*Pinus aristada/ Festuca arizonica*). To complete protection of all common communities and the species they support, protection of the best examples of these communities is a good approach. Improper grazing and the invasion of exotic plant species may degrade this community and should be controlled.

Significant plant community found in the Cathedral Park PCA (please see Table 1 and 2 for rank and legal status definitions)

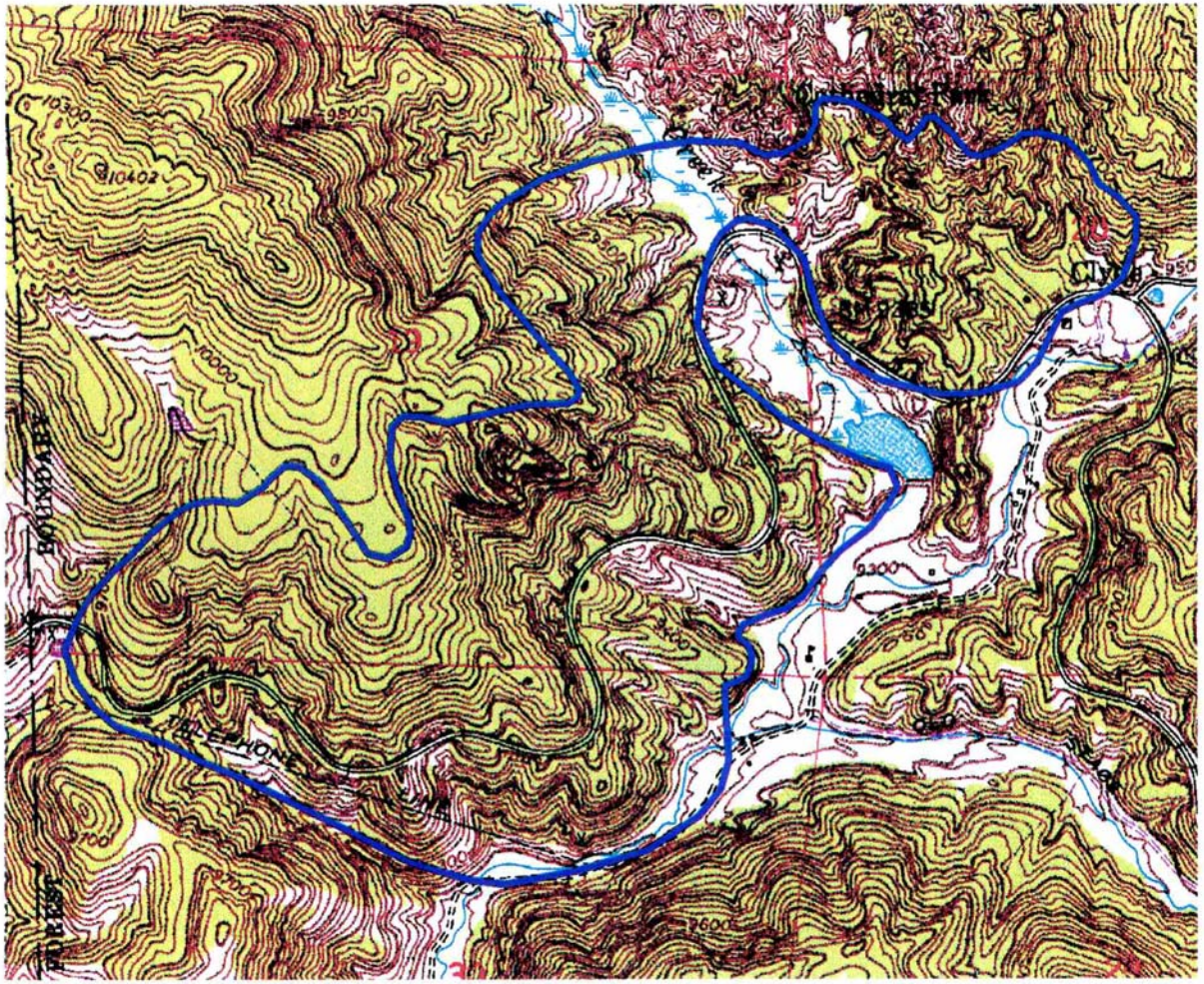
Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Fed Sens
Pinus aristada/ Festuca arizonica	montane woodland	G4	S3			

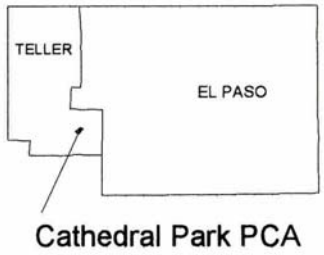


Global distribution for bristlecone pine woodlands (R. Rondeau pers. comm.)

Colorado distribution for bristlecone pine woodlands (R. Rondeau pers. comm.)

Figure 5: Cathedral Park Potential Conservation Area





PCA boundary

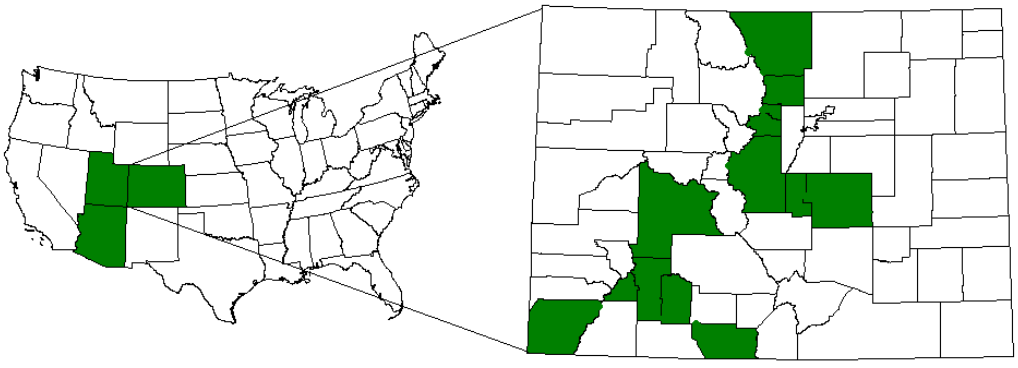
Natural Heritage Program
COLORADO

Halfway Picnic Ground Potential Conservation Area (High Biodiversity Significance)

This small area includes four rare species of the moonwort genus. These fern allies often occur together as they do here. They are a few inches tall at most, produce spores instead of flowers, and often occur within taller groupings of plants. Due to these factors, these species are easily overlooked and trampled. These four species range from globally common and state rare to globally rare. Reflected moonwort (*Botrychium echo*) is reported from 13 counties in Colorado, however, there are very few total individuals known worldwide. This site is separated from the picnic area by a small gully, however, trampling from off trail recreation is the biggest concern at this time.

Significant plants found in the Halfway Picnic Ground PCA (please see Table 1 and 2 for rank and legal status definitions)

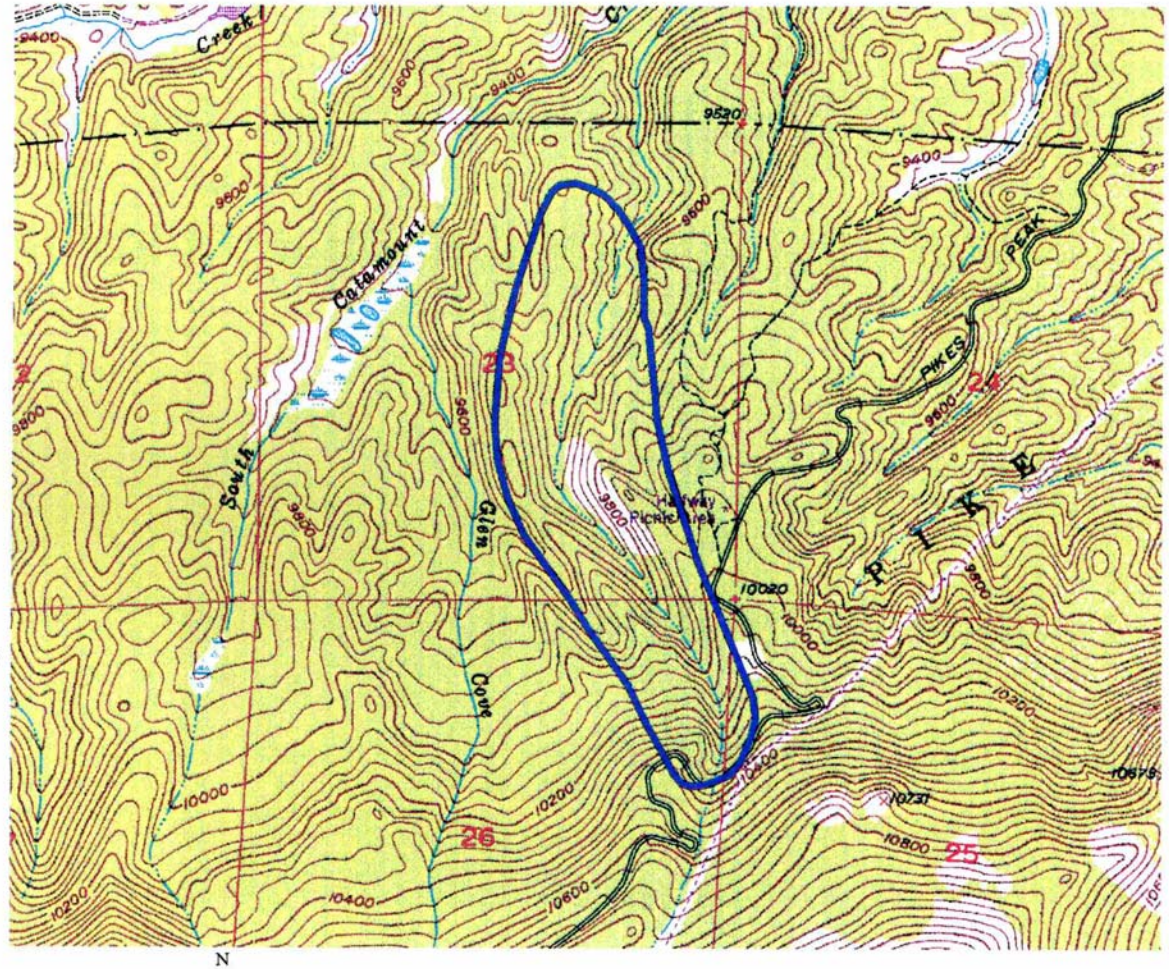
Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Fed Sens
Botrychium echo	reflected moonwort	G2	S2			FS
Botrychium pallidum	pale moonwort	G2	S2			FS
Botrychium hesperium	western moonwort	G3	S2			
Botrychium lanceolatum var. *lanceolatum*	lance-leaved moonwort	G5T4	S2			

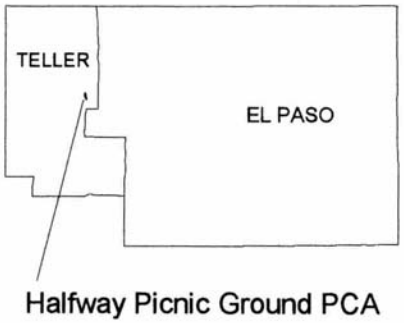


Global distribution for reflected moonwort (USDA, NRCS 1997)

Colorado distribution for reflected moonwort (CNHP 1999)

Figure 6: Halfway Picnic Ground Potential Conservation Area





PCA boundary

0.6 0 0.6 Miles

Natural Heritage Program
COLORADO

Green Mountain Falls Potential Conservation Area (Moderate Biodiversity Significance)

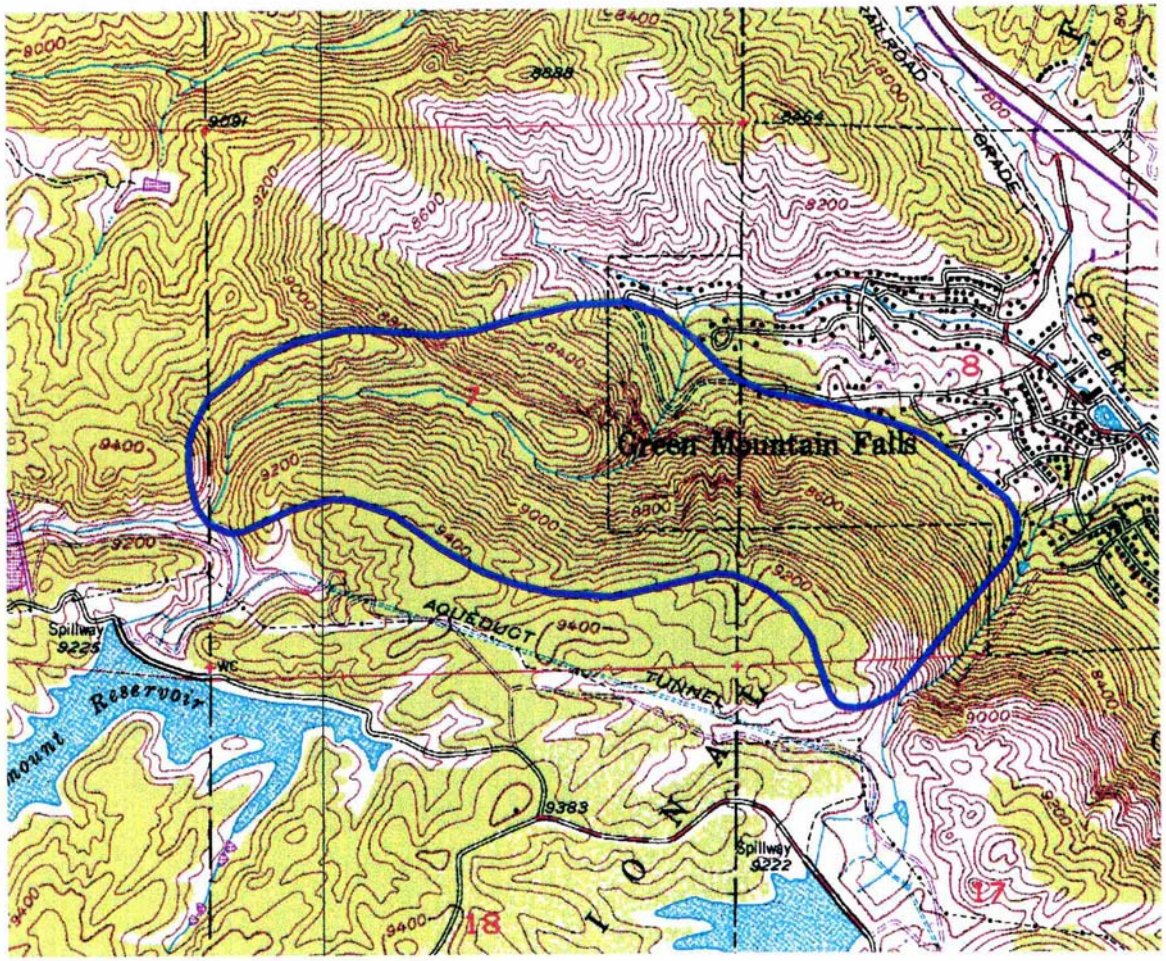
This site contains a large population of the dwarf rattlesnake plantain (*Goodyera repens*). This orchid is rare in the state but common globally. A second state rare orchid species, white adder's mouth (*Malaxis brachypoda*), is known historically from this area. The site surrounds the Thomas Trail which divides this population. The trail should not be widened and exotic species should be eradicated. Of primary concern is butter-and-eggs (*Linaria vulgaris*), which is found along the main trail up Green Mountain Falls. Encroaching residential development may destroy the dwarf rattlesnake plantain occurrence and will likely bring in exotic species.

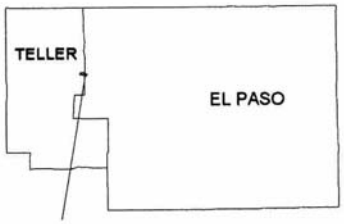
Significant plants found in the Green Mountain Falls PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Fed Sens
Malaxis brachypoda	white adder's-mouth	G4	S1			FS
Goodyera repens	dwarf rattlesnake plantain	G5	S2			

Habitat for dwarf rattlesnake plantain

Figure 7: Green Mountain Falls Potential Conservation Area





Green Mountain Falls PCA

PCA boundary

N
W
E
S

0.7 0 0.7 Miles

Minnehaha Potential Conservation Area (General Biodiversity Significance)

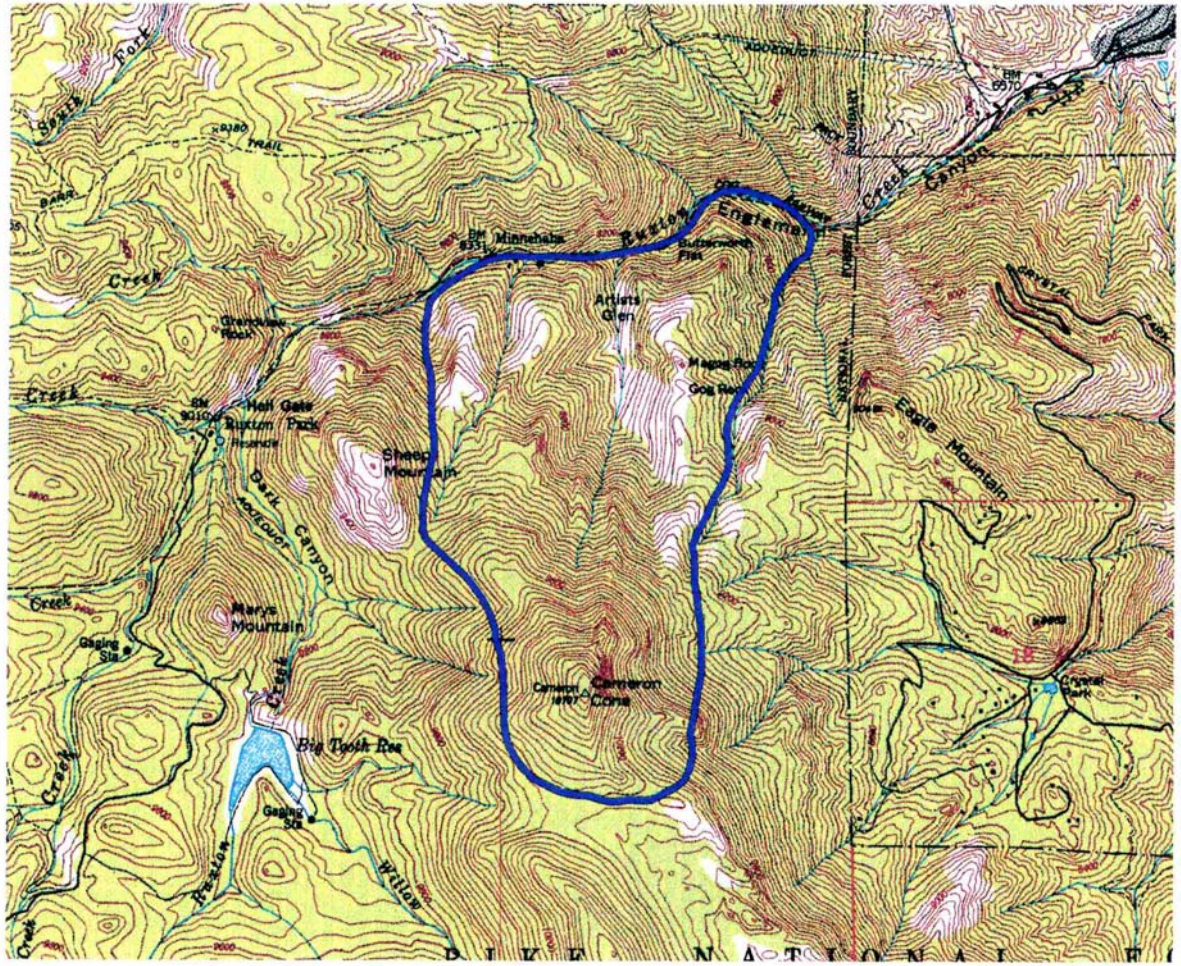
Two state rare/globally common plant species are found within this site. This site is only accessible by the cog railroad. The dwarf rattlesnake plantain (*Goodyera repens*) occurs near the railroad line. Maintenance of the railroad may disturb this population. Another concern for this PCA is the invasion of butter and eggs (*Linaria vulgaris*), found along the cog railroad, or other exotic species.

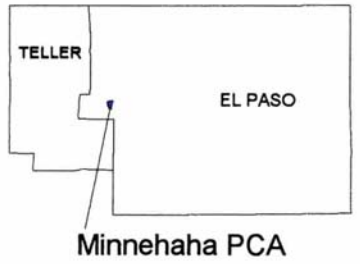
Significant plants found in the Minnehaha PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Fed Sens
Telesonix jamesii	James' saxifrage	G4	S2?			
Goodyera repens	dwarf rattlesnake plantain	G5	S2			

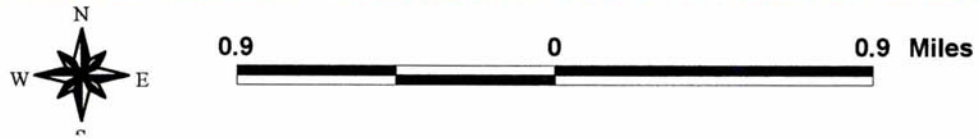
Dwarf rattlesnake plantain

Figure 8: Minnehaha Potential Conservation Area





PCA boundary



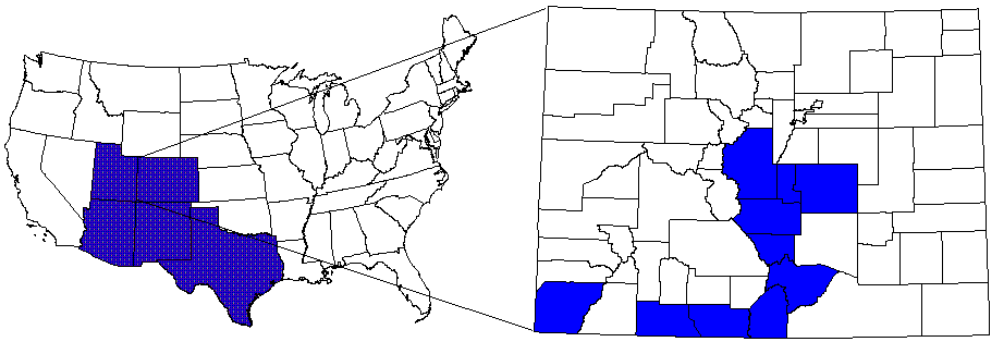
Rock Creek Potential Conservation Area (General Biodiversity Significance)

The canyons of Rock Creek and Little Fountain Creek are included in this site. Steep canyons and cliffs are the preferred nesting habitat for the Mexican spotted owl (*Strix occidentalis lucida)* and the American peregrine falcon (*Falco peregrinus anatum)*. Nest disturbances are the most common threats to these birds. Rock climbers attracted to this steep rocky canyon should be discouraged from recreating here during the nesting season.

Two state rare/globally common plants are also found along Little Fountain Creek. Both species have large brilliantly colored flowers which may be subject to collecting. These aquatic dependent species are affected by changes in the hydrological setting. Trails and roads are adjacent and dissect these plant populations. Trails should be re-routed to protect the plants from trampling and collecting.

Significant birds and plants found in the Rock Creek PCA (please see Table 1 and 2 for rank and legal status definitions)

Scientific Name	**Common Name**	**Global Rank**	**State Rank**	**Fed Status**	**State Status**	**Fed Sens**
Strix occidentalis lucida	Mexican spotted owl	G3T3	S1B, SU	LT	T	
Falco peregrinus anatum	American peregrine falcon	G4T4	S2B, SZN	LE	T	
Cypripedium pubescens	yellow lady's slipper	G5	S2			
Lilium philadelphicum	wood lily	G5	S3			



U.S. distribution of the Mexican spotted owl (Gutierrez et al. 1995)

Colorado distribution of probable and confirmed breeding of the Mexican spotted owl (Andrews and Righter 1992)

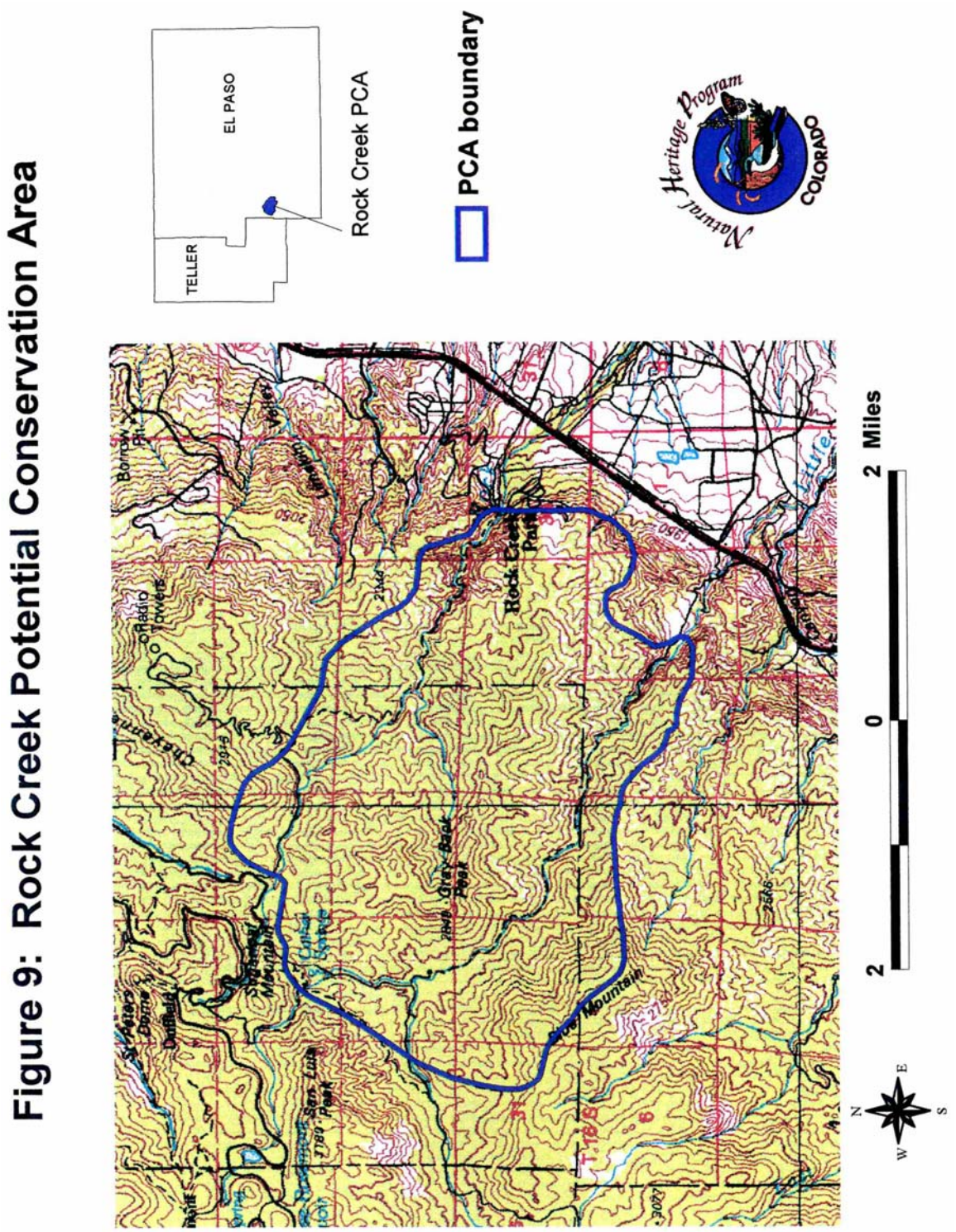


Figure 9: Rock Creek Potential Conservation Area

General Management Comments

The Pikes Peak area receives intense pressure from recreation use. Off-road vehicle use, hiking, climbing and biking is prevalent. In general, dirt trails and roads can cause erosion problems if they are not designed and managed properly. Pikes Peak granite gravel is the predominant substrate in the area and is highly erodable. As the gravel is pushed down a slope it finds its way to riparian and wetland areas. This gravel can fill-in creek bottoms and wetlands (Dunne and Leopold 1978). The uplands are also affected by this movement of gravel. Vegetation, especially forbs, may not be able to survive the unstable nature of the slope. Surface disturbances are not easily recovered above timberline (Zwinger and Willard 1972).

A secondary effect of trails and roads is the establishment of non-native plants. Many noxious weeds can push out native vegetation in a very short amount of time and spread quickly. The invasion of exotic plant species may threaten any one of the significant native species and may also quickly degrade riparian areas. Riparian zones should be avoided when building new trails, roads, picnic areas, etc. Butter-and-eggs (*Linaria vulgaris*) is not the only exotic species in this area, but it is the most common. It is found along the Pikes Peak Highway, Gold Camp/Old Stage roads, Highway 67 and 24 and along the cog railroad. This species is defined as a "noxious weed" according to the Colorado Noxious Weed Act (Colorado Department of Agriculture). It does not appear to be moving into the natural vegetation at this time, but a plan of removal for this and other exotic species should be instigated.

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