Survey of Critical Biological Resources, El Paso County, Colorado

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Knowledge to Go Places

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Cover photograph: Big bluestem-prairie sandreed (*Andropogon gerardii-Calamovilfa longifolia*) tallgrass prairie near Colorado Springs Airport (CNHP photo).

Executive Summary

Citizens of El Paso County are concerned with the conservation of natural resources within the county. They recognize the need to plan for the conservation of the plants, animals and plant communities native to El Paso County. They also recognize that with limited economic resources, it is important to prioritize conservation efforts. Thus, timely information regarding the locations of the most significant biological resources is essential.

In 1999, the Colorado Natural Heritage Program (CNHP) proposed to the El Paso County Board of Commissioners that a biological survey be conducted for El Paso County. The goal of the project was to systematically identify the locations of rare species and significant natural plant communities are in El Paso County, and to identify and prioritize areas of critical habitat (potential conservations areas) for these species and communities. In addition, CNHP offered to assist in conservation efforts and to present the results of the study to the county commissioners, county planning departments, and interested local groups.

A majority of the funding for this biological survey was provided through a Great Outdoors Colorado (GOCO) planning grant to El Paso County Parks and Leisure Services Department. The County then contracted with Colorado Natural Heritage Program to perform the biological survey. A related study of wetland and riparian resources funded by the Colorado Department of Natural Resources was conducted simultaneously by CNHP.

Field survey work began in June 2000 and continued through November 2000, with additional surveys conducted during April 2001. Because little is known from these areas, private lands were given the highest priority for inventory. Such locations were identified by examining existing biological data for rare plant and animal species, and significant plant communities (collectively called "elements") from the Colorado Natural Heritage Program's database and accumulating additional existing information on these elements. Areas that were expected to contain significant elements were delineated as "Targeted Inventory Areas" (TIAs). These areas were prioritized for inventory based on the relative rarity of the elements expected to be found there and the area's ability to maintain viable populations of those elements. Extensive field surveys were conducted within the TIAs, and areas found to contain significant elements were delineated as "Potential Conservation Areas."

Results of the survey confirm that there are many areas with high biological significance in El Paso County. There are several extremely rare plants and animals that depend on these areas for survival. All together, 24 rare or imperiled plant species, 25 rare or imperiled animal species, and 47 plant communities of concern have been documented in El Paso County (Appendix).

CNHP identified 40 Potential Conservation Areas (PCAs) in El Paso County. Each PCA was ranked according to its biodiversity significance. Of the 40 PCAs identified, two are

of outstanding significance (B1), 11 are of very high significance (B2), 13 are of high significance (B3), six are of moderate significance (B4), and eight are of general significance (B5). Of particular interest are rare plants that are unique to Pikes Peak; a Preble's meadow jumping mouse population along Monument Creek and its tributaries; a native historic population of greenback cutthroat trout in Severy Creek; tallgrass prairie remnants near Colorado Springs Airport; Mountain Plover and playa communities in southeastern El Paso County; foothills communities at Aiken Canyon and Cheyenne Mountain; native historic populations of Arkansas darter in Big Sandy and Black Squirrel creeks, and large intact sandsage prairie communities at Signal Rock Sandhills. El Paso County is truly unique with an amazing richness of rare fauna and flora well worth preserving for future generations. Overall, the concentration and quality of imperiled elements and habitats attest to the fact that conservation efforts in El Paso County will have both statewide and global significance.

CNHP believes that the PCAs identified in this report include those areas that most merit conservation efforts, but emphasizes that protecting only these sites will not adequately protect all the biodiversity values in El Paso County. Despite the best efforts of field biologists during one field season, it is likely that some elements in the county were not documented during the survey due to lack of access, phenology of species, or time constraints. We believe that future surveys will identify additional areas of biological importance.

This project included a conservation-planning component to facilitate use of the biological information. Strategies for implementing conservation were developed with input from the El Paso County Planning Team, which consisted of representatives from government and local agencies, non-profit organizations, landowners, and private citizens. The strategies that were developed are summarized in this report.

The PCA boundaries in this report do not confer any regulatory protection. The boundaries are intended to support planning and decision making for the conservation of these significant areas. The results of the survey will be provided to the county in GIS format. Additional information may be requested from Colorado Natural Heritage Program, 254 General Services Building, Colorado State University, Fort Collins, CO 80523 (www.cnhp.colostate.edu or (970) 491-1309).

Potential Conservation Areas of El Paso County.

Potential Conservation Area	Biodiversity Rank	Page Number
Outstanding Biodiversity Significance		
Cascade Creek	B1	33
Pikes Peak	B1	36
Very High Biodiversity Significance		
Aiken Canyon	B2	41
Buffalograss Playas	B2	45
Cheyenne Canyon	B2	52
Colorado Springs Airport	B2	57
Judge Orr Road	B2	61
Monument Creek	B2	66
Schriever Playas	B2	72

Table 1. Potential Conservation Areas of El Paso County (cont.).

Very High Biodiversity Significance (cont.)		
Severy Creek	B2	76
Signal Rock Sandhills	B2	79
Squirrel Creek School	B2	83
Truckton Edison	B2	87
High Biodiversity Significance		
Big Sandy Creek at Calhan	B3	91
Blue Mountain	B3	96
Boehmer Creek	B3	100
Bohart Playas	B3	104
Chico Basin Dunes	B3	108
Chico Creek	B3	111
East Chico Basin Ranch	B3	119
Farish Recreation Area	B3	122
Fremont Fort	B3	125
Olney Prairie	B3	129
Riser at Calhan	B3	132
Table Rock	B3	135
West Kiowa Creek at Elbert	B3	139
Moderate Biodiversity Significance		
Black Forest	B4	142
Cheyenne Mountain	B4	146
Fountain and Jimmy Camp Creeks	B4	150
Pineries at Black Forest	B4	155
Rasner Ranch Playas	B4	159
Sand Creek Ridge	B4	162
General Biodiversity Significance		
Big Johnson Reservoir	B5	165
Cave of the Winds	B5	169
Edison Road	B5	172
Hanover Road	B5	176
Marksheffel Road	B5	179
Monument Southeast	B5	183
Squirrel Creek Road	B5	187
Widefield Fountain	B5	191
Network of Conservation Areas		
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This project would not have been possible without the help of many dedicated individuals. We appreciate the support of the El Paso County Commissioners, the Planning Department, and the Assessor's office. We express our sincere appreciation to the private landowners who allowed us to survey their properties and who shared their rich history of the land. We were welcomed onto many ranches and enjoyed spending time with and learning from these generous land stewards. We extend our appreciation to Colorado Division of Wildlife (CDOW) for sharing their expertise on the wide range of wildlife species in the county. Gary Dowler, CDOW Aquatic Biologist provided information on the native fishes, and Seth McClean provided extensive electronic data. Other CDOW personnel who shared their expertise include Dave Lovell and Reid DeWalt. Steve Kettler and Julie Farrell of the Southeastern Office of The Nature Conservancy provided much appreciated support in countless ways; sharing of local expertise, discussing ecology, and arranging a forum to share the information with land conservation organizations. Chris Pague of The Nature Conservancy shared local expertise and provided encouragement. Dan Fosha of The Sierra Club provided assistance with land access and history of land ownership and management in the County. Bill Maynard and Richard Bunn with Fort Carson Military Reservation generously shared their expertise on the birds and other wildlife of El Paso County. Tass Kelso, professor of Botany at Colorado College, provided many leads on locations of botanically and ecologically interesting areas and generously shared her expertise. George Maentz of The Palmer Foundation provided invaluable assistance with rare plants in El Paso County and navigating the Colorado College Herbarium. Judy von Ahlefeldt generously shared her knowledge of the plants of the Black Forest. John Valentine of the Natural Resources Conservation Service was extremely helpful in getting us oriented to the county. Land managers in the county, including Duke Phillips of Chico Basin Ranch, Ralph Mitchell of Schreiver Air Force Base, Brian Mihlbachler and Jim McDermott of the U.S. Air Force Academy, and Dick and Sandra Tanner of the Bohart Ranch were very helpful in allowing us repeated access to their properties and providing valuable local insight. The School of the Woods provided land access and advice for contacts throughout the Black Forest.

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Chapter 1. The Natural Heritage Network and Biodiversity

Just as ancient artifacts and historic buildings represent our cultural heritage, a diversity of plant and animal species and their habitats represent our “natural heritage.” Colorado’s natural heritage encompasses a wide variety of ecosystems from tallgrass prairie and shortgrass high plains to alpine cirques and rugged peaks, from canyon lands and sagebrush deserts to dense subalpine spruce-fir forests and wide-open tundra.

These widely diversified habitats are determined by water availability, temperature extremes, altitude, geologic history, and land use history. The species that inhabit each of these ecosystems have adapted to the specific set of conditions found there. Because human influence today touches every part of the Colorado environment, we are responsible for understanding our impacts and carefully planning our actions to ensure our natural heritage persists for future generations.

Some generalist species, like house finches, have flourished over the last century, having adapted to habitats altered by humans. However, many other species are specialized to survive in vulnerable Colorado habitats; among them are Bell’s twinpod (a wildflower), the Arkansas darter (a fish), and the Pawnee montane skipper (a butterfly). These species have special requirements for survival that may be threatened by incompatible land management practices and competition from non-native species. Many of these species have become imperiled not only in Colorado, but also throughout their range of distribution. Some species exist in less than five populations in the entire world. The decline of these specialized species often indicates disruptions that could permanently alter entire ecosystems. Thus, recognition and protection of rare and imperiled species is crucial to preserving Colorado’s diverse natural heritage.

Colorado is inhabited by some 800 vertebrate species and subspecies, and tens of thousands of invertebrate species. In addition, the state has approximately 4,300 species of plants and more than 450 recognized plant communities that represent terrestrial and wetland ecosystems. It is this rich natural heritage that has provided the basis for Colorado’s diverse economy. Some components of this heritage have always been rare, while others have become imperiled with human-induced changes in the landscape. 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 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 biological diversity has been recognized for decades in the scientific community. However, many conservation efforts made in this country were not based upon preserving biological diversity; 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 biological diversity Dr. Robert Jenkins of The Nature Conservancy pioneered the Natural Heritage Methodology in the early 1970s.

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 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 realized that plant communities are equally important as individual species, this methodology has 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. The 85 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. Information collected by the Natural Heritage Programs can provide a means to protect species before the need for legal endangerment status arises. It can also enable 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 single-celled organisms such as bacteria and protists through the multicellular kingdoms of plants and animals. 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 between these levels. All levels are necessary for the continued survival of species and plant communities, and many are important for the well being of humans.

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

Genetic Diversity — the genetic variation within a population and among populations of a plant or animal species. The genetic makeup of a species varies 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.

Species Diversity — the total number and abundance of plant and animal species and subspecies in an area.

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 restricted to an area.

Landscape Diversity — the type, condition, pattern, and connectedness of natural communities. A landscape consisting of a mosaic of natural 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 should 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 closely linked to all levels of this hierarchy. We at the Colorado Natural Heritage Program believe that a healthy natural environment and a healthy human environment go hand in hand, and that recognition of the most imperiled species is an important step in comprehensive conservation planning.

The Colorado 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 the Colorado Division of Parks and Outdoor Recreation for 14 years, the Program was relocated to the University of Colorado Museum in 1992, and then to the College of Natural Resources at Colorado State University in 1994, where it has operated since.

The multi-disciplinary team of scientists, planners, and information managers at CNHP gathers comprehensive information on the 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.

The Biological and Conservation Data System (BCD) developed by The Nature Conservancy is used by all Natural Heritage Programs to house data about imperiled species. This database includes taxonomic group, global and state rarity rank, federal and state legal status, observation source, observation date, county, township, range, watershed, and other relevant facts and observations. The Colorado Natural Heritage Program also uses the Biodiversity Tracking and Conservation System (BioTiCS) for digitizing and mapping occurrences of rare plants, animals, and plant communities.

These rare species and plant communities are referred to as “elements of natural diversity” or simply “elements.”

Concentrating on site-specific data for each element enables CNHP to evaluate the significance of each location for the conservation of biological diversity in Colorado and in the nation. By using species imperilment ranks and quality ratings for each location, priorities can be established to guide conservation action. A continually updated locational database and priority-setting system such as that maintained by CNHP provides an effective, proactive land-planning tool.

To assist in biological diversity conservation efforts, CNHP scientists strive to answer questions like the following:

- What species and ecological communities exist in the area of interest?
- Which are at greatest risk of extinction or are otherwise significant from a conservation perspective?
- What are their biological and ecological characteristics, and where are these priority species or communities found?
- What is the species’ condition at these locations, and what processes or activities are sustaining or threatening them?
- Where are the most important sites to protect?
- Who owns or manages those places deemed most important to protect, and what is threatening those places?
- What actions are needed for the protection of those sites and the significant elements of biological diversity they contain?
- How can we measure our progress toward conservation goals?

CNHP has effective working relationships with several state and federal agencies, including the Colorado Department of Natural Resources, the Colorado Division of Wildlife, the Bureau of Land Management, and the U.S. Forest Service. Numerous local governments and private entities, such as consulting firms, educators, landowners, county commissioners, and non-profit organizations, also work closely with CNHP. Use of the data by many different individuals and organizations encourages a cooperative and proactive approach to conservation, thereby reducing the potential for conflict.

The Natural Heritage Ranking System
Key to the functioning of Natural Heritage Programs is the concept of setting priorities for gathering information and conducting inventories. The number of possible facts and observations that can be gathered about the natural world is essentially limitless. The

financial and human resources available to gather such information are not. Because biological inventories tend to be under-funded, there is a premium on devising systems that are both effective in providing information that meets users' needs and efficient in gathering that information. The cornerstone of Natural Heritage inventories is the use of a ranking system to achieve these twin objectives of effectiveness and efficiency.

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

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

Element imperilment ranks are assigned both in terms of the element's degree of imperilment within Colorado (its State-rank or S-rank) and the element's imperilment over its entire range (its Global-rank or G-rank). Taken together, these two ranks indicate the degree of imperilment of an element. For example, the lynx, which is thought to be secure in northern North America but is known from less than five current locations in Colorado, is ranked G5 S1 (globally-secure, but critically imperiled in this state). The Rocky Mountain Columbine, which is known only in Colorado from about 30 locations, is ranked a G3 S3 (vulnerable both in the state and globally, since it only occurs in Colorado and then in small numbers). Further, a tiger beetle that is only known from one location in the world at the Great Sand Dunes National Monument is ranked G1 S1 (critically imperiled both in the state and globally, because it exists in a single location). CNHP actively collects, maps, and electronically processes specific occurrence information for animal and plant species considered extremely imperiled to vulnerable in the state (S1 - S3). Several factors, such as rarity, evolutionary distinctiveness, and endemism (specificity of habitat requirements), contribute to the conservation priority of each species. Certain species are "watchlisted," meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 2.

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 2, ranks followed by a "B," for example S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N," for example S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

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 with an "S" or a "G" respectively, followed by a number or letter. These ranks should not be interpreted as legal designations.

Table 2. Definition of Natural Heritage Imperilment Ranks.

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

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

Legal Designations for Rare Species

Natural Heritage imperilment ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare species receive legal protection. Legal status is designated by either the U.S. Fish and Wildlife Service under the Endangered Species Act or by the Colorado Division of Wildlife under Colorado Statutes 33-2-105 Article 2. In addition, the U.S. Forest Service recognizes some species as "Sensitive," as does the Bureau of Land Management. Table 3 defines the special status assigned by these agencies and provides a key to abbreviations used by CNHP.

Candidate species for listing as endangered or threatened under the Endangered Species Act are indicated with a "C". While obsolete legal status codes (Category 2 and 3) are no longer used, CNHP continues to maintain them in its Biological and Conservation Data system for reference.

Table 3. Federal and State Agency Special Designations for Rare Species.

Federal Status:	
1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)	
LE	Listed Endangered: defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.
E(S/A)	Endangered: treated as endangered due to similarity of appearance with listed species.
LT	Listed Threatened: defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range.
P	Proposed: taxa formally proposed for listing as Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule).
C	Candidate: taxa for which substantial biological information exists on file to support proposals to list them as endangered or threatened, but no proposal has been published yet in the Federal Register.
2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as S")	
FS	Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by: Significant current or predicted downward trends in population numbers or density. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as "S")	
BLM	Sensitive: those species found on public lands designated by a State Director that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.
4. State Status:	
The Colorado Division of Wildlife has developed categories of imperilment for non-game species (refer to the Colorado Division of Wildlife's Chapter 10 – Nongame Wildlife of the Wildlife Commission's regulations). The categories being used and the associated CNHP codes are provided below.	
E	Endangered: those species or subspecies of native wildlife whose prospects for survival or recruitment within this state are in jeopardy, as determined by the Commission.
T	Threatened: those species or subspecies of native wildlife which, as determined by the Commission, are not in immediate jeopardy of extinction but are vulnerable because they exist in such small numbers, are so extremely restricted in their range, or are experiencing such low recruitment or survival that they may become extinct.
SC	Special Concern: those species or subspecies of native wildlife that have been removed from the state threatened or endangered list within the last five years; are proposed for federal listing (or are a federal listing "candidate species") and are not already state listed; have experienced, based on the best available data, a downward trend in numbers or distribution lasting at least five years that may lead to an endangered or threatened status; or are otherwise determined to be vulnerable in Colorado.

Element Occurrences and their Ranking

Actual locations of elements, whether they are 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. To prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to the ecological quality of the occurrences 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 three factors:

Size – a measure of the area or abundance of the element's occurrence, relative to other known, and/or presumed viable, examples. Takes into account factors such as area of occupancy, population abundance, population density, population fluctuation, and minimum dynamic area (which is the area needed to ensure survival or re-establishment of an element after natural disturbance).

Condition/Quality – an integrated measure of the composition, structure, and biotic interactions that characterize the occurrence. This includes factors such as reproduction, age structure, biological composition (such as the presence of exotic versus native species), structure (for example, canopy, understory, and ground cover in a forest community), and biotic interactions (such as levels of competition, predation, and disease).

Landscape Context – an integrated measure of two factors: the dominant environmental regimes and processes that establish and maintain the element, and connectivity. Dominant environmental regimes and processes include herbivory, hydrologic and water chemistry regimes (surface and groundwater), geomorphic processes, climatic regimes (temperature and precipitation), fire regimes, and many kinds of natural disturbances. Connectivity includes such factors as a species having access to habitats and resources needed for life cycle completion, fragmentation of ecological communities and systems, and the ability of the species to respond to environmental change through dispersal, migration, or re-colonization.

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 not enough information is available to rank an element occurrence, an EO-Rank of E is assigned. EO-Ranks and their definitions are summarized in Table 4.

Table 4. Element Occurrence Ranks and their Definitions.

A	Excellent viability.
B	Good viability
C	Fair viability.
D	Poor viability.
H	Historic: known from historical record, but not verified for an extended period of time.
X	Extirpated (extinct within the state).
E	Extant: the occurrence does exist but not enough information is available to rank.
F	Failed to find: the occurrence could not be relocated.

Potential Conservation Areas and Their Ranking

In order to successfully protect populations or occurrences, it is helpful to delineate Potential Conservation Areas (PCAs). These PCAs focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence of natural heritage significance. Potential Conservation Areas may include a single occurrence of a rare element, or a suite of rare element occurrences or significant features.

The goal of the PCA 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 about each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features; vegetative cover; and current and potential land uses. In developing the boundaries of a Potential Conservation Area, CNHP scientists consider a number of factors that include, but are not limited to:

- ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the PCA and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater;
- land intended to buffer the PCA against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

The boundaries presented are meant to be used for conservation planning purposes and have no legal status. The proposed boundary does not automatically recommend exclusion of all activity. Rather, the boundaries designate ecologically significant areas in which land managers may wish to consider how specific activities or land use changes within or near the PCA affect the natural heritage resources and sensitive species on which the PCA is based. Please note that these boundaries are based on our best estimate of the primary area supporting the long-term survival of targeted species and plant communities. A thorough analysis of the human context and potential stresses has not been conducted. However, CNHP's conservation planning staff is available to assist with these types of analyses where conservation priority and local interest warrant additional research.

Off-Site Considerations

Frequently, all necessary ecological processes cannot be contained within a PCA of reasonable size. For example, taken to the extreme, the threat of ozone depletion could expand every PCA to include the entire planet. The boundaries described in this report indicate the immediate, and therefore most important, area to be considered for protection. Continued landscape level conservation efforts are necessary as well, which will involve regional efforts in addition to coordination and cooperation with private landowners, neighboring land planners, and state and federal agencies.

Ranking of Potential Conservation Areas

CNHP uses element and element occurrence ranks to assess the overall biological diversity significance of a PCA, which may include one or many element occurrences. Based on these ranks, each PCA is assigned a biological diversity rank (or B-rank). See Table 5 for a summary of these B-ranks.

Table 5. Natural Heritage Program Biological Diversity Ranks and their Definitions.

B1	Outstanding Significance (indispensable): only known occurrence of an element A-ranked occurrence of a G1 element (or at least C-ranked if best available occurrence) concentration of A- or B-ranked occurrences of G1 or G2 elements (four or more)
B2	Very High Significance: B- or C-ranked occurrence of a G1 element A- or B-ranked occurrence of a G2 element One of the most outstanding (for example, among the five best) occurrences rangewide (at least A- or B-ranked) of a G3 element. Concentration of A- or B-ranked G3 elements (four or more) Concentration of C-ranked G2 elements (four or more)
B3	High Significance: C-ranked occurrence of a G2 element A- or B-ranked occurrence of a G3 element D-ranked occurrence of a G1 element (if best available occurrence) Up to five of the best occurrences of a G4 or G5 community (at least A- or B-ranked) in an ecoregion (requires consultation with other experts)
B4	Moderate Significance: Other A- or B-ranked occurrences of a G4 or G5 community C-ranked occurrence of a G3 element A- or B-ranked occurrence of a G4 or G5 S1 species (or at least C-ranked if it is the only state, provincial, national, or ecoregional occurrence) Concentration of A- or B-ranked occurrences of G4 or G5 N1-N2, S1-S2 elements (four or more) D-ranked occurrence of a G2 element At least C-ranked occurrence of a disjunct G4 or G5 element Concentration of excellent or good occurrences (A- or B-ranked) of G4 S1 or G5 S1 elements (four or more)
B5	General or State-wide Biological Diversity Significance: good or marginal occurrence of common community types and globally-secure S1 or S2 species.

Protection Urgency Ranks

Protection urgency ranks (P-ranks) refer to the timeframe in which it is recommended that conservation protection occur. In most cases, this rank refers to the need for a major change of protective status (for example agency special area designations or ownership). The urgency for protection rating reflects the need to take legal, political, or other administrative measures to protect the area. Table 6 summarizes the P-ranks and their definitions.

Table 6. Natural Heritage Program Protection Urgency Ranks and their Definitions.

P1	Protection actions needed immediately. It is estimated that current stresses may reduce the viability of the elements in the PCA within 1 year.
P2	Protection actions may be needed within 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA within this approximate timeframe.
P3	Protection actions may be needed, but probably not within the next 5 years. It is estimated that current stresses may reduce the viability of the elements in the PCA if protection action is not taken.
P4	No protection actions are needed in the foreseeable future.
P5	Land protection is complete and no protection actions are needed.

A protection action involves increasing the current level of protection accorded one or more tracts within a potential conservation area. It 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. It does not include management actions. Situations that may require a protection action are as follows:

- Forces that threaten the existence of one or more element occurrences at a PCA. For example, development that would destroy, degrade or seriously compromise the long-term viability of an element occurrence; or timber, range, recreational, or hydrologic management that is incompatible with an element occurrence's existence;

- The inability to undertake a management action in the absence of a protection action; for example, obtaining a management agreement;

- In extraordinary circumstances, a prospective change in ownership or management that will make future protection actions more difficult.

Management Urgency Ranks

Management urgency ranks (M-ranks) indicate the timeframe in which it is recommended that a change occur in management of the element or PCA. This rank refers to the need for management in contrast to protection (for example, 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.). Management action does not include legal, political, or administrative measures taken to protect a potential conservation area. Table 7 summarizes M-ranks and their definitions.

Table 7. Natural Heritage Program Management Urgency Ranks and their Definitions.

M1	Management actions may be required within one year or the element occurrences could be lost or irretrievably degraded.
M2	New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA.
M3	New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.
M4	Current management seems to favor the persistence of the elements in the PCA, but management actions may be needed in the future to maintain the current quality of the element occurrences.
M5	No management needs are known or anticipated in the PCA.

Chapter 2. Potential Conservation Strategies

Conservation Strategies

Conservation Strategies can be classified as three major types:

1. Land protection accomplished through conservation easements, land exchanges, long term leases, purchase of mineral or grazing rights, acquisition, or government regulation;

2. Management of the land influenced so that significant resources are protected; and

3. Public education about the significant ecological values of the county to engender support for land use decisions that protect these values.

The first step to facilitate any of the conservation strategies suggested above is to identify the significant elements of biodiversity and their locations in the county. This report and the accompanying GIS data provide information necessary for this first step. The next step is to use this information to conserve these elements and the areas that support them. The PCA descriptions within this report provide protection and management suggestions for each area identified during the inventory. However, some general recommendations for conservation of biological diversity in El Paso County are given here.

1. Develop and implement a plan for protecting the PCAs profiled in this report, with most attention directed toward areas with biodiversity rank (B-rank) B1, B2 and B3. The PCAs provide a basic framework for implementing a comprehensive conservation program. The B1, B2 and B3 sites, because they have global biological significance, are in need of priority attention. Those interested in conserving these areas could consider purchasing lands or development rights from willing landowners. Also, one can support local organizations, such as land trusts that purchase or acquire conservation easements for protection of biological diversity or open space. Partnerships with organizations that access federal funding for conservation should be developed. Finally, continued cooperation among local entities to preserve the county's biodiversity is always recommended.

2. Use this report in the review of proposed activities in or near PCAs to determine how activities affect elements of biodiversity. All of the PCAs presented contain elements of biodiversity that are of state or global significance. Weighing the biodiversity represented by PCAs should allow planners and biologists to consider natural resource conservation when making land use decisions.

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 seemingly minor changes can have profound and far-reaching impacts. As proposed land use changes are considered, they should be compared to the maps presented herein and in GIS formats. If a proposed project has the potential to impact a site, planning personnel can work with persons, organizations, or agencies with the appropriate biological expertise to assist in the planning process. CNHP routinely conducts site specific environmental reviews and should be considered a valuable resource. Also, CNHP is continually updating biodiversity data throughout the state and can provide up-to-date information in the area of concern. To contact CNHP's Environmental Review Coordinator call (970) 491-7331. Other key partners, such as the Colorado Division of Wildlife, can be valuable resources.

3. Recognize the importance of larger, contiguous natural communities. While the PCAs identified in this report contain significant elements of natural diversity, protection of large areas in each vegetation type may ensure that we do not lose species that have not yet been located. Since all rare species cannot be easily identified, consider conservation or management of large, contiguous communities that may house a host of these species. Protecting large, unfragmented blocks of land in each of the major vegetation types may increase the available habitat for lesser-known and more common forms of wildlife. Large migrating animals like deer and elk are a part of our natural diversity, and their needs for winter range and access to food and water should be taken into consideration. Similarly, landscape fragmentation affects smaller animals and plants by altering continuous vegetation that may function as habitat corridors or by disrupting a continuous landscape and creating habitat for edge-adapted species (Forman and Godron 1986). Clustering developments and designating large common areas for preservation of natural communities may be more beneficial to rare species than scattering residences widely over the landscape. Providing education programs that explain the value of open space and relay the importance of these larger communities may increase interest in planning for biodiversity in future development. Trails and roads commonly fragment otherwise contiguous landscapes (Forman and Alexander 1998). 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. Increase efforts to protect biodiversity by promoting cooperation and incentives among landowners, pertinent government agencies, and non-profit conservation organizations. One of the most effective means of developing cooperation for biodiversity conservation is to involve all stakeholders in land use planning. The long-term protection of natural diversity will be facilitated by the cooperation of private landowners, businesses, 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. By developing incentives that encourage biodiversity considerations in land-use planning, the likelihood of conserving biodiversity should increase. Such incentives will make planning for conservation a higher priority for private and public entities.

5. Promote wise management of the biodiversity resources that exist within PCAs. Since the delineation of PCAs does not by itself provide protection for the plants, animals, and plant communities, management that supports these elements should be encouraged. The development of a site specific conservation plan for PCAs is a necessary component of the long-term protection of the elements within the PCAs. Because some of the most serious impacts to El Paso County's ecosystems are at a large scale (i.e., 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 CNHP, the Colorado Division of Wildlife, the U.S. Fish and Wildlife Service, the Natural Resources Conservation Service, The Nature Conservancy, and various academic institutions. With the rate of population growth in Colorado, rare and imperiled species will likely decline if not given appropriate protection or management.

6. Stay informed and involved in public land management decisions. Approximately 20 percent of El Paso County is publicly owned. The U.S. Forest Service and the Bureau of Land Management own approximately seven percent and the State Land Board owns approximately 13 percent of the county. Many of the PCAs identified here are on public land and may be protected from development, but these same areas may not be protected from other impacts. Even the land ownership is not always secure, since federal and state agencies are becoming more and more involved in land exchanges. The Pike National Forests is in the process of developing or revising management plans, such as Forest Management Plans and Grazing Management Plans. These plans require public input. By encouraging the protection of the biologically significant PCAs on public lands, El Paso County can retain a greater diversity of habitats and species.

7. Continue inventories for species that cannot be surveyed adequately in one field season and continue inventories on lands that could not be accessed in 2000 and 2001. Not all targeted inventory areas can be surveyed in one field season due to several factors, including lack of access to lands, the phenology of the species being surveyed, 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 were not documented during the survey. Thus, it is recommended that this report and the data included within it serve as a guide for subsequent surveys of El Paso County.

8. Continue to take a proactive approach to weed and exotic species control. Weeds affect both agriculture and native plant communities. The introduction and/or sale of non-native species that impact natural areas can greatly hinder efforts to conserve rare plant and animal species. Exotic, invasive species such as tamarisk (*Tamarix ramosissima*), Russian olive (*Eleagnus angustifolia*), yellow toadflax (*Linaria vulgaris*), and non-native fish species can severely alter habitats by out-competing native species. Natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. The use of native species for revegetation and landscaping efforts should limit the effects of invasive weeds. Ideally, native seeds should be harvested and cultivated locally. The Native Plant Revegetation Guide for Colorado by the Colorado Natural Areas Program describes the appropriate species to be used for revegetation. This resource is available on the World Wide Web at http://parks.state.co.us/cnap/publications.html.

9. Encourage public education functions and publications. One of the greatest tools in conserving land for biodiversity is to explain the value of such areas to the public. As described in this report, El Paso County is rich in animal and plant diversity and houses some of the most unique environments in Colorado. Conveying the value and function of these habitats and the species that inhabit them to the public can generate greater interest in conserving lands. Conducting forums or presentations that highlight the biodiversity of El Paso County should increase awareness of the uniqueness of the habitats within the county. Similarly, providing educational pamphlets or newsletters that explain why these areas are so valuable can increase public interest and support for biodiversity conservation.

10. Develop and implement comprehensive program 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 (i.e., 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 El Paso County wetlands. Such an effort could provide a blueprint for wetland conservation in the county. Encourage and support statewide wetland protection efforts such as CDOW's Wetlands Partnership. County governments are encouraged to support research efforts on wetlands to aid in their conservation. Countywide education on the importance of wetlands could be implemented through the county extension service or other local agencies. Encourage communication and cooperation with landowners regarding protection of wetlands in El Paso County. Utilize the expertise and breadth of experience within the Playa Lakes/Arkansas River Wetland Focus Area Committee.

Likely Impacts to Biological Diversity in El Paso County

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 can be severely altered by the construction of dams, reservoirs, and other water diversions. These water diversions and impoundments have altered the normal high peak flows that were once a part of the natural hydrological regimes of many tributaries of the Arkansas River. These periodic floods are necessary for continued viability of most riparian vegetation. For example, many plants can only reproduce with flooding events, i.e., cottonwood trees (Rood and 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. For example, 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 have 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. Many historical wetlands, such as seeps and springs, have been lost or altered due to water "development" projects, such as water diversions or impoundments. The biodiversity significance of a human-made pond with minimal edge habitat is generally less than the biodiversity significance of extensive intact seep and spring wetlands or naturally occurring ponds.

Development

Residential development is increasing in El Paso County, especially along the I-25 corridor, in the foothills, and along Highway 24 between Colorado Springs and Calhan. Development creates a number of stresses, including habitat loss and fragmentation, introduction of non-native species, fire suppression, and predation and disturbance from domestic animals (dogs and cats) (Oxley *et al*. 1974, Coleman and Temple 1994). Habitat loss to development is considered irreversible.

Livestock Grazing

Domestic livestock grazing has been a traditional livelihood in El Paso County since the late 1800s (Whittemore 1967) and has left a broad and sometimes subtle impact on the landscape. Many riparian areas in El Paso County are used for rangeland. Because there is little surface water available in the county, riparian areas often serve as the only available water. Additionally, riparian areas are often areas of the highest production of grasses and forbs. Long-term, incompatible livestock use of wetland and riparian areas can 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 to severe and irreversible, such as extensive gullying and introduction of non-native or noxious species.

Logging

Most logging operations require a network of roads. The impacts from roads can result in threats to biodiversity (see "Roads" below for more detailed discussion). Other logging impacts include loss of wildlife habitat, habitat fragmentation, soil erosion, and lower water quality for aquatic species. The U.S. Forest Service monitors logging closely; nonetheless, problems can still occur (Husong and Alves 1998). The effects of logging on biodiversity have not been determined in El Paso County.

Recreation

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in El Paso County. Different types of recreation, primarily motorized vehicle use, typically have different effects on ecosystem processes. All-terrain vehicles 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. ATVs have also been identified as a vector for the invasion of non-native plant species.

Non-motorized recreation, mostly hiking but also some mountain biking and rock climbing, presents a different set of issues (Cole and Knight 1990, Knight and Cole 1991). Wildlife behavior can be significantly altered by repeat visits of hikers or 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 can be high.

Roads

There is a complex, dense network of roads in many parts of El Paso County. Expansion of the existing road network in some areas will detrimentally affect the biodiversity 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 some 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 patterns, and therefore inhibit important interior species (Forman and Alexander 1998).

Effects on wildlife can be attributed to road avoidance, such as a species' avoidance of roads and mortality due to vehicular collisions (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 and 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 *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 dominate a previously natural area (i.e., scraped roadsides). This can 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.

Fragmentation and Edge Effects

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat (Forman and Godron 1986). Edges are often created by naturally occurring processes such as floods, fires, and wind. Edges can also be created by human activities such as roads, timber harvesting, agricultural practices, and rangeland management. Human-created edges are often dominated by plant and animal 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 may limit the mobility of species that require large landscapes or a diversity of landscapes for their survival.

Chapter 3. The El Paso County Inventory

Introduction

El Paso County is home to a vast array of plants, animals and plant communities; however the numbers and diversity of these organisms is not fully understood. Federal, state, and local landowners of El Paso County have a good understanding of the ecology of their specific lands, but no attempt to document the diversity and abundance of rare species or plant communities has been conducted for the entire county. In order to assist all landowners in managing their lands, CNHP conducted a county-wide survey of the rare species and communities.

Purpose of Study

Rare plants, animals, and plant communities are usually the least understood organisms in a landscape. Some of these organisms are only understood after their rarity is recognized, as in the case of federal threatened and endangered species. However, conservation of these organisms can often be accomplished more quickly and less expensively if there is a clear understanding of their distribution and abundance. Furthermore, the likelihood for human conflicts is minimized if there is the opportunity to proactively plan for managing human activity or managing the species or habitat of interest. The purpose of this inventory is to provide a data resource for all El Paso County citizens interested in conducting such proactive planning. This document should be considered a tool for managing lands that support rare species and communities within El Paso County.

Although this report is intended to be a “tool” for the county and its citizens, there are limitations to the information within it. In particular, a majority of the survey work was conducted over one spring and summer. The distribution and abundance of all organisms change with time, and the authors of this report anticipate that the conservation areas described in the report will change with time. Also, all areas of El Paso County were not surveyed, and priority was given to private lands. Due to limitations of time and land access, this report only includes information from readily observed species or from areas that biologists received permission to visit. Finally, this report does not include all species or communities found within El Paso County. This project specifically targeted the organisms that are tracked by the CNHP. As described in Chapter 1, CNHP has a methodology specific to Natural Heritage Programs and this study was intended to survey for those species believed to be the most rare or the least known.

Fig.1. Location of El Paso County, Colorado

Description of Study Area

El Paso County is located along the convergence of the high plains and the Rocky Mountains in south central Colorado (Fig. 1). El Paso County encompasses 2,128 square miles (551,000 ha) and ranges in elevation from 5,230 ft (1,594 m) on the shortgrass prairie in the southeast corner to 14,110 ft (4,300 m) at Pikes Peak. Counties that surround El Paso County include Crowley, Douglas, Elbert, Fremont, Lincoln, Pueblo, and Teller. The principal mountainous features located within El Paso County include the Rampart Range, and Pikes Peak.

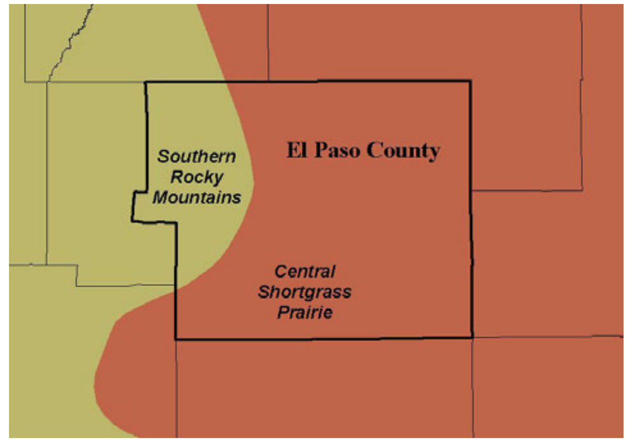


Fig. 2. Ecoregions of El Paso County (Stein et al. 2000).

El Paso County is located within the Southern Rocky Mountains and Central Shortgrass Prairie ecoregions (Stein *et al*. 2000; Fig. 2). The Central Shortgrass Prairie ecoregion is characterized by rolling plains and tablelands dissected by streams, canyons, badlands, and buttes and dominated by shortgrass, mixed-grass, and sandsage prairie (The Nature Conservancy 1998). Small patches of remnant tallgrass prairie occur along the base of the foothills and in other areas where the soils and moisture regime are appropriate.

The Southern Rocky Mountain Ecoregion includes two major mountain systems and the intervening valleys and parks from southern Wyoming to northern New Mexico. The major ecological zones are alpine, subalpine, upper montane, lower montane and foothill (Neely *et al*. 2001).

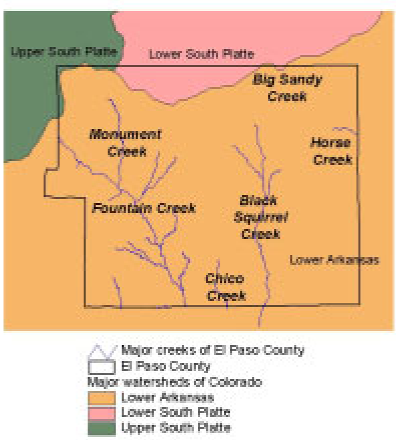


Fig. 3. Major River Drainages and Creeks of El Paso County.

The principal drainage within the county is the Arkansas River (Fig. 3). However, the extreme northern portion of El Paso County is within the South Platte River watershed. The principal tributaries to the Arkansas River include Fountain Creek, Black Squirrel Creek, Chico Creek, and Big Sandy Creek.

The climate within El Paso County varies greatly with elevation. Average annual precipitation within the region ranges from less than 12 inches (30.5 cm) per year in eastern El Paso County to over 25 inches (64 cm) per year at Pikes Peak (Fig. 4). The wettest (highest rainfall) months are July and August when the rain often falls in severe, localized thunderstorms (Western Regional Climate Center 2001). July is the hottest month; Colorado Springs has a mean maximum temperature of 84.5 degrees F (29.2 degrees C). January is the coldest month with mean low temperatures of 16.3 degrees F (-8.7 degrees C) in Colorado Springs (Western Regional Climate Center 2001).

El Paso County is experiencing rapid human population growth. Between 1990 and 2000, the population in El Paso County increased by 30.2 percent (U.S. Census Bureau 2001). The current population estimate for El Paso County is 516,929 (U.S. Census Bureau 2001). The primary population centers are Colorado Springs, Monument, Manitou Springs, and Fountain (Fig. 5). In the county, development is spreading west into the foothills, east onto the plains, and north and south along the foothills/Front Range corridor. Residential development is occurring at all scales including high-density subdivisions and 35-acre ranchettes.

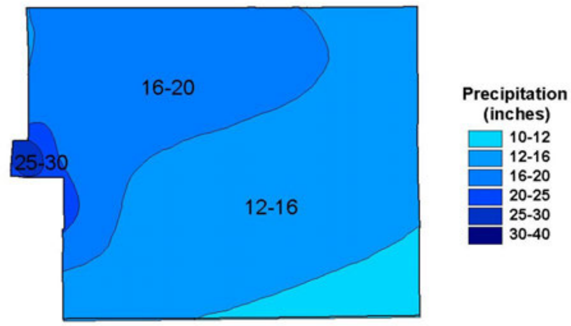


Fig. 4. Average Annual Precipitation in El Paso County (inches)

More than 72 percent of the land within the county is privately owned (Fig. 6) (Colorado Division of Wildlife 1998). The Colorado State Land Board owns about 13 percent, primarily in a contiguous area in south-central El Paso County (Note: the coverage of state-owned land shown in Fig. 6 is not current. Additional lands within the central portion of El Paso County that were recently purchased by the state are not reflected on the map). The Department of Defense (Fort Carson Military Reservation, the U.S. Air Force Academy, Farish Recreation Area, Peterson Air Force Base, and Schriever Air Force Base) is the third largest ownership category with eight percent. The U.S. Forest Service owns and manages seven percent of the county as the Pike National Forest. The state wildlife area managed by the Colorado Division of Wildlife, Ramah Reservoir in El Paso County, is also included within the study area.

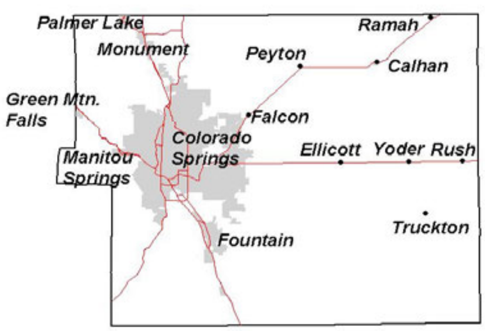


Fig. 5. Cities and Towns of El Paso County.

The geologic features of the county range from quaternary alluvial deposits to Precambrian rocks exposed at Pikes Peak (Fig. 7) (Green 1992). Throughout much of the study area, the bedrock is covered by alluvial (carried by water) and aeolian (wind blown) deposits except along the flanks of deeply cut streams (Romero 1992). The northern portion of El Paso County is underlain by deposits of the Denver Basin (Dawson, Denver, Arapahoe, Laramie-Fox Hills). These formations form a large bowl centered on the city of Denver with the southern end extending to Colorado Springs. The Denver Basin is tapped by Denver and other Front Range cities as a significant water source. Underlying the Denver Basin formations is the relatively impermeable Pierre Shale, the bedrock formation beneath parts of Colorado Springs (Chronic 1980). Beneath the Pierre Shale is the Niobrara Shale, a series of interbedded limestones and shales, which outcrops in the Arkansas River Valley in Pueblo County. Beneath the Niobrara Formation is the Dakota Sandstone, the formation making up the Dakota Hogback, the intermittent ridge that can be traced along the edge of the mountains from Wyoming to New Mexico (Chronic 1980).

The mountains are comprised of Precambrian granites and gneisses. Pikes Peak granite makes up Pikes Peak and the core of the Rampart Range (including Cheyenne Mountain, which is the southern extent of the Colorado Front Range) (Chronic 1980).

Soils in the county are highly variable. Mountain soils are normally rocky and shallow, except in areas where groundwater discharges or slope wetlands occur. These areas often form organic soils (i.e., peat or muck) due to organic matter production, persistent soil saturation and the resultant anaerobic conditions, and cool year-round temperatures. Along drainages, both in the mountains and on the plains, wetland plant communities occur on alluvial soils. Detailed soil survey information is available through the Natural Resource Conservation Services (see SCS, Larsen 1981).

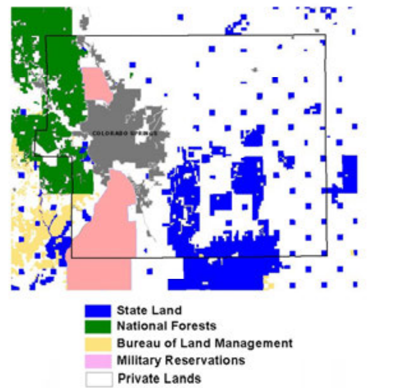


Fig. 6. Land ownership in El Paso County.

Inventory Methods

The methods for assessing and prioritizing conservation needs are diverse. The Colorado Natural Heritage Program follows a general method that is continuously being developed specifically for this purpose. The Natural Heritage Inventory described in this report was conducted in several steps summarized below. Additionally, input from a committee of individuals representing local public and private interests was sought at all stages.

Collecting Information

CNHP databases were updated with information regarding the known locations of species and significant plant communities within El Paso County. 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, Colorado College, Rocky Mountain Herbarium, and local private collections. The Colorado Division of Wildlife provided extensive data on a range of species. Both

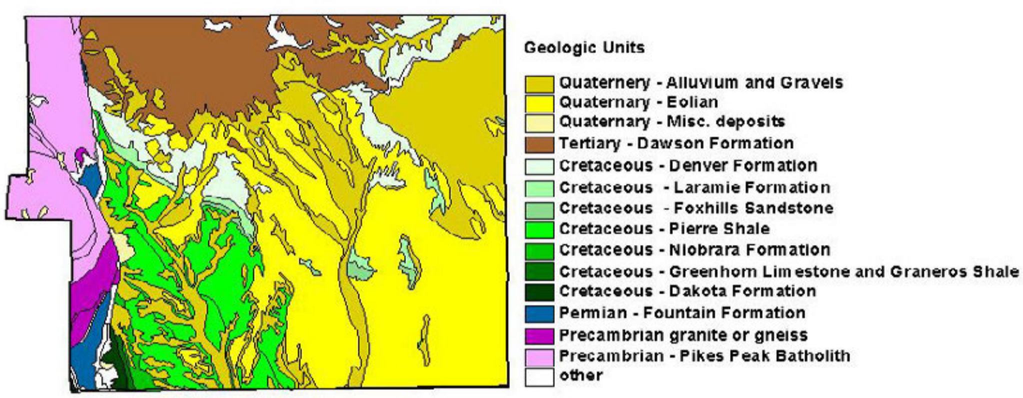


Fig. 7. Geology of El Paso County.

general and specific literature sources were incorporated into CNHP databases, either in the form of locational information or as biological data pertaining to a species in general. Other information was gathered to help locate additional occurrences of natural heritage elements. Such information covers basic species and community biology including range, habitat, phenology (reproductive timing), food sources, and substrates. This information was also entered into CNHP databases.

Identifying Rare or Imperiled Species and Significant Plant Communities Potentially Occurring in the County

The information collected in the previous step was used to refine a list of potential species and natural plant communities and to refine our search areas. In general, species and plant communities that have been recorded from El Paso County or from adjacent areas, are included in this list. Species or plant communities preferring habitats that are not included in this study area were removed from the list. Over 100 rare species and significant plant communities were targeted in these surveys (Appendix). Given a limited amount of time and funding for this research, a specific subset of species and communities were the priority of our inventory efforts. These elements were considered to be a priority because of their high level of biological significance (G1-G3) and/or because they are known to occur in areas that are subject to various development pressures such as hydrological alterations and residential development.

The amount of effort given to the inventory for each of these elements is prioritized according to the element's rank. Globally-rare (G1-G3) elements are given highest priority; state-rare (S1-S3) elements are of a lower priority.

Identifying Targeted Inventory Areas

Sites to survey in the field were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities (Fig. 8). Previously documented locations were targeted, and additional potential areas were chosen using available information sources. Element occurrences with precisely known locations were always included so that they could be verified and updated. Many locations were not known due to ambiguities in the original data. In such cases, sites to survey for that element were chosen in likely areas in the general vicinity. Areas with potentially high natural values were selected using aerial photographs, geology maps, vegetation surveys, personal recommendations from knowledgeable local residents, and numerous roadside surveys by our field scientists. Aerial photography is a useful tool in this step of the process. High altitude infrared photographs at 1:40,000 scale (National Aerial Photography Program 85) were used for this project and are well suited for assessing vegetation types and, to some extent, natural conditions on the ground.

Using the biological information stored in the CNHP databases areas, having the highest potential for supporting specific elements were identified. General habitat types can be discerned from aerial photographs. Those chosen for survey sites appeared to be

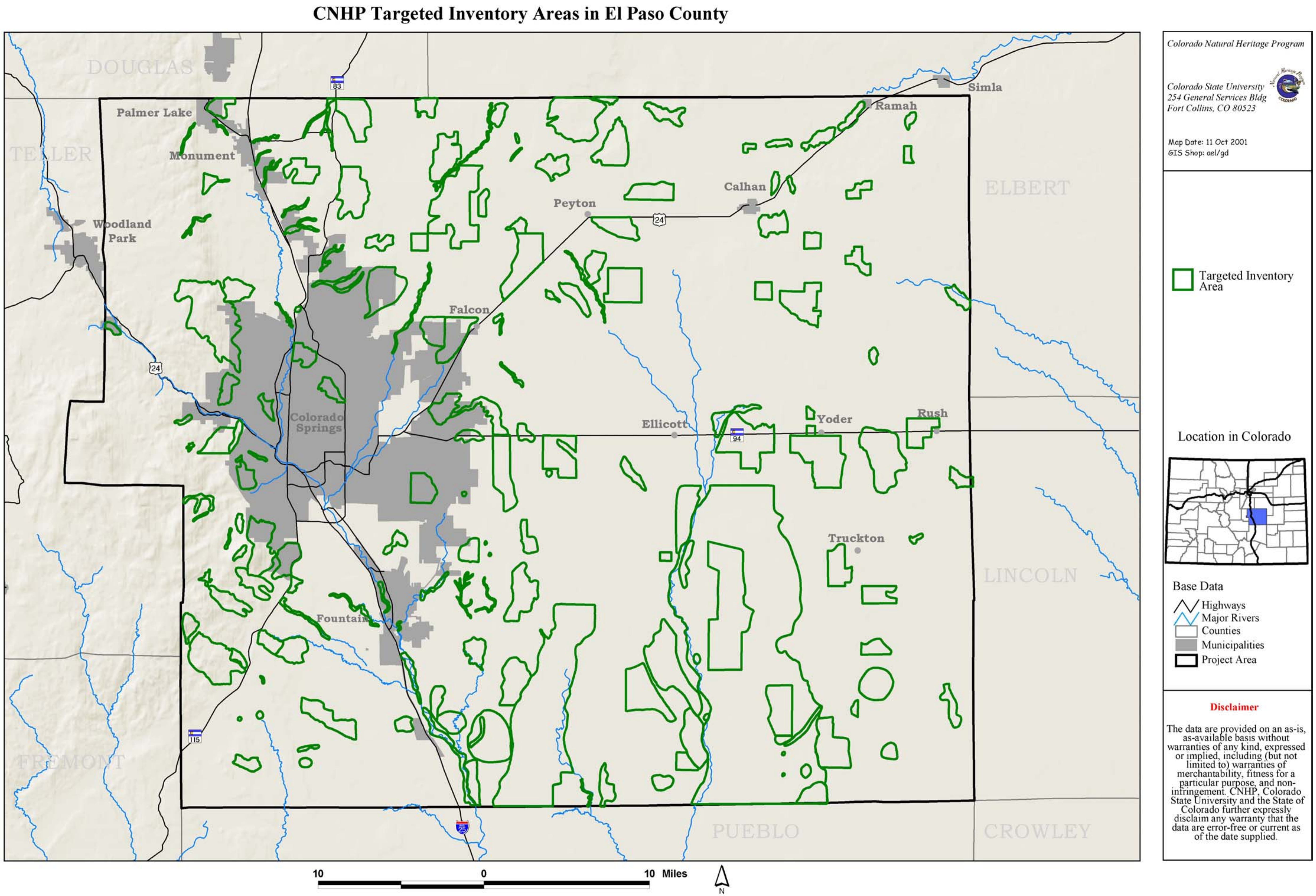


Fig 8. Targeted Inventory Areas in El Paso County

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, and quarries were identified.

The above information was used to delineate over TIAs that were believed to have relatively high probability of harboring significant natural resources. These areas vary in size from <0.1 acres to >65,000 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 shrublands is especially difficult to discern from aerial photographs, and a quick survey from the road can reveal such aspects as weed infestation or composition of vegetation.

Because there were limited resources to address an overwhelming number of potential sites, surveys for all elements were prioritized by the degree of imperilment. For example, the 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.

Contacting Landowners

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 local assessors' offices. 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. However, some species were readily visible, such as prairie dog colonies, without having to be on the land.

Conducting Field Surveys

Survey sites where access could be obtained 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 that are only present during certain times of the year.

The methods used in the surveys vary according to the elements that were being targeted (Appendix). 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 techniques to document their presence. These are summarized below:

- Amphibians: visual observation and capture using aquatic dip nets
- Reptiles: visual observation
- Mammals: live traps, pitfall traps and mist nets

- Birds: visual observation or identification by song or call
- Insects: aerial net and visual observation
- Plants: visual observation
- Plant communities: visual observation

Where 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 include 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 size of the population or community, the condition or naturalness of the habitat, and the landscape context (ease or difficulty of protecting) of the occurrence. These factors are combined into an element occurrence rank, useful in refining conservation priorities. See the previous section on Natural Heritage Methodology for more about element occurrence ranking.

Results of Biological Inventory

Results of the survey confirm that there are many areas with high biological significance in El Paso County. There are several extremely rare plants and animals that depend on these areas for survival. All together, 24 rare or imperiled plant species, 25 rare or imperiled animal species, and 47 plant communities of concern have been documented in El Paso County (Appendix).

Delineating Potential Conservation Areas

As the objective for this inventory is to prioritize specific areas for conservation efforts, Potential Conservation Area (PCA) boundaries were delineated. Such a boundary is an estimation of the minimum area needed to ensure persistence of the element. In order to ensure the preservation of an element, the ecological processes that support that element 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 PCA or the element may call for alterations to the boundaries.

The Colorado Natural Heritage Program identified 40 Potential Conservation Areas (PCAs) in El Paso County. Each PCA was ranked according to its biodiversity significance. Of the 40 PCAs identified, two are of outstanding significance (B1), 11 are of very high significance (B2), 13 are of high significance (B3), six are of moderate significance (B4), and eight are of general significance (B5). Of particular interest are rare plants that are unique to Pikes Peak; a Preble's meadow jumping mouse population along Monument Creek and its tributaries; a native historic population of greenback cutthroat trout at Severy Creek; tallgrass prairie remnants near Colorado Springs Airport;

Mountain Plover and playa communities in southeastern El Paso County; foothills communities at Aiken Canyon and Cheyenne Mountain; native historic populations of Arkansas darter in Big Sandy and Black Squirrel creeks, and large intact sandsage prairie communities at Signal Rock Sandhills. El Paso County is truly unique with an amazing richness of rare fauna and flora well worth preserving for future generations. Overall, the concentration and quality of imperiled elements and habitats attest to the fact that conservation efforts in El Paso County will have both statewide and global significance.

Delineating Proposed Networks of Conservation Areas

Occasionally a landscape area will encompass many Potential Conservation Areas that share similar species or natural communities and ecological processes. For example, in South Park, Park County, Colorado, there are numerous extreme rich fens that are physically isolated from one another, yet they all contain the same types of rare plants and plant communities. Each of the isolated fens has been included in its own PCA. Yet, when considering the "big picture" of the overall landscape, these fens probably interact with each other and influence each other on a larger scale. In order to capture this repeating pattern and higher-level interactions on the landscape scale, a Network of Conservation Areas (NCA) is delineated.

- NCAs include unoccupied or unsurveyed areas within the same ecological system that is required by the species or natural communities of the PCAs;

- Ecological processes are consistent in spatial and temporal scales within an NCA;

- NCAs contain PCAs with an obvious repeating pattern (the same species or natural communities are in each included PCA). Most NCAs are drawn at a regional scale that may be best represented on a state-wide map.

Chapter 4. Potential Conservation Areas

In order to successfully protect populations or occurrences, it is helpful to delineate Potential Conservation Areas (PCAs). These PCAs focus on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence of natural heritage significance. Potential Conservation Areas may include a single occurrence of a rare element or a suite of rare or significant features.

The goal of the PCA is to identify a land are 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 about each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features; vegetative cover; and current and potential land uses. In developing the boundaries of a PCA, CNHP scientists consider a number of factors that include, but are not limited to:

- ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the PCA and surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater;
- land intended to buffer the PCA against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

The boundaries presented are meant to be used for conservation planning purposes and have no legal status. **The proposed boundary does not automatically recommend exclusion of all activity.** Rather, the boundaries designate ecologically significant areas in which land manager may wish to consider how specific activities or land use changes within or near the PCAs affect the natural heritage resources and sensitive species on which the PCA is based. **Please note that these boundaries are based on our best estimate of the primary area supporting the long-term survival of targeted species and plant communities. A thorough analysis of the human context and potential stresses has not been conducted.** However, CNHP's conservation planning staff are available to assist with these types of analyses where conservation priority and local interest warrant additional research.

Table 8 indicates those PCAs that have been identified for El Paso County. These can be used to prioritize and evaluate conservation needs within El Paso County (see discussion in Chapter 1).

Table 8. Potential Conservation Areas of El Paso County Displayed by Biological Diversity Rank (see Fig. 9).

Potential Conservation Area	Biodiversity Rank	Page Number
Outstanding Biodiversity Significance		
Cascade Creek	B1	33
Pikes Peak	B1	36

Table 8. Potential Conservation Areas of El Paso County Displayed by Biological Diversity Rank (see Fig. 9)(cont.).

Very High Biodiversity Significance		
Aiken Canyon	B2	41
Buffalograss Playas	B2	45
Cheyenne Canyon	B2	52
Colorado Springs Airport	B2	57
Judge Orr Road	B2	61
Monument Creek	B2	66
Schriever Playas	B2	72
Severy Creek	B2	76
Signal Rock Sandhills	B2	79
Squirrel Creek School	B2	83
Truckton Edison	B2	87
High Biodiversity Significance		
Big Sandy Creek at Calhan	B3	91
Blue Mountain	B3	96
Boehmer Creek	B3	100
Bohart Playas	B3	104
Chico Basin Dunes	B3	108
Chico Creek	B3	111
East Chico Basin Ranch	B3	119
Farish Recreation Area	B3	122
Fremont Fort	B3	125
Olney Prairie	B3	129
Riser at Calhan	B3	132
Table Rock	B3	135
West Kiowa Creek at Elbert	B3	139
Moderate Biodiversity Significance		
Black Forest	B4	142
Cheyenne Mountain	B4	146
Fountain and Jimmy Camp Creeks	B4	150
Pineries at Black Forest	B4	155
Rasner Ranch Playas	B4	159
Sand Creek Ridge	B4	162
General Biodiversity Significance		
Big Johnson Reservoir	B5	165
Cave of the Winds	B5	169
Edison Road	B5	172
Hanover Road	B5	176
Marksheffel Road	B5	179
Monument Southeast	B5	183
Squirrel Creek Road	B5	187
Widefield Fountain	B5	191
Network of Conservation Areas		
West Bijou Creek	NA	196

PCA Profile Explanation

PCA Profiles are the summaries of the CNHP rankings, area location, area description, and ranking justifications. The following 40 PCA profiles, ranging in size from 104 acres to 104,720 acres, are sorted alphabetically by biodiversity rank. The PCA Profile includes the following fields:

Biodiversity Rank
Protection Urgency Rank
Management Urgency Rank;
Location
Legal Description
Size
Elevation
General Description
Biodiversity Rank Justification
Boundary Justification
Protection Rank Comments
Management Rank Comments

The Biodiversity Rank, the Protection Urgency Rank, and the Management Urgency Rank fields are described in detail in Chapter 1. The Location field includes information about the PCAs general location. The Legal Description field includes all of the relevant legal location data, including associated 7.5-minute U.S.G.S. quadrangle maps, Township (T), Range (R), and Section. The Size field reports the size of the PCA in acres and hectares. The Elevation field reports the elevation range for that particular PCA. The General Description field reports the features and biology of the PCA. This description may include such items as the history of the area, the management of the land and surrounding areas, and the flora and fauna found there. The Biodiversity Rank Justification field explains the rationale for the rankings given to a particular PCA. Similarly, the Protection Rank Comments and the Management Rank Comments fields explain in greater detail the reasons for the associated protection and management ranks.

CNHP Potential Conservation Areas in El Paso County

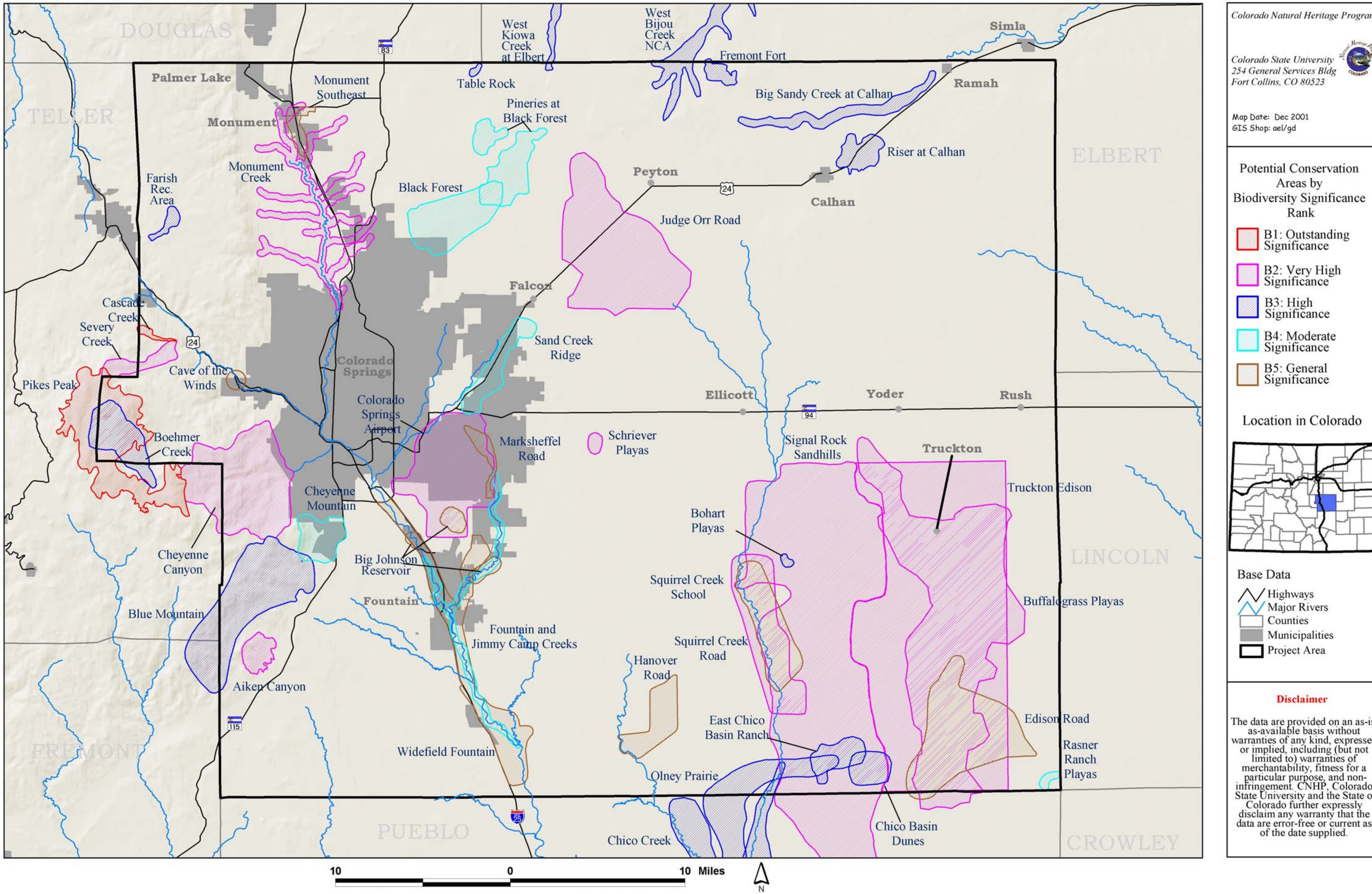


Fig 9. Map of El Paso County Potential Conservation Areas (PCAs)

Cascade Creek

Biodiversity Rank: B1 (Outstanding significance)
The Cascade Creek PCA supports one excellent (A-ranked) occurrence of the globally-imperiled (G1 S1) narrowleaf grapefern (*Botrychium lineare*).

Protection Urgency Rank: P4 (Low urgency)
The occurrence of the narrowleaf grapefern is located on the Pike-San Isabel National Forest, but it is very close to the Pikes Peak Highway where it is vulnerable to edge effects, erosion, weed invasion, and trampling.

Management Urgency Rank: M2 (High urgency)
The narrow leaf grapefern occurrence is imminently threatened by invasion of yellow toadflax (*Linaria vulgaris*) and trampling by human visitors. Erosion and surface runoff from the Pikes Peak Highway may also be impacting the occurrence.

Location: El Paso and Teller counties, on the north slope of Pikes Peak, 2.3 - 3.3 miles up the Pikes Peak Highway from the tollbooth.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Woodland Park, Cascade
T13S R68W Sections 19-22

Size: 401 ac (162 ha)

Elevation: 8,460 to 9,260 ft (2,579 to 2,822 m)

General Description: This PCA follows Cascade Creek for approximately two miles, from near its headwaters to its confluence with Fountain Creek near the town of Cascade. The creek is mostly willow dominated and is parallel to the Pikes Peak Highway for almost its entire length. Engelmann spruce, limber pine, and aspen surround the open grassy meadows which support the globally-rare plant species.

This PCA includes a 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 second largest (45 individuals) documented in the world. Trampling from recreational activities and highway maintenance or widening are the potential threats to this occurrence.

Biodiversity Rank Justification: The narrowleaf grapefern (*Botrychium lineare*) is a globally-rare plant species known from seven very widely-scattered locations in Colorado, Oregon, California, Montana, Idaho, Quebec, and New Brunswick. This population on Pikes Peak is the second largest (45 individuals) documented at any of these locations.

Table 9. Natural Heritage Element Occurrences at the Cascade Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Botrychium lineare	Narrowleaf grapefern	G1	S1			FS	B	1998-07-07

Boundary Justification: The PCA boundary includes the known occurrence and additional apparently suitable habitat in the vicinity of the occurrence. Additional area on the periphery of these areas is also included in the PCA in the hope that future management can reduce edge effects to the habitat for the narrowleaf grapefern. Little is known about the habitat needs or biology of *Botrychium* species. Additional information may warrant expanding the boundary. The current boundary is considered the smallest area needing some protection to ensure the viability of the occurrence.

Protection Rank Comments: This location is on public land (Pike National Forest) managed by the U.S. Forest Service. Its proximity to the Pikes Peak Highway leaves the occurrence of narrowleaf grapefern somewhat vulnerable to impacts from erosion, runoff, weed invasion, and trampling from human visitors who are not aware of the occurrence.

Management Rank Comments: This site is adjacent to the heavily-traveled Pikes Peak Highway. Sedimentation from the road could threaten the population. Toadflax (*Linaria vulgaris*) grows on the roadside and presents a significant threat to the occurrence, since it easily and rapidly becomes naturalized in undisturbed native plant habitat. However, weed spraying near the rare plants could also have severe deleterious effects. Thus, careful and persistent hand pulling is recommended. Negative impacts from human visitors at the pullout near the eastern subpopulation of plants may warrant closing this pullout to protect these plants. The narrowleaf grapefern is inconspicuous and is easily trampled.

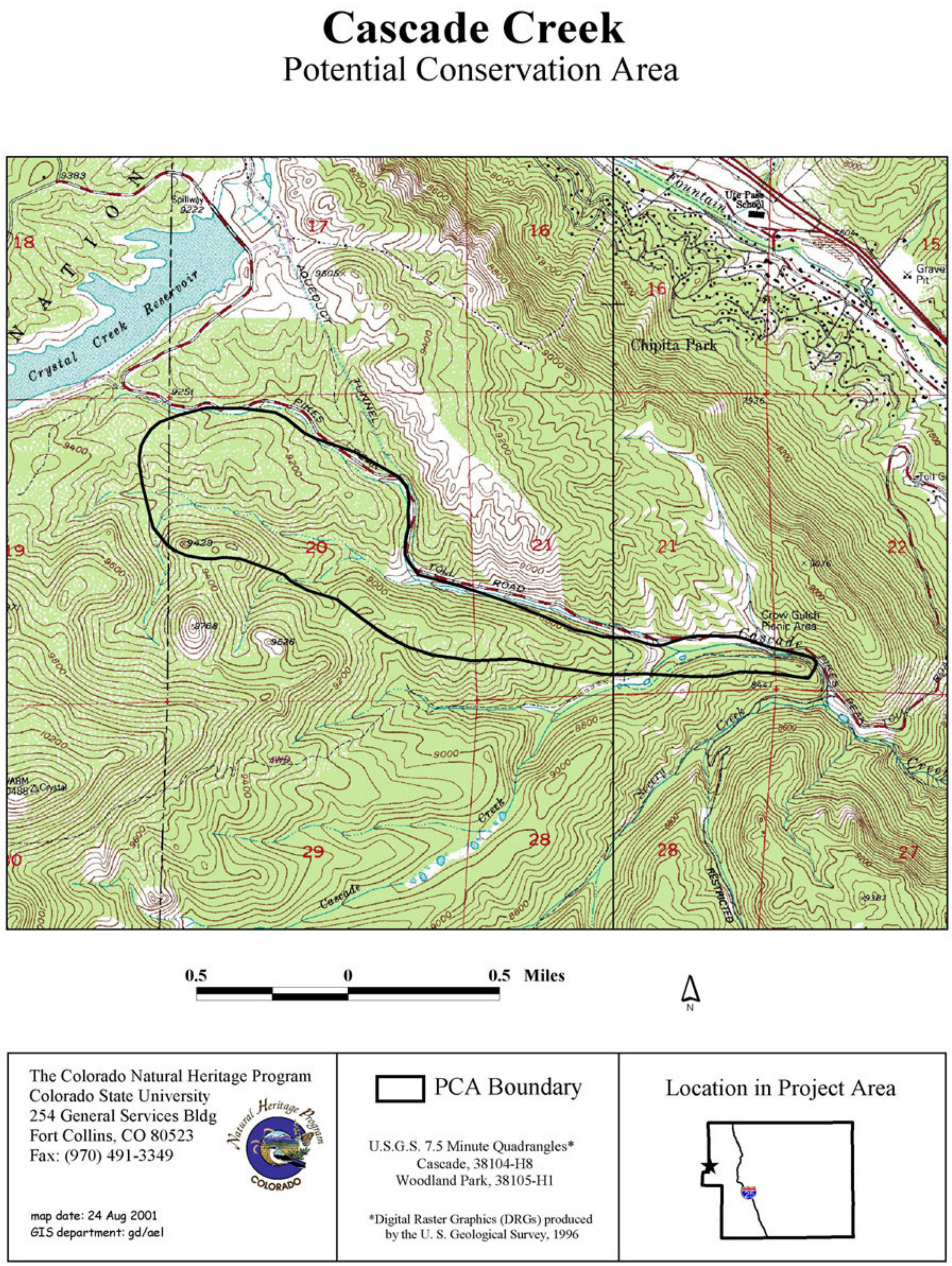


Fig. 10. Cascade Creek Potential Conservation Area Map

Pikes Peak

Biodiversity Rank: B1 (Outstanding significance)
The Pikes Peak site supports all known occurrences of the globally-rare (G1 S1) Pikes Peak spring parsley (*Oreoxis humilis*). It also supports occurrences of at least six other species of rare plants.

Protection Urgency Rank: P4 (Low urgency)
No protection actions are needed in the foreseeable future.

Management Urgency Rank: M1 (Very high urgency)
Management actions may be required within one year or the element occurrences could be lost or irretrievably degraded.

Location: Teller and El Paso counties. Alpine areas of Pikes Peak, Almagre Mountain, and Sheep Mountain.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Woodland Park, Pikes Peak, Manitou Springs
T13S R69W Sections 34-36
T14S R68W Sections 6-8, 17-20, 29-34
T14S R69W Sections 1-3, 9-16, 21-27, 34-36
T15S R68W Sections 3-11, 14, 15
T15S R69W Sections 1, 2, 11, 12

Size: 16,959 ac (6,863 ha)

Elevation: 9,020 to 14,109 ft (2,780 to 4,300 m)

General Description: At 14,109 ft (4,300 m), Pikes Peak overlooks Colorado Springs to the east. Above timberline the slopes are dominated by dry meadows, boulder fields, rock gardens, talus, and large boulder outcrops derived from Pikes Peak and Windy Point granite. Several stream headwaters (i.e., Beaver Creek and French Creek) flow down to the elaborate network of reservoirs which supplies Colorado Springs with water. The elevation of the east face of Pikes Peak falls dramatically, losing 2,000 ft (617 m) over one-half mile (0.8 km) in the South Cirque and the Bottomless Pit. Both of these features are clearly visible from Colorado Springs. In contrast, the west face gently rolls from the summit. To the south are two alpine summits, Sheep Mountain and Almagre Mountain, which seem dwarfed in comparison to Pikes Peak at 12,397 ft (3,779 m) and 12,367 ft (3,769 m), respectively. Almagre Mountain, also locally known as "Baldy," includes Stratton Reservoir in its low point. Lower on the east slopes of Almagre is a high-quality bristlecone pine/whiproot clover (*Pinus aristida/Trifolium dasyphyllum*) stand. Dead, weathered bristlecone pine stands are found on the south slopes of Sheep Mountain.

The Pikes Peak Potential Conservation Area 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 in new locations on Pikes Peak in 2001. 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 species which is known only from Pikes Peak, there are an additional six other rare plants found in this site. The status of the Pikes Peak spring parsley and the overall number of species of significant plants found here gives weight to the importance of this area for global biodiversity conservation.

Biodiversity Rank Justification: This site includes all known occurrences for the globally-rare Pikes Peak spring parsley (*Oreoxis humilis*). The Rocky Mountain columbine (*Aquilegia saximontana*), a plant species known only from Colorado, is also found within the site. This species is known only from approximately 30 locations in the state. Other globally-rare alpine species such as alpine poppy (*Papaver kluanense*) and the clawless draba (*Draba exunguiculata*) are known from the area, but they have not been documented with exact locations within the last 20 years. Also included in the site are several state-rare species such as James' telesonix (*Telesonix jamesii*) and alpine bluebells (*Mertensia alpina*). In Colorado, alpine bluebells are documented solely from Pikes Peak.

Table 10. Natural Heritage element occurrences at the Pikes Peak PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Oreoxis humilis	Pikes Peak spring parsley	G1	S1				A	2000-07-11
Oreoxis humilis	Pikes Peak spring parsley	G1	S1				A	1998-08-23
Oreoxis humilis	Pikes Peak spring parsley	G1	S1				A	1998-08-22
Draba exunguiculata	Clawless draba	G2	S2				H	1923-07-07
Telesonix jamesii	James' telesonix	G2G3	S2?				A	1998-08-22
Telesonix jamesii	James' telesonix	G2G3	S2?				A	1998-08-23
Telesonix jamesii	James' telesonix	G2G3	S2?				A	1998-08-23
Aquilegia saximontana	Rocky Mountain columbine	G3	S3				B	1998-07-30
Aquilegia saximontana	Rocky Mountain columbine	G3	S3				E	1979-07-16
Aquilegia saximontana	Rocky Mountain columbine	G3	S3				E	1979-07-16

Table 10. Natural Heritage element occurrences at the Pikes Peak site (cont.).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Aquilegia saximontana	Rocky Mountain columbine	G3	S3				B	2000-06-27
Draba fladnizensis	Arctic draba	G4	S2S3				C	1998-07-28
Mertensia alpina	Alpine bluebells	G4?	S1				B	1998-08-23
Mertensia alpina	Alpine bluebells	G4?	S1				B	1998-08-22
Mertensia alpina	Alpine bluebells	G4?	S1				A	2000-07-12
Papaver kluanense	Alpine poppy	G5 T3T4	S3S4				H	1923-07-16
Plant Communities								
Pinus aristata/ Trifolium dasyphyllum	Upper montane woodlands	G3	S3				C	1994-08-04

Boundary Justification: The boundary is drawn to protect the occurrences from direct impacts resulting from surface disturbances. Continuous suitable habitat is included to allow additional individuals to become established over time.

Protection Comments: This site is partially publicly owned (managed by the U.S. Forest Service, Pike National Forest) and partially owned by Colorado Springs Utilities.

Management Comments: On the summit of Pikes Peak is a restaurant and parking area; the Pikes Peak Highway heads down the mountain to the north. The only other road in this PCA is the reservoir maintenance road (not open to the public) up Beaver Creek, which ends at Reservoir 8. There is also a tunnel moving water between east and middle Beaver Creeks. The Pikes Peak toll road is creating erosion and sedimentation problems. Currently there is little recreational activity except on roads and established trails. Continuation of ongoing trail maintenance programs, especially on trail 652 (which is eroding badly), would help encourage hikers to remain on established trails. If hiking use increases, additional trails may be needed. Restricting motor vehicle use to the tollroad and restricting all forms of recreation to established trails and roads would benefit the rare element occurrences.

Above timberline in the tundra, surface disturbances take much longer to restore (Zwinger and Willard 1972). Restrictions on off trail/road use would reduce disturbances to fragile areas. Well-marked and carefully-constructed trails are important. The west side of Pikes Peak has no current marked trails, but there are several old two-track roads, which are still visible and could be used for trail routes if new trails are needed. Reduction of erosion from the Pikes Peak highway would be beneficial. A reservoir, a radio tower, and several dirt roads are found on Almagre Mountain. Management of these roads to limit their number and extent would help avoid additional disturbances to the element occurrences within the Pikes Peak site.

Pikes Peak
Potential Conservation Area

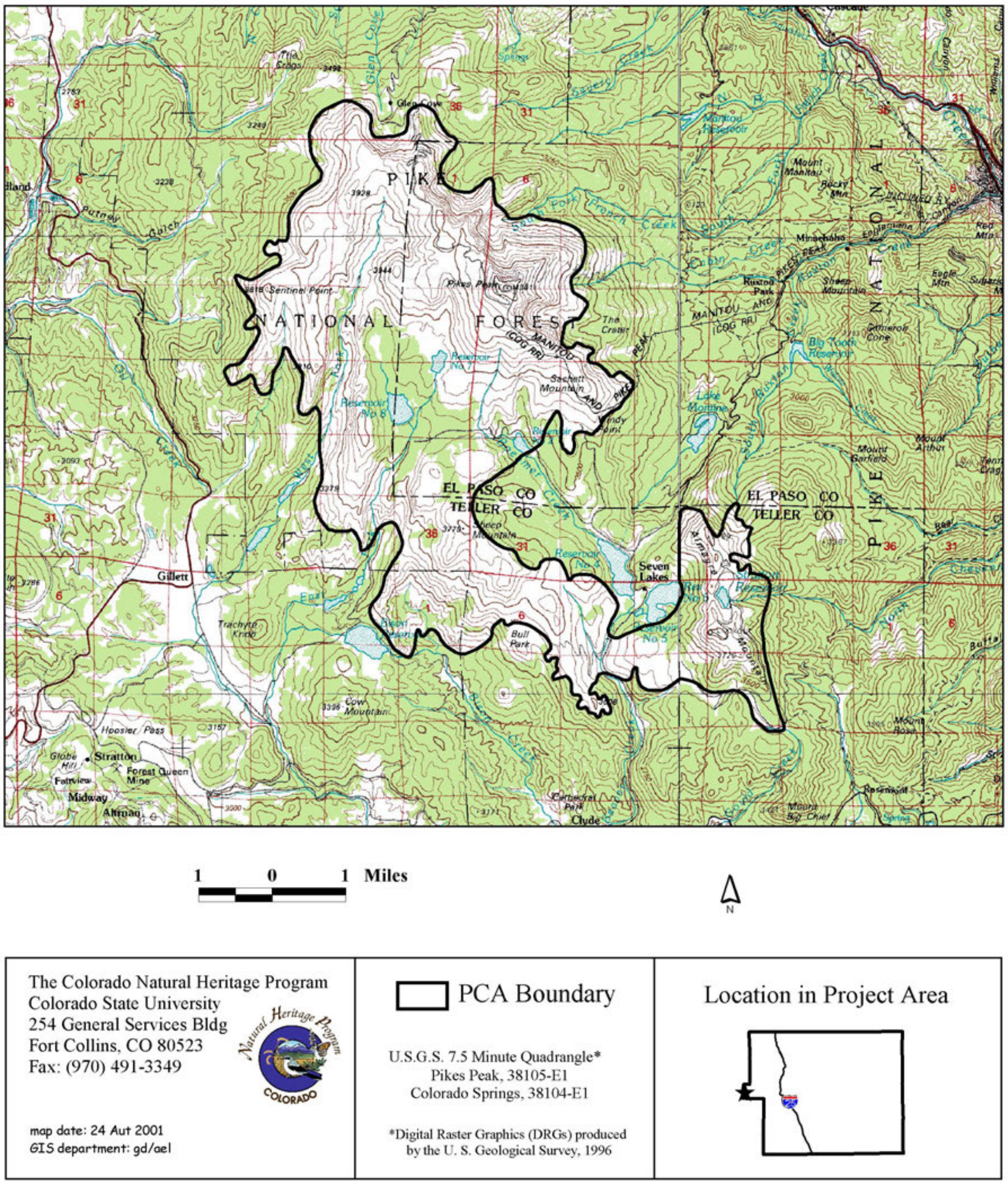


Fig. 11. Pikes Peak Potential Conservation Area Map

Potential Conservation Area Profiles: B2 PCAs

Aiken Canyon

Biodiversity Rank: B2 (Very high significance)
This PCA contains an excellent to good (AB-ranked) occurrence of a globally-imperiled (G2 S2) mountain mahogany/needlegrass community (*Cercocarpus montanus/Stipa comata*), an excellent (A-ranked) occurrence of a globally-vulnerable (G3 S2) pinyon pine/Scribner needlegrass community (*Pinus edulis/Stipa scribneri*), as well as an excellent (A-ranked) occurrence of an unranked mesic oak thicket community (*Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana*) (GU SU).

Protection Urgency Rank: P3 (Moderate urgency)
About half of the Aiken Canyon site is currently protected by a conservation easement through The Nature Conservancy of Colorado. Private lands within and adjacent to this remain vulnerable to development. Parts of the site are contained within a registered State Natural Area.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate for maintenance of the element occurrences. Weed management at a larger scale including the area around the site will probably be necessary to maintain its viability.

Location: Approximately 10 miles south of Colorado Springs off State Highway 119. The site is located west of Highway 115 and occupies the lower foothill canyons of Little Turkey Creek.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Mount Big Chief, Mount Pittsburg
T16S R67W Sections 15-17, 20-22, 27-29

Size: 2,017 ac (816 ha).

Elevation: 6,800 to 8,500 ft (2,072 to 2,560 m).

General Description: The Aiken Canyon site supports two rare plant communities and provides refuge for numerous plant and animal species whose habitat within the Front Range oak-shrub foothills zone is rapidly being converted to developed uses. Located at the ecotone between the prairie grasslands of the Great Plains and the forests of the lower montane zone, the shrubland and woodland communities at Aiken Canyon are interspersed with meadows of mixed-grass and tallgrass species. The grassland areas support tall- and midgrass species such as big bluestem (*Andropogon gerardii*), Scribner needle grass (*Stipa scribneri*), little bluestem (*Schizachyrium scoparium*), and prairie sandreed (*Calamovilfa longifolia*). The original range for the tallgrass species is climatically restricted in Colorado and these species have declined to a fraction of their original range as a result of land use changes and development.

The shrubland areas at the Aiken Canyon site support a mosaic of Gambel's oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus*), and skunkbush sumac (*Rhus trilobata*) interspersed with grassy meadows at the lower elevations and woodlands and forests at the higher elevations.

The Aiken Canyon site provides habitat for numerous species of wildlife, including black bear, mule deer, Rocky Mountain elk, mountain lions, bobcats, gray foxes, badgers, and tuft-eared pine squirrels. Through the efforts of local bird watchers and The Nature Conservancy, more than 100 species of birds have been documented at Aiken Canyon. These include three species of Colorado nuthatches, Western Bluebirds, Wild Turkeys, Hairy and Downy Woodpeckers, and several raptors, including Golden Eagles, Prairie Falcons, Northern Harriers, Cooper's Hawks, and Sharp-Shinned Hawks. The canyon also contains potential habitat for the Mexican Spotted Owl, which has been listed as threatened by the U.S. Fish and Wildlife Service.

Table 11. Natural Heritage element occurrences at the Aiken Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Cercocarpus montanus / Stipa comata	Mountain mahogany / needlegrass	G2	S2				AB	2000-07-25
Pinus edulis / Stipa scribneri	Pinyon pine / Scribner needlegrass	G3	S2				A	2000-07-25
Quercus gambelii-Cercocarpus montanus / Muhlenbergia montana	Mesic oak thickets	GU	SU				A	2000-07-25
Insects								
Amblyscirtes simius	Simius roadside skipper	G4	S3				E	2000
Atrytonopsis hianna	Dusted skipper	G4G5	S3				E	1997

Biodiversity Rank Justification: This site contains and was primarily drawn to support an excellent-to-good (AB-ranked) occurrence of a globally-imperiled (G2 S2) mountain mahogany (*Cercocarpus montanus*) needle and thread grass (*Stipa comata*) shrubland. This site also supports an excellent (A-ranked) occurrence of a globally-vulnerable (G3 S2) two-needle pinyon (*Pinus edulis*) Scribner needle grass (*Stipa scribneri*) woodland community, and an excellent (A-ranked) occurrence of an unranked (GU SU) Gambel's oak and mountain mahogany shrubland (*Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana*). Additionally, the mixed-grass prairie remnants provide habitat for two skipper butterflies, the dusted skipper (*Atrytonopsis hianna*) (G4G5 S2), and the Simius roadside skipper (*Amblyscirtes simius*) (G4 S3). Both species are considered apparently secure; however, these skippers are restricted to remnant patches of mixed grasslands where their hostplants big bluestem (*Andropogon gerardii*) and blue grama (*Bouteloua gracilis*) may be encountered. Additionally, the state-critically-imperiled birdbill day-flower (*Commelina dianthifolia*) (G5 S1) is known from Aiken Canyon (Tass Kelso, Colorado College, pers. comm.).

Boundary Justification: The boundary encompasses the lower elevation alluvial fans and outwash plains that support the prairie-shrubland mosaic communities, and extends to the top of the local watershed divide to encompass the steep east-facing canyons and rock outcrops that support the higher elevation woodland and forest elements.

Protection Rank Comments: The Nature Conservancy currently holds a 99-year lease on approximately half of the site and holds title to another 591 acres. This portion of the site is managed as a nature preserve and is effectively protected from direct impacts. Development and land use on adjacent parcels owned by the federal government and private landowners could have indirect impacts on the Aiken Canyon site. The Nature Conservancy is currently working with local landowners and managers to develop a site conservation plan that will minimize off site impacts.

Management Rank Comments: Weed management is the biggest threat to the quality and persistence of the elements at the Aiken Canyon site. The Nature Conservancy has implemented a weed management program to eliminate existing weed populations and minimize establishment of new populations. A wildfire management plan has also been developed to reduce the potential for catastrophic crown fires.

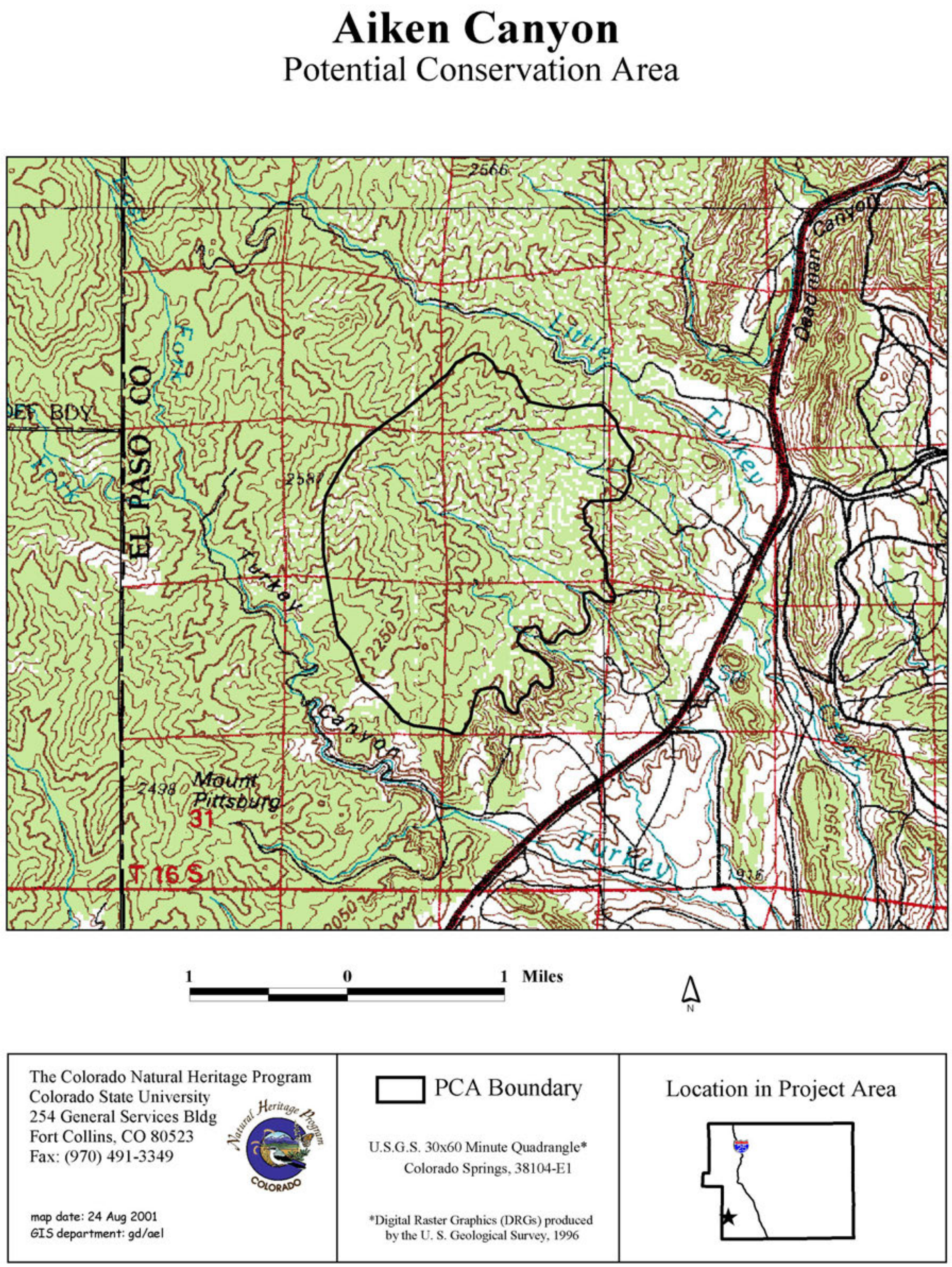


Fig. 12. Aiken Canyon Potential Conservation Area Map

Buffalograss Playas

Biodiversity Rank: B2 (Very high significance)
This PCA contains the best known playa habitat for the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*). It also includes the best known occurrences of a globally-vulnerable (G3 S3) buffalograss playa community (*Buchloe dactyloides–Ratibida tagetes–Ambrosia linearis*). Over 300 playas occur within this PCA, most of which are in good condition. It is unique to find a high concentration of playas in relatively unaltered condition. Many playas in other playa lake regions have been plowed or otherwise altered.

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years primarily due to residential development pressures.

Management Urgency Rank: M4 (Low urgency)
Current management appears excellent for maintenance of the element occurrences. If development occurs, management issues will likely become more serious.

Location: Southeastern El Paso County. Extends south from near the town of Yoder through the towns of Truckton and Edison to south of the El Paso/Pueblo county line.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Big Springs Ranch, Yoder, Rush, Truckton, Truckton NE, Edison School, Truckton SE
T14S R61W Sections 19, 20, and 28-34
T15S R60W Sections 7-10, 15-21, and 28-33
T15S R61W Sections 3-6, 8-10, 13-17, 20-28, and 33-36
T16S R60W Sections 3-11, 14-22, and 28-33
T16S R61W Sections 1, 2, 11-15, 22-27, 34-36
T17S R60W Sections 5-8, 17-20, and 30-32
T17S R61W Sections 1-3, 10-15, 22-27, and 34-36
T18S R60W Sections 5 and 6
T18S R61W Sections 1-3 and 11

Size: 55,332 ac (22,392 ha).

Elevation: 5,315 to 6,070 ft (1,620 to 1,850 m).

General Description: In southeastern El Paso County, between the many low rolling hills of shortgrass prairie, are small flat-bottomed depressions. There are no surface channels draining the area, instead rainfall and runoff collect in these basins forming ephemeral wetlands. It is not clear whether these depressions are wind deflated playas (Bolen *et al*. 1989) or remnants of buffalo wallows (Uno 1989; F. Knopf, USGS, pers. comm.), both of which develop clay bottoms and collect runoff after heavy rainstorms. We have chosen to refer to these depressions as playas, fully acknowledging that their origin is not well understood. The area outlined by the PCA is estimated to contain over 300 playas, an average density of about three playas per square mile. The playas are generally circular to oval-shaped, oriented roughly north-south, and range in size from about 0.5 to 10 ac (0.2 to 5 ha).

These basins remain dry throughout most of the year and collect water only after heavy rainfall. In southeastern El Paso County, the heavy rains generally occur in the late summer and in many cases a series of storms are required in order for the playas to retain water (Weathers 2000; G. Paul, local landowner, pers. comm.). Runoff collecting in a dry playa infiltrates cracks in the clay bottom of the playa and swells the clay, effectively sealing the playa bottom (Zartman *et al*. 1994). After the clay has been wetted, subsequent storms can result in playa filling. The playas may hold water for periods ranging from days to weeks, depending on the size of the drainage basin and intensity of the rainstorm (Weathers 2000). In some cases, these playas may hold water from May to August (G. Paul, pers. comm.) or in dry years may remain dry year round.

The vegetation in the playas is shorter than the surrounding blue grama (*Bouteloua gracilis*) shortgrass prairie and consists of different species. The dominant species in the playas is the perennial warm-season grass buffalograss (*Buchloe dactyloides*). Growing with the buffalograss are the perennial forbs plains ambrosia (*Ambrosia linearis*) (G3 S3) and short-ray prairie coneflower (*Ratibida tagetes*).

The vegetation in the playas generally occurs in bands where the outermost rim often supports the highest density of plains ambrosia and coneflower. Other plants growing in the playas include a dryland sedge (*Carex eleocharis* ssp. *stenophylla*), prostrate vervain (*Verbena bracteata*), frog-fruit (*Phyla cuneifolia*), spreading yellow cress (*Rorippa sinuata*), greenthread (*Thelesperma megapotamicum*, *T. filifolium*), curly cup gumweed (*Grindelia squarrosa*), and Russian thistle (*Salsola iberica*). Interestingly, buffalograss submerged during the growing season has been known to withstand more than five weeks of inundation (Porterfield 1945). In the playas that remain wet the longest, there may be a small bare ground portion in the center with very sparse cover that could include western wheatgrass (*Pascopyrum smithii*), spikerush (*Eleocharis palustris* and *E. acicularis*), goosefoot (*Chenopodium* sp.), or weedy annuals.

Plains ambrosia is a shortgrass prairie species that is restricted to an area of about 100 miles by 50 miles (primarily in El Paso and Lincoln counties). Plains ambrosia requires a little more moisture than most upland plants and as such, the playas appear to be their native habitat as the clay soils of the playas retain moisture longer than the upland soils. Roadsides also appear to provide the extra moisture required by the plains ambrosia and, as such, plains ambrosia is very prevalent on the sides of many unpaved roads in the area. The playas in El Paso County are the best known occurrences for this species.

Where the playas are most concentrated, the density can exceed 10 playas per square mile. The playas provide heterogeneity within a sea of shortgrass prairie which is biologically important in providing for the needs of a wide range of species (Knopf 1996a, Hoagland and Collins 1997). Other factors affecting grassland environmental and compositional heterogeneity include fire, soils, grazing, and prairie dogs. Fire management, reduced numbers of prairie dogs, and replacement of bison by cattle have reduced heterogeneity in many areas. Playas may serve as the primary source of heterogeneity in the region (Hoagland and Collins 1997).

In late summer 2000, Mountain Plover (*Charadrius montanus*) (G2 S2B,SZN) were observed gathering for migration in dry playas. Mountain Plover is a declining shortgrass prairie species that is known to inhabit areas with low vegetation and a high percentage of bare ground such as prairie dog towns and heavily grazed shortgrass prairie (Knopf 1996b). Observations of concentrations of Mountain Plover exceeding 50 birds in the playas in late summer may indicate that playas may be another habitat attractive to Mountain Plover because of the low-growing vegetation. In addition, a breeding location for another shortgrass prairie bird that prefers low-growing vegetation, McCown's Longspur (*Calcarius mccownii*) (G5 S2B, SZN), was noted in the vicinity of playas (A. Versaw, pers. comm.). This may be the southernmost known current breeding location in Colorado for McCown's Longspur (Kingery 1998).

In the U.S., the area typically described as the playa lakes region includes approximately 140,000 square miles (36.2 million ha) of southwestern Kansas, southeastern Colorado, the panhandle of Oklahoma, eastern New Mexico, and the panhandle and Southern High Plains of Texas (Haukos and Smith 1997). El Paso County is northwest of this area and its playas appear to differ from those further south. The El Paso County playas are smaller and are inundated at different times than the more southern playas. The more southern playas fill with rainwater during late winter and early spring and may remain flooded through summer and fall and as such are considered critical to the maintenance of waterfowl and shorebirds on the central flyway (Guthrey and Bryant 1982, Batt 1996). Though the El Paso County playas can fill during wet springs, they are more often inundated late in the summer and are dry during spring migration. Finally, most of the more southern playas are within areas of intense agricultural use and many have been plowed for crops, modified for collection of irrigation or feedlot runoff, or otherwise altered (Guthery and Bryant 1982, Bolen *et al*. 1989, Haukos and Smith 1994). The El Paso County playas are primarily rangeland with little alteration by agriculture. The most common disturbance in the El Paso County playas is roads.

The most common explanation for the origin of playas is deflation (wind erosion), though theories on playa formation are controversial (Osterkamp and Wood 1987). The consistent north-south orientation of the playas in southeastern El Paso County suggests deflation influenced their formation. As previously mentioned, these playas are also consistent with descriptions of buffalo wallows. Wallows are formed by bison pawing the ground, creating patches of bare ground in which to dust bathe (Uno 1989), or perhaps mud bathe to protect against biting insects or aid in shedding their heavy fur (Hornaday 1889; F. Knopf, USGS, pers. comm.). Active wallows range from 3 to 5 m in diameter and merging of adjacent wallows can create wallows larger than about 0.5 acre (1,400 m^2) (Uno 1989, Knopf 1996a). Bison were extirpated from the area by 1875 (Hornaday 1889) but evidence of their wallows can remain evident on the landscape for more than a hundred years (Knopf 1996a). Perennial grasses invade wallows not used by bison (Uno 1989). It is possible that the southeast El Paso County playas result from of a combination of factors including deflation and buffalo wallowing.

The land within the PCA is primarily privately owned and used for cattle grazing. About 10 percent of the area is tilled for crops or developed for rural housing. Most of the southeast El Paso County playas have not been plowed and retain their native vegetation for the most part. The most common modifications of the playas are unpaved roads passing through or excavation of the center of the playa to retain water longer for livestock watering. More recently, development pressure is increasing and land is being subdivided, usually into 35-acre parcels. Within these subdivided properties, in some cases homes have been placed adjacent to or within playas.

Biodiversity Rank Justification: This PCA contains the best known playa habitat for the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*). It also includes most of the known extent of the globally-vulnerable (G3 S3) buffalograss playa community (*Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis*). The landscape included within this PCA is fragmented by roads and some agriculture but remains largely intact. Hundreds of playas remain in good to excellent condition in the PCA. Plains ambrosia, though locally abundant, has a very limited global range (about 50 miles by 100 miles) and almost all of the habitat is privately owned.

Table 12. Natural Heritage element occurrences at the Buffalograss Playas PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3			FS	A	2000-07-19
Ambrosia linearis	Plains ambrosia	G3	S3			FS	A	2000-07-13
Ambrosia linearis	Plains ambrosia	G3	S3			FS	A	2000-07-12
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	2000-09-12
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	2000-07-13
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	2000-07-12
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	2000-06-30
Ambrosia linearis	Plains ambrosia	G3	S3			FS	C	2000-07-18
Ambrosia linearis	Plains ambrosia	G3	S3			FS	C	1993-07
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				B	2000-09-12

Table 12. Natural Heritage element occurrences at the Buffalograss Playas PCA (cont.).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				B	2000-07-19
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				B	2000-07-13
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				B	2000-07-13
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				C	2000-07-12
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				C	2000-09-12
Bouteloua gracilis-Buchloe dactyloides	Shortgrass prairie	G4	S2?				B	2000-11-18
Bouteloua gracilis	Blue grama shortgrass prairie	G4Q	S4				C	2000-10-26

Boundary Justification: The site boundary for Buffalograss Playas includes the densest concentration of playas in El Paso County. Playas continue for many miles north, south, and east of this PCA but not in the concentrations found within it. The entire PCA is underlain by Dwyer soils. Roadside occurrences of plains ambrosia extend for many miles beyond the boundary but these are not included because they are of lower conservation value.

Protection Rank Comments: All land within this PCA is either privately owned or leased from the State Land Board for grazing. Historically, grazing has been the dominant land use in the area, varying in intensity from light to heavy. Increasingly, grazing lands are being subdivided and sold as 35-acre or larger parcels and residential development is progressing rapidly, mostly in the form of mobile homes on small plots.

Six sections within the PCA are owned by the State Land Board and leased for grazing. Limited areas are currently cultivated at present, but when the land was initially homesteaded there were many small cultivated areas, probably one per section or more. Most of these areas have not been farmed for many years but the areas that were once plowed still do not exhibit a typical shortgrass prairie flora.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. Grazing regimes that maintain the natural mosaic nature of the shortgrass prairie should be encouraged. Introduction of additional domestic pets (primarily dogs and cats) with increased residential development may negatively impact shortgrass prairie birds dependent on the playa area for breeding or brood rearing.

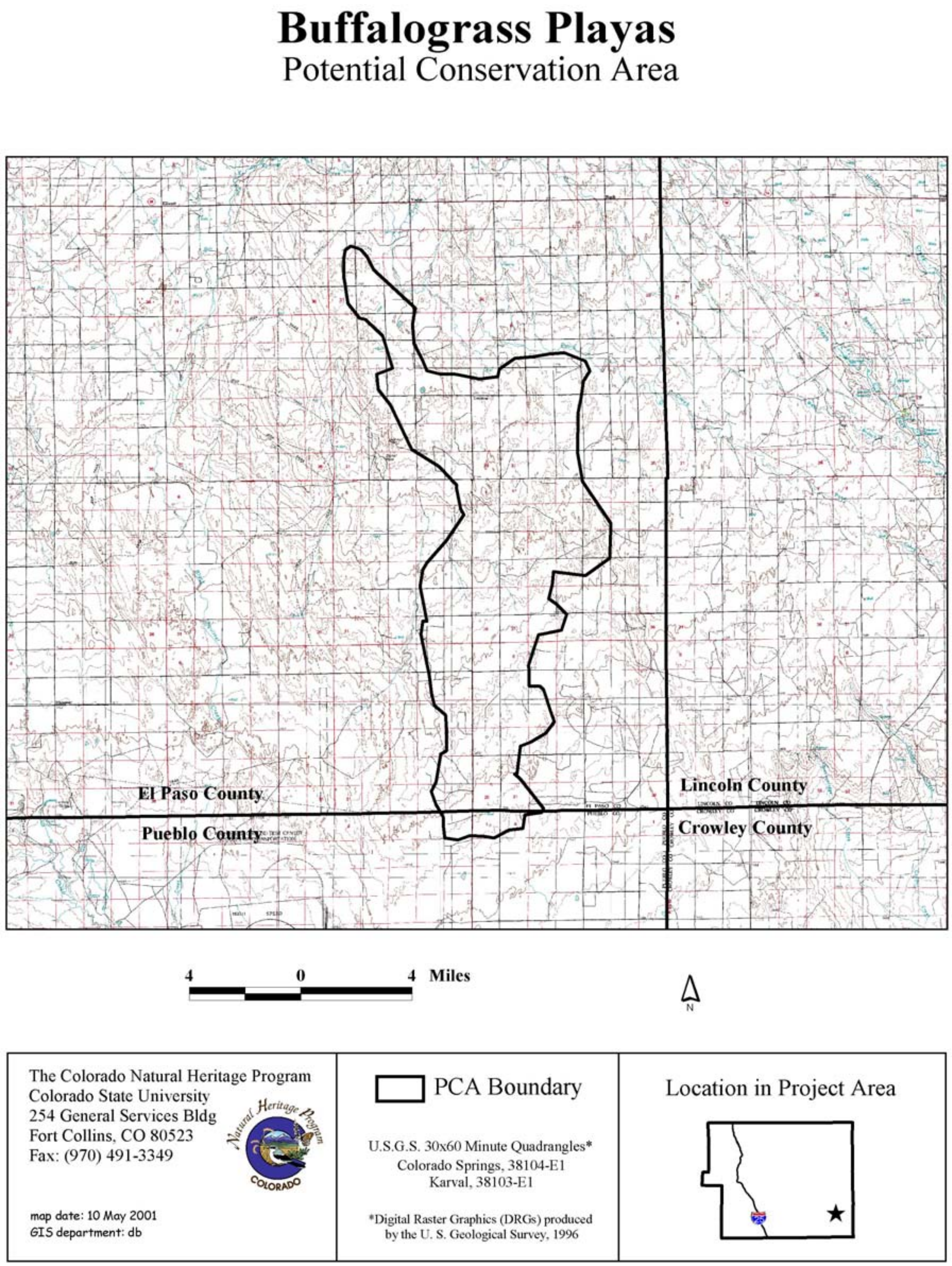


Fig. 13. Buffalograss Playa Potential Conservation Area Map

Cheyenne Canyon

Biodiversity Rank: B2 (Very high significance)
This PCA contains excellent (A-ranked) examples of a globally-imperiled plant subspecies, Rydberg's golden columbine (*Aquilegia chrysantha* var**.** *rydbergii*).

Protection Urgency Rank: P4 (Low urgency)
There is mixed ownership between USFS, El Paso County, City of Colorado Springs, State Land Board, and private.

Management Urgency Rank: M1 (Very high urgency)
Recreation impacts are of concern.

Location: El Paso and Teller counties. West of Colorado Springs, including Bear Creek and North Cheyenne Canyon.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Manitou Springs, Colorado Springs, Mount Big Chief, and Cheyenne Mountain
T14S R67W Sections 15-17, 19-22, and 27-35
T14S R68W Sections 23-26 and 34-36
T15S R67W Sections 2-11 and 14-22
T15S R68W Sections 1-3 and 10-13

Size: 18,520 ac (7,495 ha).

Elevation: 6,260-12,000 ft (1,908 to 3,658 m).

General Description: The Cheyenne and Bear Creek drainages lie in the foothills west of Colorado Springs and below the Pikes Peak summit. Snowmelt and springs feed the creeks within the PCA. Granite cliffs, outcrops, and boulders are dominant features of the landscape in this area. The upland communities consist of mixed conifers dominated by ponderosa pine (*Pinus ponderosa*), oak (*Quercus gambelii*), Douglas fir (*Pseudotsuga menziesii*), and spruce-fir (*Picea-Abies*) at the higher elevations. The drainages are filled with Douglas fir, hazelnut (*Corylus cornuta*), narrowleaf cottonwood (*Populus angustifolia*), river birch (*Betula occidentalis*), chokecherry (*Prunus virginiana*), Rocky Mountain maple (*Acer glabrum*), aspen (*Populus tremuloides*), and willow (*Salix* spp.). The site covers a large area between 6,260 to 12,000 ft (1,931 to 3,700 m) in elevation.

North Cheyenne and Bear creeks (and likely South Cheyenne Creek) support a plant species variety known only from Colorado and is the most biologically significant element in this site. Rydberg's golden columbine (*Aquilegia chrysantha* var. *rydbergii*) is currently known only from Cheyenne Mountain and Cheyenne/Bear Canyons. This plant is found along the creeks and side drainages in moist areas. In addition to this globally-rare plant, there are 10 other significant plants, animals and plant communities found within this site.

Biodiversity Rank Justification: This site includes a large occurrence of Rydberg's golden columbine (*Aquilegia chrysantha* var. *rydbergii*), a variety known only from Colorado. Rydberg's golden columbine has only been documented from three other locations worldwide, two of which are known only historically and are probably extirpated. (The full species, *Aquilegia chrysantha*, is known from Arizona, New Mexico, Texas, and Mexico, and there is some debate by the experts as to the validity of the variety in Colorado, as the full species is known from Cheyenne Mountain and the lower Rampart Range.) In addition to this globally-significant variety there are six other rare plant species reported from this site. Three globally-rare riparian plant communities and one globally-rare bird also occur within this area.

Table 13. Natural Heritage element occurrences at the Cheyenne Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Telesonix jamesii	James' telesonix	G2 G3	S2?				B	2000-06-27
Aquilegia saximontana	Rocky mountain columbine	G3	S3				B	1998-07-06
Aquilegia chrysantha var *rydbergii*	Golden columbine	G4T1Q	S1			BLM	A	1998-07-08
Aquilegia chrysantha var *rydbergii*	Golden columbine	G4T1Q	S1			BLM	A	1998-07-20
Aquilegia chrysantha var *rydbergii*	Golden columbine	G4T1Q	S1			BLM	E	1994-06-12
Aquilegia chrysantha var *rydbergii*	Golden columbine	G4T1Q	S1			BLM	H	1914-07
Botrypus virginianus spp. *europaeus*	Rattlesnake fern	G5	S1				H	1901-07-03
Carex leptalea	Bristle-stalk sedge	G5	S1				H	1956-06-23
Cypripedium calceolus spp. *parviflorum*	Yellow lady's-slipper	G5	S2					1990
Cypripedium calceolus spp. *parviflorum*	Yellow lady's-slipper	G5	S2				H	1978-06-15
Pellaea atropurpurea	Purple cliff-brake	G5	S2S3				H	1895-07-09

Table 13. Natural Heritage element occurrences at the Cheyenne Canyon PCA (cont.).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Populus angustifolia/ Prunus virginiana	Narrowleaf cottonwood/ Common chokecherry	G2 G3	S1				B	1995-07-24
Corylus cornuta	Lower montane forest	G3	S1				B	1995-08-24
Pseudotsuga menziesii/ Betula occidentalis	Montane riparian forest	G3?	S3				B	1995-06-26
Animals								
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S2B, SZN				B	1996-07-19

Boundary Justification: Boundaries encompass riparian canyon bottoms and upland slopes which support rare plant species and riparian plant communities. The immediate watershed is included because the occurrences within this site depend on mesic to wet conditions for survival.

Protection Rank Comments: Land ownership within this area includes a mixture of USFS, El Paso County, City of Colorado Springs, State Land Board, and private. Recreational use appears to have widened the trails in this area and use along Cheyenne Creek appears to be particularly heavy. Actions addressing these problems would likely be progressive towards protecting the columbines.

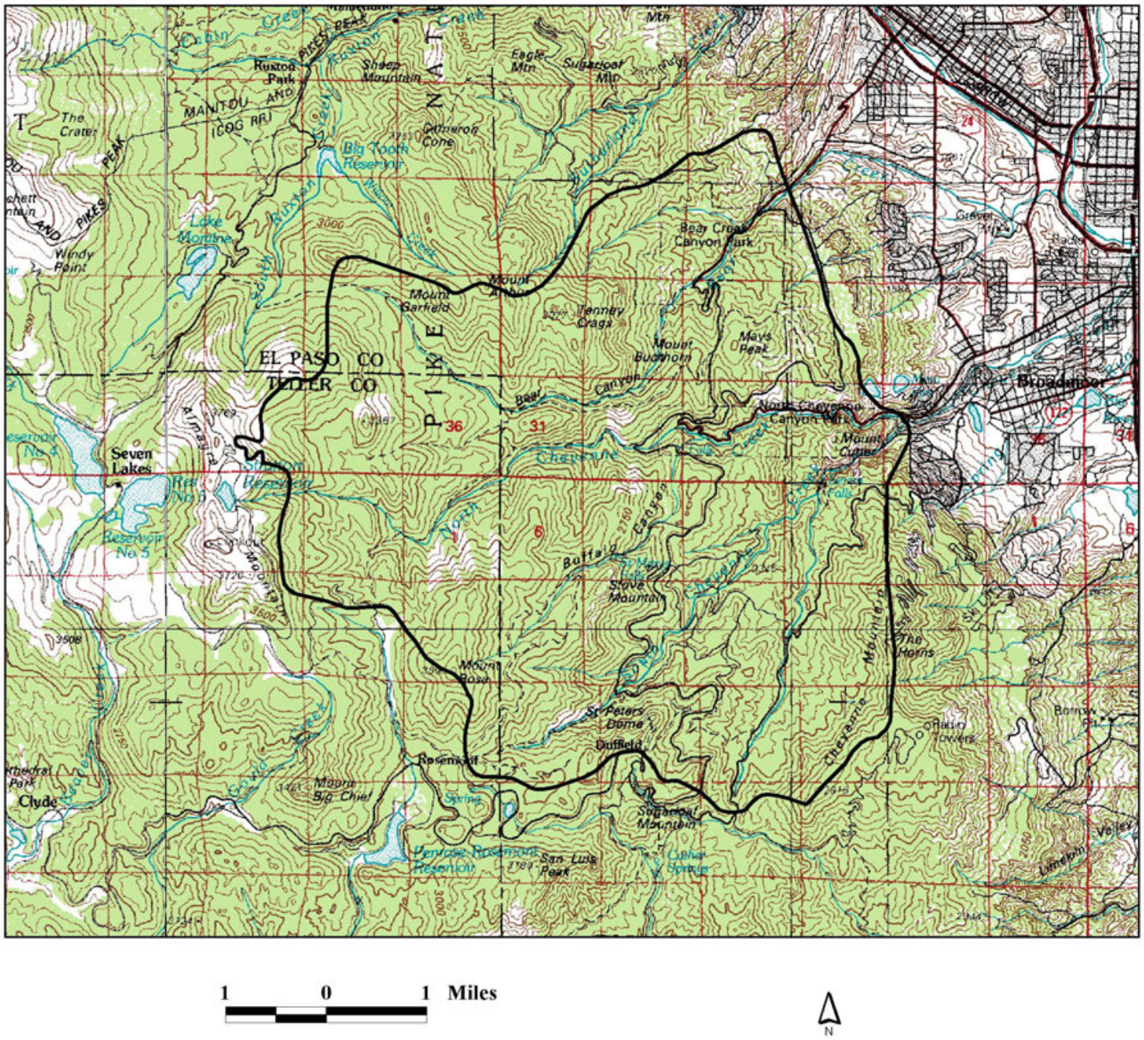
Management Rank Comments: North Cheyenne Canyon is a 1,320-acre park owned and managed by the City of Colorado Springs (Cameron 2001). The amount of recreational use and development is lower at Bear Creek than at North Cheyenne Canyon, and supports a much larger population of Rydberg's golden columbine. Due to these factors, Bear Creek is an ideal location to implement strong protective measures for Rydberg's golden columbine. The Bear Creek trail is becoming widened with use and is eroding in a stretch below the falls. Conservation of the columbines will be aided by ensuring that future development, such as trails, roads, and picnic grounds, are placed outside of the riparian zones.

The rare plant communities and the globally-significant golden columbine rely on riparian areas. To maintain the occurrences of columbine, recreational use on the south side of North Cheyenne Creek could be limited or restricted. Currently, impacts from the road, picnic areas and parking areas are expanding into the riparian zones. This could be detrimental to the rare plants found there. Bear Creek is less disturbed and only accessed by a trail. Trail expansion and the associated increase in use could also impact the rare plants at this site. The columbine's large yellow flower attracts attention and may be collected excessively by tourists and recreationists. Interpretive signs explaining the impact of collecting these plants may alleviate this threat. The upland areas are also important but are not as easily impacted by recreation.

Trail 701 at the upper end of North Cheyenne Creek is currently open to motor bikes. This type of use has increased erosion along the granite gravel trail. Managing the type and timing of use may minimize excessive erosion and minimize impacts to the rare plants found there. A globally-rare plant species, the Rocky Mountain columbine (*Aquilegia saximontana*), is growing directly adjacent to this trail.

Management for the Peregrine Falcon appears adequate. The area around the nest is closed during breeding season. Sightings of Peregrine Falcons have been reported repeatedly since 1994.

Cheyenne 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: 10 May 2001
GIS department: db

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles*
Colorado Springs, 38104-E1

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

Location in Project Area

Fig. 14. Cheyenne Canyon Potential Conservation Area Map

Colorado Springs Airport

Biodiversity Rank: B2 (Very high significance)
This PCA contains a good (B-ranked) example of a globally-imperiled (G2 S2) big bluestem-prairie sandreed tallgrass community (*Andropogon gerardii-Calamovilfa longifolia*). This is the largest known occurrence of this tallgrass community in Colorado.

Protection Urgency Rank: P1 (Very high urgency)
The occurrence is within the incorporated area of Colorado Springs. Most of the PCA is owned by the City of Colorado Springs and Colorado Springs Airport Authority. The easternmost portion is part of the historic Banning-Lewis Ranch and is currently planned for development. Portions of the City Airport Authority property are planned for development as a light industrial park and golf course. Housing subdivisions are rapidly encroaching and have recently decreased the tallgrass prairie acreage.

Management Urgency Rank: M3 (Moderate urgency)
Portions of the grassland are mowed by the Airport Authority as part of routine maintenance. Potential skipper populations could benefit from timing the mowing to avoid larval/pupal stages.

Location: Colorado Springs Airport PCA is located south and east of the Colorado Springs Airport.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Elsmere and Colorado Springs
T14S R65W Sections 15-22, 27-33, and 36
T14S R66W Sections 13, 24, 25, and 34-36
T15S R65W Sections 3-10 and 16-21
T15S R66W Sections 1-3, 12, 13, and 24.

Size: 17,489 ac (7,078 ha).

Elevation: 5,700 to 6,300 ft (1,737 to 1,920 m).

General Description: Remnants of tallgrass prairie occur in Colorado as disjunct populations from the historic tallgrass prairie that made up the eastern third of the Great Plains. Historically, tallgrass prairie occupied approximately 150 million ac (60 million ha), but today less than two percent of that remains (Samson and Knopf 1994). Most tallgrass prairie has been converted to cropland or other uses. In Colorado, tallgrass prairie remnants are limited to the plains adjacent to the Front Range where rainfall amounts and soils are appropriate. Further east of the Front Range, the rainfall amount diminishes and shortgrass prairie dominates. Very few large patches of tallgrass prairie remain in Colorado.

Tallgrass prairie is present in scattered patches in El Paso County both along the foothills and out into the plains in the northern portion of the county. The Colorado Springs Airport PCA encompasses the largest known occurrence of a big bluestem–prairie sandreed (*Andropogon gerardii-Calamovilfa longifolia*) (G2 S2) tallgrass prairie in Colorado. The community is most extensive within about two square miles south of the airport between Drennan and Powers Roads and occurs in small patches within surrounding areas. Based on a roadside survey, the occurrence appears to be in good condition with relatively few weeds. Other grasses occurring within the matrix of big bluestem and prairie sandreed are little bluestem (*Schizachyrium scoparium*), needle-and-thread grass (*Stipa comata*), blue grama (*Bouteloua gracilis*), and purple three-awn (*Aristida purpurea*).

Associated with tallgrass prairie are at least five species of skippers (butterflies in the family Hesperiidae) known to rely on big bluestem as their primary host plant (Opler and Wright 1999). These eastern Great Plains skippers occur, like tallgrass prairie, as disjunct populations along the Colorado Front Range. Though we have no current records of these species within the Colorado Springs Airport PCA, three skippers tracked by CNHP have been documented in El Paso County (Colorado Natural Heritage Program 2001; Opler *et al*. 1995). These include the dusted skipper (*Atrytonopsis hianna*) (G4G5 S2), crossline skipper (*Polites origines*) (G5 S3), and Ottoe skipper (*Hesperia ottoe*) (G3G4 S2). Future surveys may reveal additional populations of these rare butterflies.

Biodiversity Rank Justification: This site contains a good (B-ranked) occurrence of a globally-imperiled (G2) big bluestem-prairie sandreed tallgrass prairie community (*Andropogon gerardii-Calamovilfa longifolia*). Large occurrences of this community type are rarely encountered and this is the largest known occurrence in Colorado.

Table 14. Natural Heritage element occurrences at the Colorado Springs Airport PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Andropogon gerardii-Calamovilfa longifolia	Tallgrass prairies	G2	S2				B	2000-11-22

Boundary Justification: The boundary encompasses the two square miles of tallgrass prairie south of the airport occurrence and smaller scattered tallgrass patches occurring within a matrix of shortgrass prairie and residential and light industrial development. The PCA includes areas occupied by the Colorado Springs Airport, portions of Peterson Air Force Base, the residential, commercial and light industrial areas to the west and southeast of the Airport, and areas south of the airport recently purchased by Colorado Springs Open Space. Most of the area included within the boundary is converted to non-native vegetation, or to commercial use, with the tallgrass prairie occurring in scattered patches. The lands to the east of the PCA are privately owned and actively grazed but have been planned for development, as have the partially developed lands to the west of the airport. The eastern boundary of the occurrence was surveyed from the road. An on-site survey may result in an expansion of the element occurrence and the PCA boundary to include areas that support the occurrence but which have not yet been adequately surveyed.

Protection Rank Comments: Development pressures are intense in this portion of the county. The entire occurrence is within the municipal boundary of Colorado Springs and the land on the western edge is actively undergoing residential development. The property is owned by the City of Colorado Springs and private landowners.

Management Rank Comments: The Airport Authority mows the tallgrass community as part of routine maintenance. Evaluating the mowing regime to determine an appropriate interval and timing could benefit the community and potentially occurring skippers. It is unknown whether or not the grazing management in the eastern portion of the PCA favors the persistence of the tallgrass prairie system.

Colorado Springs Airport
Potential Conservation Area

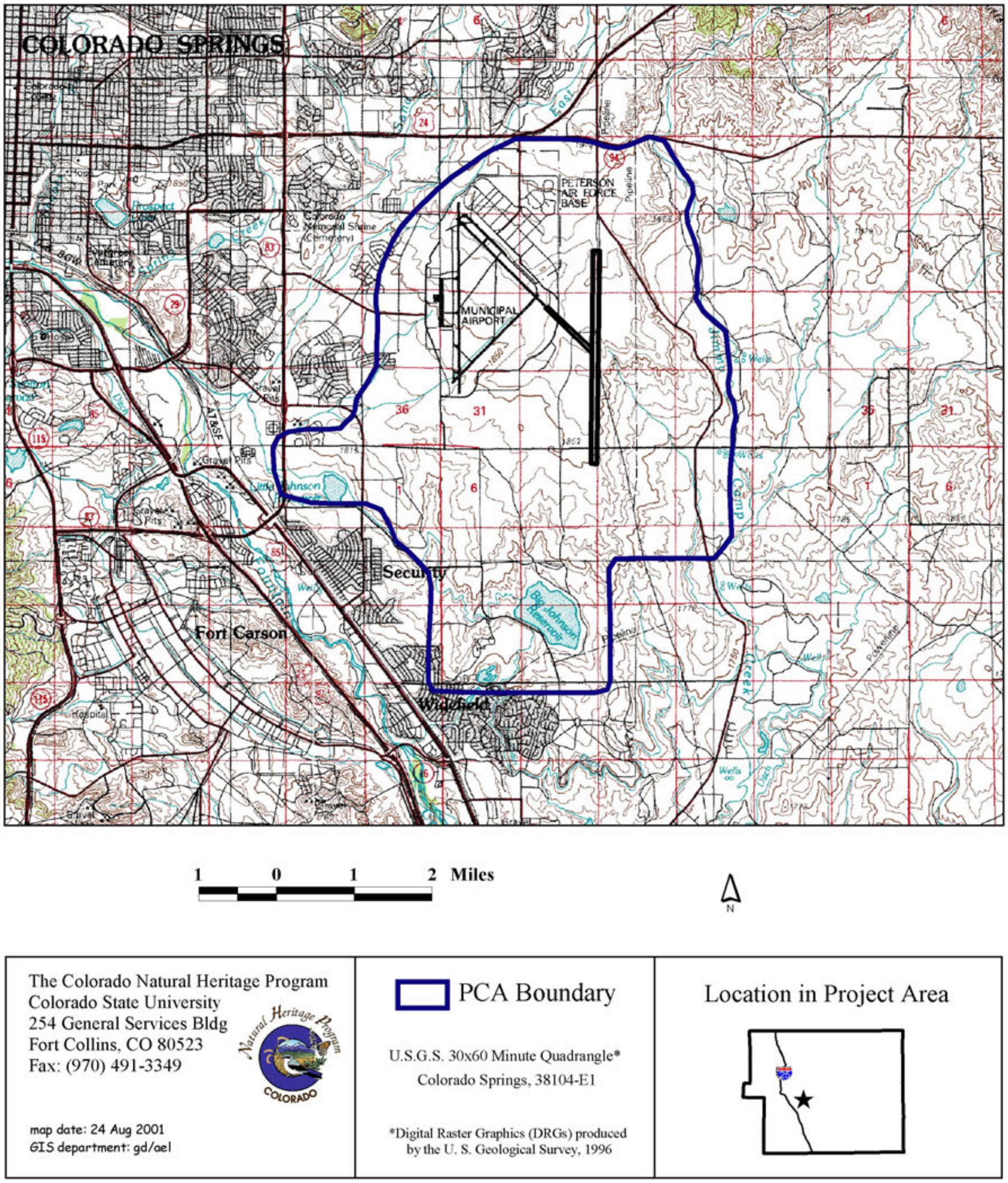


Fig. 15. Colorado Springs Airport Potential Conservation Area Map

Judge Orr Road

Biodiversity Rank: B2 (Very high significance)
This PCA contains a good (B-ranked) example of a globally-imperiled (G2 S2) tallgrass community, big bluestem–little bluestem (*Andropogon gerardii-Schizachyrium scoparium*). The PCA also contains several good (B-ranked) examples of globally-vulnerable (G3) to globally-secure (G5) wetland plant communities.

Protection Urgency Rank: P2 (High urgency)
The town of Falcon and associated housing subdivisions are encroaching on the grasslands and wetlands within the PCA. The PCA is comprised of private lands and one State Land Board parcel of ¾ square mile. The private lands could easily find development a viable option.

Management Urgency Rank: M4 (Low urgency)
Current management appears appropriate for maintenance of the element occurrences. If development continues to proceed at a rapid rate, water management may become the primary management issue.

Location: Judge Orr Road PCA is located in El Paso County both north and south of Highway 24 between the towns of Falcon and Peyton. The wetlands occur throughout the PCA but are more prevalent south of Highway 24 along Judge Orr Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Eastonville, Falcon, Haegler Ranch, and Peyton
T11S R64W Sections 33 and 34
T12S R63W Sections 18-20 and 29-34
T12S R64W Sections 2-4, 8-11, 13-17, 20-29, and 32-36
T13S R63W Sections 3-9 and 16-18
T13S R64W Sections 1-4 and 8-16

Size: 25,026 ac (10,128 ha).

Elevation: 6,420 to 7,200 ft (1,957 to 2,195 m).

General Description: Low rolling hills of tallgrass, midgrass, and shortgrass prairie with swales containing wet meadows and small ephemeral drainages form a relatively intact landscape in north-central El Paso County. Located south and west of the Black Forest, the PCA encompasses the upper watershed of Black Squirrel Creek and its tributaries.

Remnants of tallgrass prairie occur in Colorado as disjunct populations from the historic tallgrass prairie that made up the eastern third of the Great Plains. Historically, tallgrass prairie occupied approximately 60 million hectares, but today less than two percent of that remains (Samson and Knopf 1994). Most tallgrass prairie has been converted to cropland or other uses. In Colorado, tallgrass prairie remnants are limited to the plains adjacent to the Front Range where the rainfall and soil is appropriate. Further east of the Front Range the rainfall diminishes and shortgrass prairie dominates. Very few large patches of tallgrass prairie remain in Colorado.

Tallgrass prairie is present in scattered patches in El Paso County both along the foothills and out into the plains in the northern portion of the county. Within the Judge Orr Road PCA, two grassland communities have been described. The first is south of Highway 24 and along both sides of Judge Orr Road where a fairly large occurrence of a big bluestem-little bluestem western Great Plains tallgrass prairie (*Andropogon gerardii-Schizachyrium scoparium*) (G2 S2) is present. The community occurs in patches within about a five square mile area. The occurrence appears to be in good condition with relatively few weeds and sustainable grazing practices. Other grasses present include blue grama (*Bouteloua gracilis*), prairie sandreed (*Calamovilfa longifolia*), and scattered Indian grass (*Sorghastrum nutans*).

Associated with tallgrass prairie are at least five species of skippers (butterflies in the family Hesperiidae) known to rely on big bluestem as their primary host plant (Opler and Wright 1999). These eastern Great Plains skippers occur, like tallgrass prairie, as disjunct populations along the Colorado Front Range. Though we have no current records of these species within the Judge Orr Road PCA, three skippers tracked by CNHP have been documented in El Paso County (Opler *et al*. 1995, Colorado Natural Heritage Program 2001a). These include the dusted skipper (*Atrytonopsis hianna*) (G4G5 S2), crossline skipper (*Polites origines*) (G5 S3), and Ottoe skipper (*Hesperia ottoe*) (G3G4 S2). Future surveys may reveal populations of these rare butterflies.

North of Highway 24 is another relatively intact grassland. The dominant species appear to be little bluestem, blue grama, and mountain muhly (*Muhlenbergia montana*). The community is described as little bluestem with sideoats grama (*Schizachyrium scoparium-Bouteloua curtipendula*) (G3 S2), a globally-vulnerable midgrass prairie community.

Perhaps the most striking aspect of the prairie along Judge Orr Road is the abundance of creeks and wetlands. These creeks and wetlands are supported by regional shallow groundwater resulting from groundwater recharge in the Black Forest to the north. The land gently slopes to the southeast, forming the headwaters of Black Squirrel Creek. Many small drainages flow from the area and can form wide wet meadows up to 40 ac in size. Along Judge Orr Road, the many drainages and wet meadows support a mosaic of wetland communities including Baltic rush (*Juncus balticus* var. *montanus*) (G5 S5), Nebraska sedge (*Carex nebrascensis*) (G4 S3), clustered sedge (*Carex praegracilis*) (G3 S2), woolly sedge (*Carex lanuginosa*) (G3? S3), three-square bulrush (*Scirpus pungens*) (G3G4 S3), and saltgrass (*Distichlis spicata*) (G5 S3). Another prevalent species is the European pasture grass redtop (*Agrostis gigantea*). These communities can form monotypic stands or intermingle with adjacent types.

The drainages and associated ponds support small fishes (unidentified species), abundant northern leopard frogs (*Rana pipiens*) (G5 S3) (a species on CNHP's "watchlist"), and a variety of aquatic invertebrates. Birds observed within the PCA wetlands include Common Snipe, American Coot, Pied-billed Grebe, and Northern Harrier. Aquatic vegetation in the ponds and drainages includes pondweed (*Potamogeton* sp.), hornwort (*Ceratophyllum demersum*), duckweed (*Lemna minor*), and arrowhead (*Sagittaria* sp.).

Small-headed rush (*Juncus brachycephalus*) (G5 S1), a common wetland in parts of the eastern US and Canada, occurs as a disjunct in Colorado. Streams draining the Black Forest and their associated wet meadows are the only known current Colorado locations for this plant. Small-headed rush has been documented within the PCA on Black Squirrel Creek and a tributary.

Development pressures are intense in this portion of the county. The primary land use within the PCA is cattle grazing but with increasing encroachment of the town of Falcon. Falcon occurs within the described wetland complex and is in a period of rapid expansion. Water diversion structures have been constructed and wetlands dredged and filled to allow for residential and commercial development. Drainage and diversion structures have the potential to alter the hydrologic regime supporting the larger wetland complex.

Biodiversity Rank Justification: This site contains a good (B-ranked) occurrence of a globally-imperiled (G2 S2) big bluestem little bluestem tallgrass prairie community (*Andropogon gerardii-Schizachyrium scoparium*). Large occurrences of this community type are rarely encountered and no A-ranked occurrences remain in Colorado. The PCA also includes good example of many globally-vulnerable to common wetland communities but the biodiversity rank is not dependent on these occurrences.

Table 15. Natural Heritage element occurrences at the Judge Orr Road PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Juncus brachycephalus	Small-headed rush	G5	S1				E	2000-09-06
Juncus brachycephalus	Small-headed rush	G5	S1				E	1997-09-03
Plant Communities								
Andropogon gerardii-Schizachyrium scoparium	Xeric tallgrass prairies	G2	S2				B	2000-10-23
Schizachyrium scoparium-Bouteloua curtipendula	Great Plains mixed-grass prairies	G3	S2				B	2000-11-22
Carex praegracilis	Clustered sedge wetland	G3	S2				B	2000-10-23
Carex lanuginosa	Wet meadow	G3?	S3				B	2000-10-23
Scirpus pungens	Bulrush	G3G4	S3				B	2000-10-23

Table 15. Natural Heritage element occurrences at the Judge Orr Road PCA (cont.).

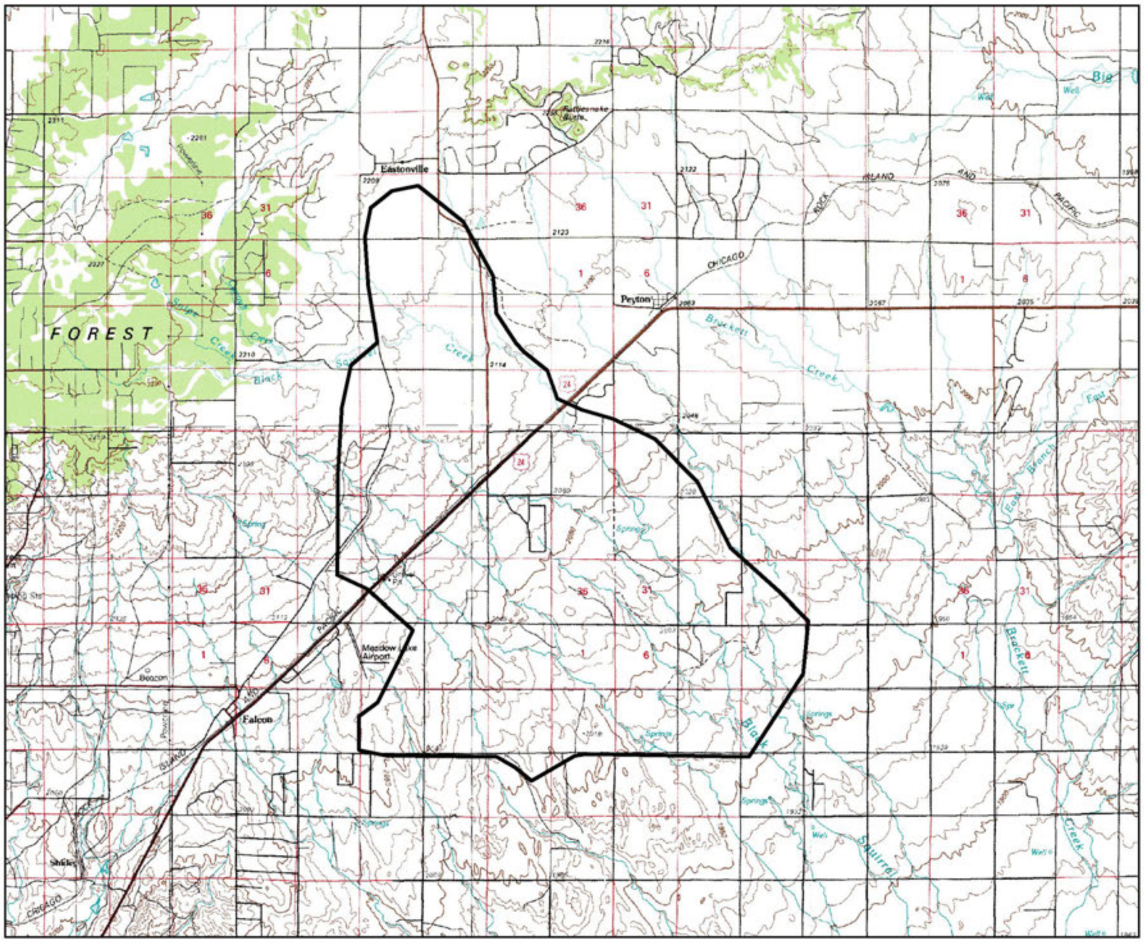
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Carex nebrascensis	Wet meadow	G4	S3				B	2000-10-23
Distichlis spicata	Salt meadow	G5	S3				B	2000-10-23
Juncus balticus var. *montanus*	Wet meadow	G5	S5				B	2000-10-23

Boundary Justification: The boundary encompasses the tallgrass prairie and midgrass prairie element occurrences. The boundary also encompasses the wetlands and riparian areas and a portion of the upstream watershed to account for continued surface flow and periodic flooding. These processes are necessary for the viability of the occurrence and maintenance of ecological functions. The PCA could be expanded to include a greater proportion of the upstream watershed to ensure maintenance of the ecological and hydrological processes. The wetlands and grasslands extend beyond the boundary of the PCA; the boundary includes the largest known grasslands/wetlands in good condition with relatively unfragmented ownership. Further investigation might extend the occurrences east of Peyton.

Protection Rank Comments: The land is privately owned in parcels ranging up to about 8,000 ac (3,240 ha). The primary land use in the PCA is cattle grazing; however, development pressures are extremely high as the town of Falcon grows south and east.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. Alteration of the hydrologic regime associated with encroaching developments (i.e., surface water diversions, groundwater withdrawals) will likely be the primary management issue in the area. Management of non-native plants within the wetlands would improve their ecological health.

Judge Orr Road
Potential Conservation Area



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The Colorado Natural Heritage Program
Colorado State University
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Fax: (970) 491-3349

map date: 10 May 2001
GIS department: db

PCA Boundary

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

Colorado Springs, 38104-E1
Castle Rock, 39104-A1

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

Location in Project Area

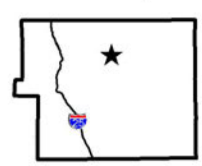


Fig. 16. Judge Orr Road Potential Conservation Area Map

Monument Creek

Biodiversity Rank: B2 (Very high significance)
The Monument Creek site supports an excellent (A-ranked) and a fair (C-ranked) occurrence of the globally- and state-imperiled (G5T2 S2) Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a species designated as sensitive (Forest Service), as federally threatened, and as a species of special concern (State of Colorado).

Protection Urgency Rank: P2 (High urgency)
Possibly the biggest threat to this PCA are encroaching urban developments and impacts. Although the impacts of development are unclear, it is known that Preble’s meadow jumping mice are either absent from, or do not occur in large numbers, near urban settings.

Management Urgency Rank: M3 (Moderate urgency)
New management actions may be needed within five years to maintain the current quality of the jumping mouse occurrences.

Location: This conservation area is located approximately 12 miles north of the city of Colorado Springs. It extends from the town of Monument to the northern border of Colorado Springs. It encompasses the length of Monument Creek plus all eastern tributaries and most western tributaries including Beaver Creek, Deadman’s Creek, Lehmans Run and West Monument Creek.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Palmer Lake, Monument, Cascade, Pikeview
T11S R66W Sections 17, 19, 20, 30, 32, and 33
T11S R67W Sections 14, 15, 22-28, 33-36
T12S R66W Sections 4-9, 16-21, and 28-32
T12S R67W Sections 1, 2, 9-16, 21, 23-28, and 33-36
T13S R66W Sections 5-8, 17, and 18
T13S R67W Section 1

Size: 12,709 ac (5,143 ha).

Elevation: 6,260 to 7,440 ft (1,908 to 2,268 m).

General Description: Monument Creek flows southward from the Monument Divide through the U.S. Air Force Academy (Academy) and into the city of Colorado Springs. The potential conservation area begins at the town of Monument and extends to the northern edge of the city of Colorado Springs. This site is centered around Monument Creek and includes the tributaries of Beaver Creek, Deadman's Creek, Lehman Run, and West Monument Creek to the west and Dirty Woman Creek, Jackson Creek, Smith Creek, Monument Branch, Black Squirrel Creek, and Kettle Creek to the east. The floodplain is composed of gravel and silt and is defined by steep, eroding sandstone cliffs and gentle terraces. Monument Creek meanders broadly through some stretches, particularly on the

Academy, where periodic flooding events have created substantial deposits of silt and debris. The riparian vegetation is dominated by coyote willow (*Salix exigua*), peachleaf willow (*Salix amygdaloides*), and crack willow (*Salix fragilis*) with scattered stands of narrowleaf cottonwood (*Populus angustifolia*). Also found in these mesic habitats are snowberry (*Symphoricarpos occidentalis*), wild plum (*Prunus americana*), and Russian olive (*Elaeagnus angustifolia*). Stream banks retain native graminoid vegetation in the form of sedges (*Carex* spp.) and rushes (*Juncus* spp.). Surrounding uplands are generally midgrass prairie that is composed of smooth brome (*Bromopsis inermis*), cheatgrass (*Bromus tectorum*), big bluestem (*Andropogon gerardii*), needle-and-thread (*Stipa comata*), and little bluestem (*Schizachyrium scoparium*). Ponderosa pine (*Pinus ponderosa*) and Gambel's oak (*Quercus gambelii*) occur in patches on either side of Monument Creek and its tributaries.

Prior to the establishment of the U.S. Air Force Academy, the area was used for logging and ranching operations since settlement in the 1860s (Ripley 1994). Within the Academy, logging has not occurred since 1915, and cattle grazing has not occurred since the purchase of the area by the Air Force in 1954 (Ripley 1994). Cattle grazing and smaller ranching operations still exist north of the Academy. South and east of the Academy the riparian system is quickly being encroached upon by residential and commercial development.

Biodiversity Rank Justification: This PCA is of high global significance because it is one of the best-known occurrences of a globally-rare subspecies (Schorr 2001). Also, this PCA is the best-known occurrence of Preble's meadow jumping mice in the Arkansas River drainage. The population of jumping mice from within the Academy has shown persistence since 1994 and has shown resilience to severe flooding in 1999. This PCA that incorporates Monument Creek and the associated tributaries provides protection from stochastic events that may affect portions of the Monument Creek population or segments of the population within tributaries. This complex of mainstem waterway and tributaries lends a degree of protection from such stochastic events that might jeopardize a more homogenous population that is susceptible to site-specific catastrophic events. This potential conservation area includes the habitat parameters that are likely critical to Preble's meadow jumping mouse persistence: dense herbaceous and shrub riparian communities and upland grassland communities free from urban impacts.

Table 16. Natural Heritage element occurrences at the Monument Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Mammals								
Zapus hudsonius preblei	Preble's meadow jumping mouse	G5T2	S1	T	SC	FS	A	2000-09
Zapus hudsonius preblei	Preble's meadow jumping mouse	G5T2	S1	T	SC	FS	C	2000-09

Table 16. Natural Heritage element occurrences at the Monument Creek PCA (cont).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Butterflies								
Celastrina humulus	Hops feeding azure	G2G3	S2				C	1995-06-27
Celastrina humulus	Hops feeding azure	G2G3	S2				C	1995-07-12
Callophrys mossii schryveri	Moss' elfin	G3G4T3	S2S3				B	1994-05-03
Plant Communities								
Alnus incana-Cornus sericea	Thinleaf alder–red-osier dogwood riparian shrubland	G3G4	S3				B	1995-09-22
Populus angustifolia/ Salix exigua	Narrowleaf cottonwood riparian forest	G4	S4				B	1995-09-22
Symphori-carpos occidentalis	Snowberry shrubland	G4G5	S3				BC	1995-09-21
Symphori-carpos occidentalis	Snowberry shrubland	G4G5	S3				C	1995-09-22
Salix exigua /mesic graminoid	Coyote willow/mesic graminoid	G5	S5				B	1995-09-21
Salix exigua /mesic graminoid	Coyote willow/mesic graminoid	G5	S5				B	1995-09-22
Salix exigua /mesic graminoid	Coyote willow/mesic graminoid	G5	S5				BC	1995-09-21
Salix exigua /mesic graminoid	Coyote willow/mesic graminoid	G5	S5				B	1995-09-22
Alnus incana/mesic graminoid	Montane riparian shrubland	G5Q	S3				B	1995-07-25
Alnus incana/mesic graminoid	Montane riparian shrubland	G5Q	S3				C	1995-09-22
Plants								
Potentilla ambigens	Southern Rocky Mountain cinquefoil	G3	S1S2				B	1993-08-11
Woodsia neomexicana	New Mexico cliff fern	G4?	S2				E	1989
Woodsia neomexicana	New Mexico cliff fern	G4?	S2				E	1989
Ribes americanum	American currant	G5	S2				E	1993

Boundary Justification: The boundaries of this PCA were defined based on the presence of Preble's meadow jumping mice throughout the system. In five of the last six years, systematic sampling for Preble's meadow jumping mice has occurred within the U.S. Air Force Academy. Outside of the Academy, jumping mice have been documented in Beaver Creek, Kettle Creek, Deadman's Creek, Jackson Creek, Smith Creek, and Dirty Woman Creek. The boundary includes 300 m on either side of the associated creek. This is designed to include the riparian vegetation and associated upland grass communities that have been documented as part of Preble's meadow jumping mouse habitat (Schorr 2001). The distance of 300 m was intended to be conservative, likely including a greater amount of upland community than most mice will utilize, but sufficient in all circumstances to ensure persistence of jumping mice. A better approximation of this potential conservation area would be the area that includes the 100-year floodplain and an additional 100 m of adjacent upland habitat. Until these data layers are available for all areas within the conservation area, this conservation boundary should provide for the persistence of the Preble's meadow jumping mouse in this area.

Protection Rank Comments: Likely the biggest threat to this conservation area is the encroachment of urban impacts. Although the impacts of development are unclear, Preble's meadow jumping mice are not found in great numbers, or simply do not occur, near urban settings. Part of this potential conservation area is well protected within the U.S. Air Force Academy, but may be subject to a host of potential impacts outside of the Academy boundaries. Since the likelihood of increased urbanization east and north of the Academy is high, it is important to use these conservation area boundaries to plan for the long-term conservation of this significant Preble's meadow jumping mouse population.

Since much of the Monument Creek PCA is housed within the U.S. Air Force Academy, much of the area will be protected as long as the Academy maintains the present habitat management strategy. However, much of this PCA is located on private and local government land. Depending on the management strategies on these properties, it may be more difficult to ensure long-term persistence of the mouse PCA off Academy lands. Within the Academy, the riparian communities and associated uplands are some of the healthiest along the Front Range. Although the presence of exotic, invasive plant species may compromise the value of this conservation area, they do not appear to impact the persistence of Preble's meadow jumping mice; however further investigation is necessary to determine the conservation impact weedy plants have on jumping mouse biology. Outside the Academy current habitat management strategies may complicate the conservation value of this area. In particular, the increase in development adjacent to riparian systems in the eastern and northern sections of this conservation area may jeopardize the persistence of jumping mouse populations. To date there have not been studies associating increased development and jumping mouse declines, but anecdotal evidence (Compton and Hugie 1993, Ryon 1996) suggests that they may be incompatible. In some areas along the northern section of Monument Creek and the associated tributaries, current management may not jeopardize jumping mouse populations, but also may not allow populations to expand considerably. For the most part, the tributaries in this area are surrounded by small to medium ranches with some livestock. It is believed that jumping mice and livestock grazing are compatible, but intense utilization of riparian vegetation may alter the vegetative structure and preclude expansion of jumping mouse populations.

Management Rank Comments: Current management within the Academy restricts human access to Monument Creek and some of the associated tributaries within this potential conservation area. This management strategy likely contributes to the high-quality habitat that persists today. North and south of the Academy the level of grazing and ranching may not jeopardize the population, but may restrict the degree to which it can expand. Grazing and ranching can restrict the expanse of riparian shrub communities and thus, restrict the ability for Preble's meadow jumping mice to utilize the area. However, mild grazing pressure may not affect the population.

Of the utmost importance to ensuring the persistence of the jumping mouse populations within this conservation area is the continued management of habitats within the U.S. Air Force Academy. The current management strategy, which limits activities within riparian corridors, has provided habitat for one of the healthiest populations of Preble's meadow jumping mouse known. Outside of the Academy, it is essential to ensure that development in and around riparian corridors provide both riparian and upland habitat for jumping mice. Jumping mice have been documented using upland habitats and it is possible that habitats that only include riparian communities will not be sufficient for jumping mouse persistence. Current management strategies on ranches may be sufficient to maintain jumping mouse populations at their current level; however, avoiding impacts such as excessive grazing and compaction of soils near riparian systems will likely increase jumping mouse populations.

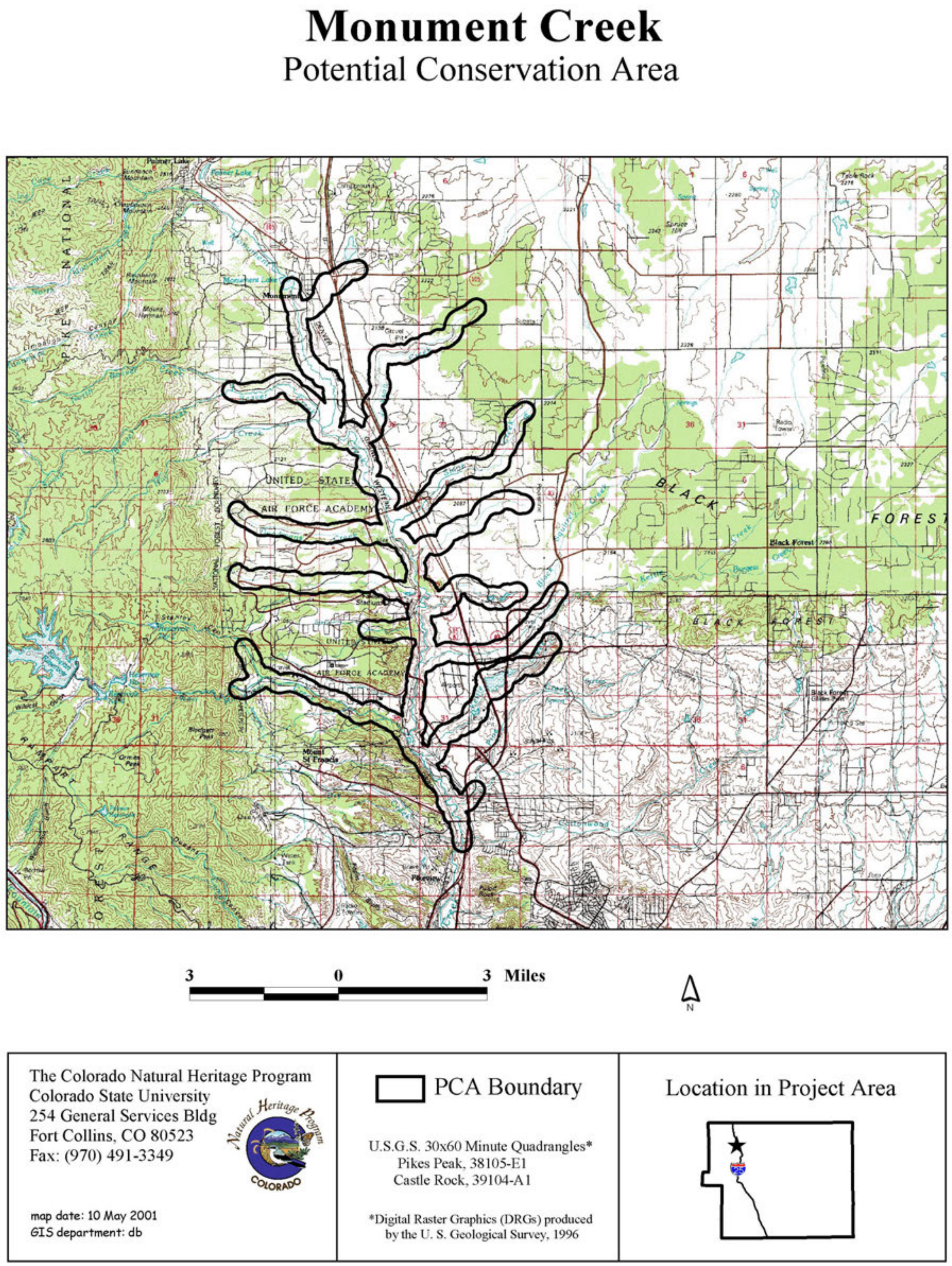


Fig. 17. Monument Creek Potential Conservation Area Map

Schriever Playas

Biodiversity Rank: B2 (Very high significance)
This PCA contains a good (B-ranked) occurrence of a globally-imperiled (G2 S2) playa grassland community (*Pascopyrum smithii – Eleocharis* spp.).

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years primarily due to residential development pressures. Two of the playas are on property owned by Schriever Air Force Base and will likely remain undeveloped.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate for maintenance of the element occurrence. Mechanical disturbance of the playas should be minimized and implementation of a weed management plan would help minimize the expansion of exotic weeds.

Location: Central El Paso County. Schriever Air Force Base, south of Highway 24 and west of Enoch Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Corral Bluffs
T14S R64W Sections 22 and 27

Size: 514 ac (208 ha).

Elevation: 6,320 to 6,380 ft (1,926 to 1,945 m).

General Description: Scattered playas occur within the rolling hills of shortgrass prairie in central El Paso County. Schriever Playas PCA contains four of these small, periodically inundated, closed basins. The playas support stands of western wheatgrass with mixed species of spikerush (*Pascopyrum smithii-Eleocharis* spp.) (G2 S1), a plant community previously documented in only a few playas in Wyoming (G. Jones, Wyoming NHP, pers. comm.).

The vegetation in the playas occurs in two zones, resulting from differences in the period of inundation. The lowest part, which is inundated most often and for the longest time, is dominated by spikerush (*Eleocharis acicularis* and *E. palustris*) and bare ground; the higher part is dominated by western wheatgrass (*Pascopyrum smithii*), a cool-season perennial. These basins remain dry throughout most of the year and collect water only after heavy rainfall. Heavy rains generally fall in the late summer and in many cases a series of storms are required in order for the playas to retain water (Weathers 2000). Runoff collecting in a dry playa infiltrates cracks in the clay bottom of the playa and swells the clay effectively sealing the playa bottom (Zartman *et al*. 1994). After the clay has been wetted, subsequent storms can result in playa filling. The playas may hold water for periods ranging from days to weeks, depending on the local topography and intensity of the rainstorm (Weathers 2000). In dry years, the playas may remain dry year round.

The most common explanation for the origin of playas is deflation, or wind erosion, though theories on playa formation are controversial (Osterkamp and Wood 1987). These playas are also consistent with descriptions of buffalo wallows which are formed by bison pawing the ground, creating patches of bare ground in which to dust bathe (Uno 1989), or perhaps mud bathe to protect against biting insects or aid in shedding their heavy fur (F. Knopf, USGS, pers. comm.). Active wallows range from 3 to 5 m in diameter and merging of adjacent wallows can create wallows larger than about 0.5 acre (1,400 m^2) (Uno 1989, Knopf 1996a). Bison were extirpated from the area by 1875 (Hornaday 1889), but evidence of their wallows can remain evident on the landscape for more than a hundred years (Knopf 1996a). Perennial grasses invade wallows not used by bison (Uno 1989). It is possible that the playas resulted from of a combination of factors including deflation and buffalo wallowing.

The land within the PCA is owned and managed by Schriever Air Force Base, State Land Board, or private owners. The area has historically been used for cattle grazing. Limited cattle grazing probably continues, but housing developments are increasingly encroaching from the west.

Biodiversity Rank Justification: This PCA contains a good (B-ranked) occurrence of a globally-imperiled (G2 S2) playa grassland community (*Pascopyrum smithii-Eleocharis* spp.).

Table 17. Natural Heritage element occurrences at the Schriever Playas PCA.

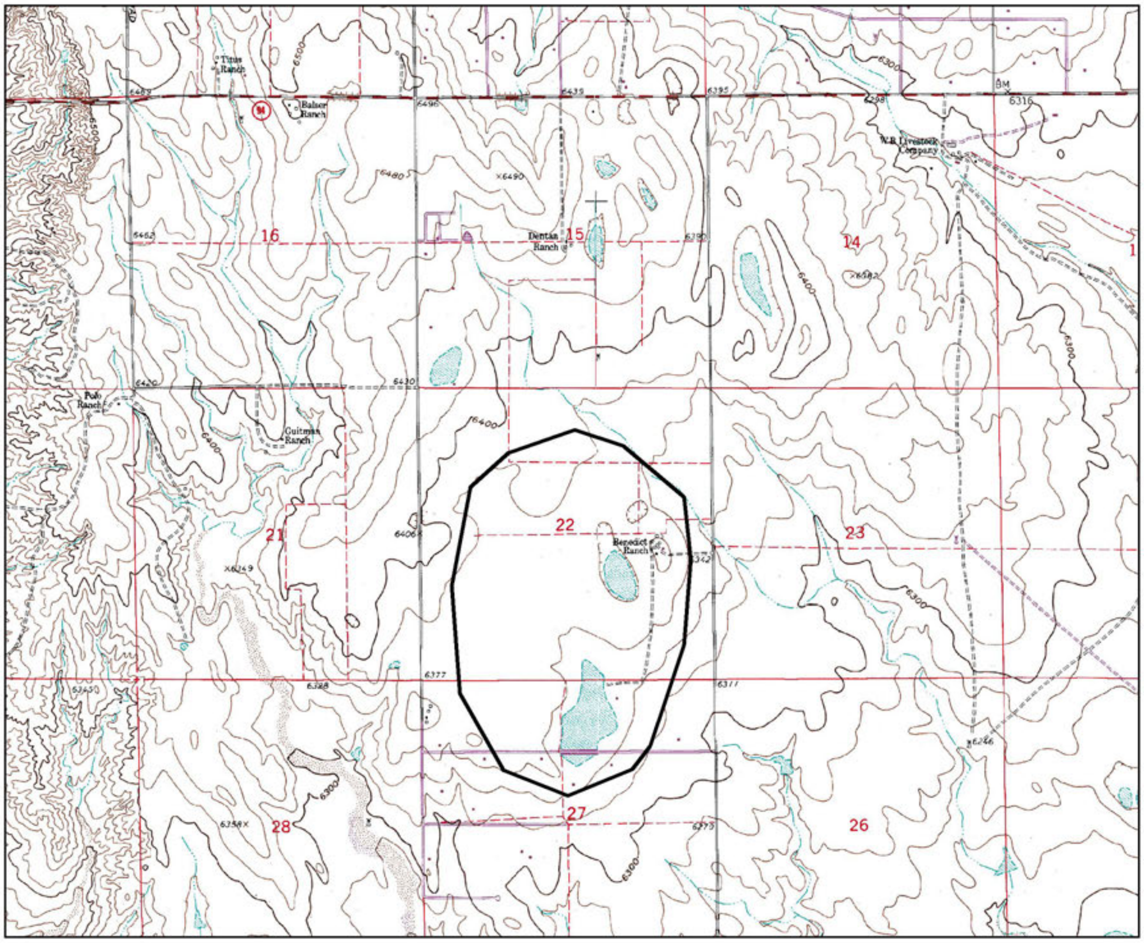
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Pascopyrum smithii – Eleocharis spp.	Playa grassland	G2	S2				B	2000-10-27

Boundary Justification: The site boundary includes four playas and most of the surrounding lands acting as the catchment basin for the playas. The catchment basin boundary was roughly delineated using 1:24,000 scale U.S.G.S. topographic quadrangle. Scattered playas occurring within a few miles of these playas were not surveyed and are not included within the PCA.

Protection Rank Comments: About 40 percent of the PCA, including the two largest playas, is owned and managed by Schriever AFB as a buffer for the developed portion of the Air Force Base. The remainder of the PCA is State Land Board property or is privately owned. Schriever AFB natural resources staff is aware of the playas and reports that the property east of Enoch Road will likely continue to be used as an undeveloped buffer for the Air Force Base (R. Mitchell, Schriever AFB, pers. comm.). The two playas on Schriever AFB have been designated as jurisdictional wetland (U.S. Army Corps of Engineers 1991) and as such are regulated under the Clean Water Act.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. One of the playas on Schriever AFB has been fenced to exclude grazing (R. Mitchell, Schriever AFB, pers. comm.). Some weedy species are present in the playas and in the surrounding uplands and weed management activities should be considered.

Schriever Playas
Potential Conservation Area



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The Colorado Natural Heritage Program Colorado State University 254 General Services Bldg Fort Collins, CO 80523 Fax: (970) 491-3349 map date: 10 May 2001 GIS department: db	PCA Boundary U.S.G.S. 7.5 Minute Quadrangle* Corral Bluffs, 38104-G5 *Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996	Location in Project Area

Fig. 18. Schriever Playa Potential Conservation Area Map

Severy Creek

Biodiversity Rank: B2 (Very high significance)
This site contains one of two stable, native historic populations of greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2) in the Arkansas River watershed.

Protection Urgency Rank: P3 (Moderate urgency)
All but the lower portion of the creek is within Pike National Forest. No special Forest Service designation is known hence the rank of P3.

Management Urgency Rank: M3 (Moderate urgency)
Activities with the potential to affect the greenback cutthroat trout population include recreational fishing with potential introduction of whirling disease and non-native fish, timber operations, and road building/maintenance.

Location: The Severy Creek PCA is located in El Paso and Teller counties about two and a half miles north of the summit of Pikes Peak.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Woodland Park, Pikes Peak, Cascade
T13S R68W Sections 21, 22, and 27-33
T13S R69W Sections 25, 35, and 36
T14S R69W Section 1

Size: 2,264 ac (916 ha)

Elevation: 8,200 to 12,300 ft (2,500 to 3,750 m)

General Description: Severy Creek is a steep gradient, high-elevation, perennial stream draining tundra and spruce fir forested slopes on the north slope of Pikes Peak. The creek flows into Cascade Creek before joining Fountain Creek. The Pikes Peak Highway passes Severy Creek at its confluence with Cascade Creek and loops around to pass the headwaters as it ascends the peak. The Colorado Division of Wildlife discovered a native population of greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2) in this high elevation stream in 1998. Genetic testing showed the population to be "pure" (Policky *et al*. 1999).

Greenback cutthroat trout is the only trout native to the headwaters of the South Platte and Arkansas River drainages. By the early 1900s, the subspecies was believed extinct due to over-harvest, introduction of non-native trout species, and habitat alteration (U.S. Fish and Wildlife Service 1998). Since then, ten native populations of greenback cutthroat trout have been discovered, seven in the South Platte watershed and three in the Arkansas watershed (U.S. Fish and Wildlife Service, 1998, Policky *et al*. 1999). Two of these historic Arkansas watershed populations are considered stable: Severy Creek in El Paso County and South Apache Creek in Huerfano County (Policky *et al*. 1999).

Recovery efforts by the Colorado Division of Wildlife have included reintroduction of the species into the South Platte and Arkansas drainages, and 25 waters within the Arkansas drainage are currently managed for greenback cutthroat trout (Policky *et al*. 1999). Of the 25 managed sites, two native populations (Severy and South Apache) and one reintroduction site (Boehmer Reservoir) are currently considered stable and 21 others are considered potentially stable.

Biodiversity Rank Justification: This site contains one of two stable, native historic populations of greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2) in the Arkansas drainage and one of only six stable native historic populations rangewide (U.S. Fish and Wildlife Service 1998). The population was discovered by Colorado Division of Wildlife in 1998 and determined to be "pure" based on genetic testing (Policky *et al*. 1999).

Table 18. Natural Heritage element occurrences at the Severy Creek PCA.

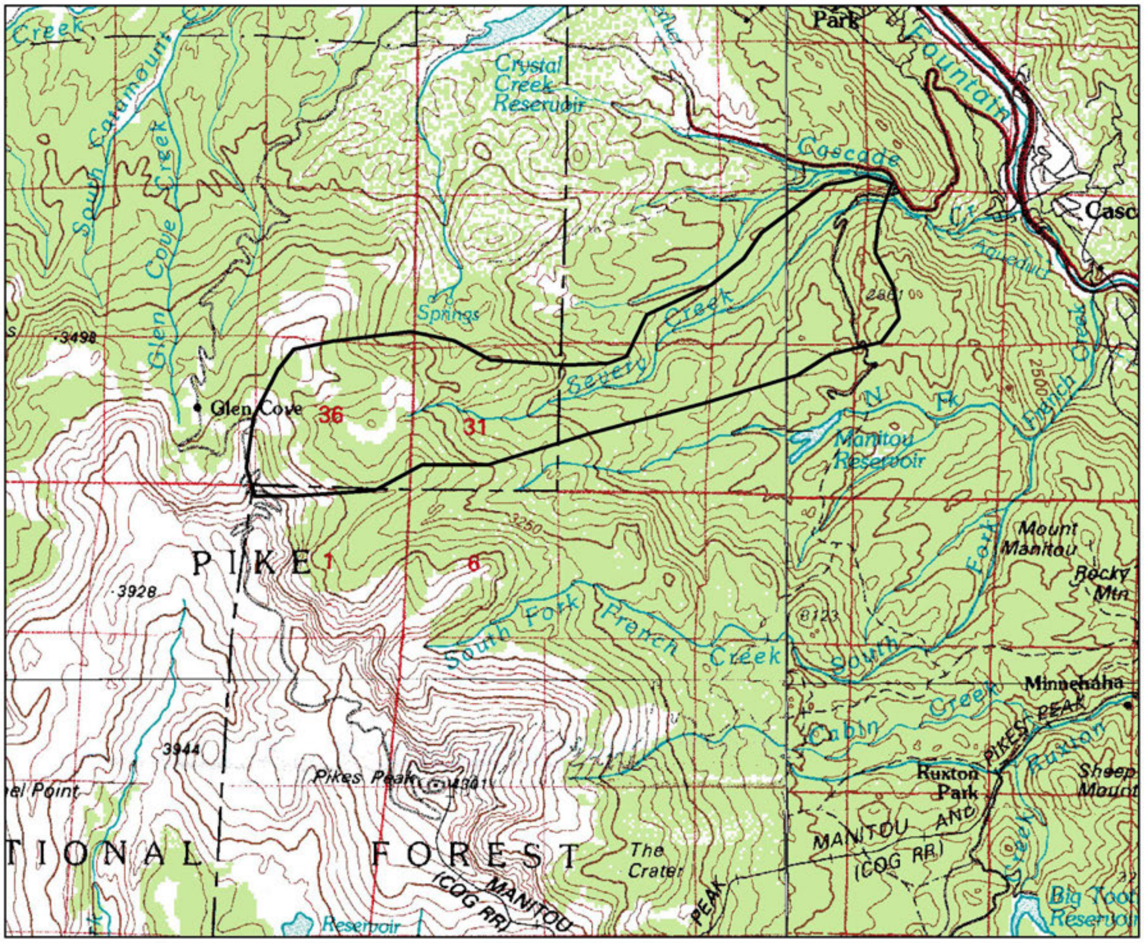
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Fish								
Oncorhynchus clarki stomias	Greenback cutthroat trout	G4T2T3	S2	LT	T		A	1998

Boundary Justification: The entire watershed of Severy Creek is included within the PCA. The watershed boundary was roughly delineated using 1:100,000 scale U.S.G.S. topographic maps. The entire watershed is included because it is small and any activities within it could potentially affect the fish population. The boundary includes the entire reach of the stream considered occupied habitat by the Colorado Division of Wildlife (Colorado Division of Wildlife 2001c).

Protection Rank Comments: The PCA is within the Pike National Forest and includes about 160 acres of private land in the lower reach.

Management Rank Comments: Colorado Division of Wildlife proposes to remove non-native brook trout from the lower mile of the system and make small yearly transplants of greenbacks above a natural barrier within the stream (Policky *et al*. 1999). Other potential management issues are recreational fishing and the potential for spreading of whirling disease or introduction of non-native fish, timber operations, and road building/maintenance.

Severy Creek
Potential Conservation Area



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

map date: 10 May 2001
GIS department: db

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle*
Pikes Peak, 38105-E1

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

Location in Project Area

Fig. 19. Severy Creek Potential Conservation Area Map

Signal Rock Sandhills

Biodiversity Rank: B2 (Very high significance)
This PCA contains an excellent (A-ranked) example of a globally-vulnerable (G3 S2) sandsage prairie community (*Artemisia filifolia/Andropogon hallii*), a good (B-ranked) occurrence of a globally-vulnerable (G3 S2) Great Plains mixed-grass prairie community (*Schizachyrium scoparium-Bouteloua curtipendula*), and good (B-ranked) occurrences of two globally-vulnerable (G3) plant species, sandhill goosefoot (*Chenopodium cycloides*), and plains ambrosia (*Ambrosia linearis*).

Protection Urgency Rank: P3 (Moderate urgency)
Protection actions are needed to secure long-term conservation. Currently, most of the land within the PCA is owned by the State Land Board and managed with conservation in mind. Most of the El Paso County portion of the PCA is state land leased by The Nature Conservancy (Bohart Ranch) or leased by Chico Basin Ranch.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate for maintenance of the element occurrences. Management programs for control of weeds and simulation of large-scale natural processes, such as fire and herbivory, are implemented within portions of the PCA.

Location: Pueblo and El Paso counties, approximately 30 miles east of Colorado Springs. The boundary of the site begins four miles south of Ellicott and extends south to near the Pueblo Chemical Depot.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Ellicott, Edison School, Hanover SE, Hanover NE, Hanover NW, North Avondale, North Avondale NE, Truckton, Boone Hill, Highlands Church, Yoder, Big Springs Ranch
T14S R61W; T14S R62W; T15S R61W; T15S R62W; T16S R61W, T16S R62W, T17S R61W, T17S R62W, T18S R61 W, T18S R62W, T19S R61W and; T19S R62W.

Size: 104,720 ac (42,379 ha)

Elevation: 5,300 to 6,100 ft (1,615 to 1,859 m)

General Description: The site is characterized by slightly rolling sandhills and interdunal swales. The majority of the site is dominated by sandsage prairie with sandsage (*Artemisia filifolia*) as the dominant species. On large areas of the site, soapweed (*Yucca glauca*) is co-dominant or more dominant than the sandsage. The understory is dominated by blue grama (*Bouteloua gracilis*) and sand dropseed (*Sporobolus cryptandrus*) with scattered patches of sand bluestem (*Andropogon hallii*) and prairie sandreed (*Calamovilfa longifolia*).

The northern end of the site is flatter and dominated by blue grama, sand dropseed, and needle-and-thread (*Stipa comata*) graminoids. At the southern end of the site the sandsage prairie is dominant.

Steep bluffs and outcrops east of Black Squirrel Creek (called the Crows Roost) support a community characterized by sparse soapweed with little bluestem (*Schizachyrium scoparium*) and sideoats grama (*Bouteloua curtipendula*). This community is classified as the *Schizachyrium scoparium-Bouteloua curtipendula* plant association (Great Plains mixed-grass prairies), although sideoats grama is not always conspicuous and sand bluestem and prairie sandreed are commonly interspersed. This may be the result of the small size of the outcrops or bluffs and the sharp environmental gradient to the sandhills prairie. Small stands of coyote willow (*Salix exigua*) are present along Black Squirrel Creek, as are some cottonwoods.

A small black-tailed prairie dog (*Cynomys ludovicianus*) town is located on the north western side of the site near the Bohart Ranch entrance. It is located on soils probably derived from alluvial sediments, but still with significant sand and small coarse material. Burrowing Owls, Mountain Plovers, and swift foxes have been seen using the habitat provided by the presence of the prairie dog town. Additionally, a Golden Eagle nest is located on the bluffs east of Black Squirrel Creek.

Biodiversity Comments: The site contains one of the best known (A-ranked) occurrences of the globally-vulnerable (G3 S2) sandsage prairie (*Artemisia filifolia/Andropogon hallii*) in Colorado. The occurrence is very large and portions are in excellent condition. Many of the sandhills communities within the site have been managed so that the natural communities appear to be in good to excellent condition. This plant community may change undergo a change in its rarity rank in the future; however, the rarity rank of closely-related communities is similar. Similar-sized patches of this plant community are known to occur in Kansas and in Oklahoma, but in a wide variety of conditions.

Within this site is a good occurrence of the globally-vulnerable (G3 S2) Great Plains mixed-grass prairie (*Schizachyrium scoparium-Bouteloua curtipendula*). This site also supports good to fair occurrences of two globally-vulnerable (G3) plant species, the sandhill goosefoot (*Chenopodium cycloides*), and plains ambrosia (*Ambrosia linearis*). The size of the site would permit most natural processes to occur or at least be simulated, although some species (i.e., pronghorn antelope) would not be supported on the site alone.

Boundary Justification: The boundary encompasses most of the highest quality natural communities. The boundary is drawn to exclude lands more impacted by residential development (to the north-northwest) and agricultural activities (north, east, and west) and encompasses mainly the sandhills in the area. Other lands in somewhat natural condition (not converted to cropland) exist in the area (especially to the south) and there appears to be sufficient size and distribution of these parcels, and corridors available for viable populations of most plant and animal species. The site is considered large enough to protect intact (or at least allow simulation of) most of the natural ecological processes necessary for survival of the elements including fire, herbivory, and geomorphology (allowing for shifting sand dunes).

Table 19. Natural Heritage element occurrences at the Signal Rock Sandhills PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3				B	2000-09-06
Chenopodium cycloides	Sandhill goosefoot	G3G4	S1				C	2000-09-29
Plant Communities								
Schizachyrium scoparium-Bouteloua curtipendula	Great Plains mixed-grass prairies	G3	S2				B	2000-09-27
Artemisia filifolia / Andropogon hallii	Sandsage prairie	G3	S2				A	2000-09-27
Artemisia filifolia / Andropogon hallii	Sandsage prairie	G3	S2				B	1997-08-29

Protection Rank Comments: There are definable threats, but none expected to be critical in the next five years. The land is a mix of privately owned parcels and State Land Board land. The Nature Conservancy currently holds a 25-year lease on most of the northern portion of the site with Chico Basin Ranch and the Transportation Test Center leasing most of the southern half. A portion of the site occurs on private land. The primary land use in the region is livestock grazing although some irrigated croplands occur nearby.

A longer-term protection concern is the possibility of the State Land Board selling the property to maximize their return on the land. Increases in land value resulting from the growth of Colorado Springs may cause this to be a major concern in the future. Increasing numbers of people are moving into the area, often putting pre-fabricated houses or mobile homes on subdivided parcels of 35 acres. Adjacent land use to the east includes areas of severely degraded sandhills habitat.

Management Rank Comments: Current management appears to be excellent over much of the site. The majority of the area is operated as working cattle ranches. Management plans for the site include active weed management, fire programs, and compatible levels of cattle grazing.

Signal Rock Sandhills
Potential Conservation Area

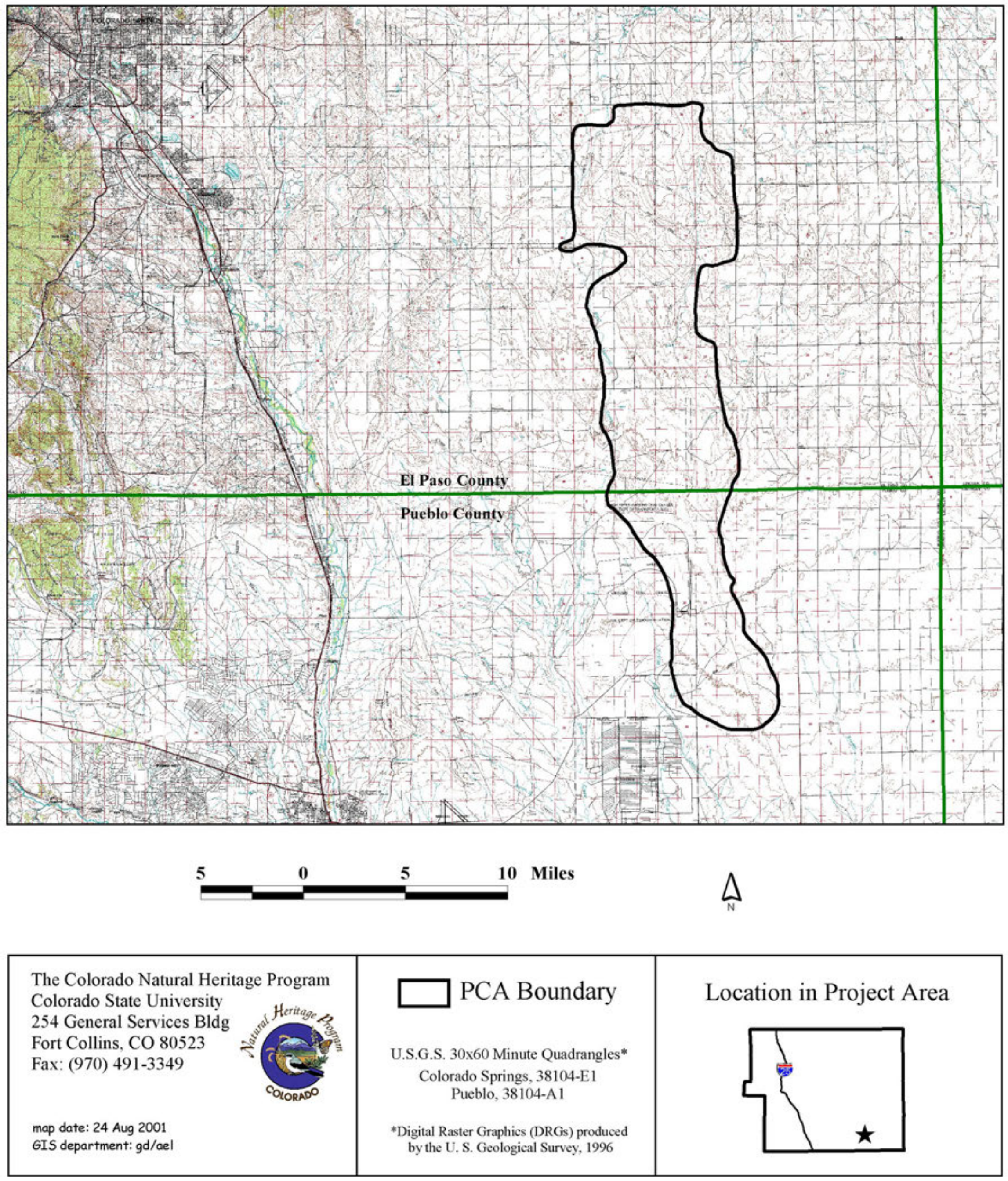


Fig. 20. Signal Rock Sandhills Potential Conservation Area Map

Squirrel Creek School

Biodiversity Rank: B2 (Very high significance)
The Squirrel Creek School site supports a good (B-ranked) occurrence of the globally- and state-imperiled (G2 S2B, SZN) Mountain Plover (*Charadrius montanus*), a species designated as sensitive (BLM, Forest Service), as a candidate for federal listing as threatened/endangered, and as a species of special concern (State of Colorado). Black-tailed prairie dogs and Burrowing Owls also occur within the Squirrel Creek School site.

Protection Urgency Rank: P2 (High urgency)
The land is privately owned and several portions of this site are threatened by residential development.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements on this site, but new management actions may be needed in the future to maintain the current quality of these occurrences.

Location: This site straddles Squirrel Creek Road from the Ellicott Highway southeastward to an area slightly to the south of Myers Road. It extends eastward to encompass Dearing Road and its surroundings. The site also extends northward about 1.8 miles from the intersection of Squirrel Creek Road and the Ellicott Highway.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Hanover NW, Hanover NE, Hanover SE
T15S R62W Sections 29-32
T15S R63W Sections 25, 36
T16S R62W Sections 5-8, 16-21, 28-34
T16S R63W Sections 1, 12, 13
T17S R62W Sections 3-5, 8-10

Size: 12,749 ac (5,159 ha).

Elevation: 5,290 to 5,800 ft (1,612 to 1,768 m).

General Description: The Squirrel Creek School site straddles Squirrel Creek Road and Black Squirrel Creek from the intersection of Squirrel Creek Road and the Ellicott Highway southeastward to the intersection of Squirrel Creek Road and Myers Road. The site also extends eastward to encompass Dearing Road and its vicinity. The site extends northward for about 1.8 miles from the intersection of Squirrel Creek Road and the Ellicott Highway. Black Squirrel Creek intermittently flows southeastward through the site, with the floodplain extending to about 0.2-0.3 miles inside the western site boundary.

The Squirrel Creek School site is characterized by a mixture of open, flat areas and gently-rolling terrain and it is covered by a mosaic of soil types (Larsen 1981). Widely-scattered ranches and homes occur on the site. Development of a very large residential subdivision is underway at Peaceful Valley Ranch, located along Myers Road to the west of the Dearing Road area. Part of this new subdivision will encroach on the southwestern portion of the Squirrel Creek School site.

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although large patches of this vegetation remain, portions of the site were converted to agricultural croplands during the past 100 years. The cultivation of some of these fields was subsequently abandoned, producing "old-field" (weedy, early successional) habitats. Other fields within the site remain under cultivation. Grazing of domestic livestock occurred historically on most or all of the site, and today grazing continues on most of the site. Some herbaceous riparian vegetation and upland dry prairie plant species line the banks of Black Squirrel Creek.

Black-tailed prairie dogs and Burrowing Owls also occur within the Squirrel Creek School site. See the Squirrel Creek Road Potential Conservation Area for additional information regarding these species' occurrences.

Biodiversity Rank Justification: A good (B-ranked) occurrence of the globally- and state- imperiled (G2 S2B, SZN) Mountain Plover is known within the Squirrel Creek School site. Breeding Mountain Plovers have been observed here for many years. More than 20 breeding pairs were observed at this site early in April 2001.

Table 20. Natural Heritage element occurrences at the Squirrel Creek School PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Charadrius montanus	Mountain Plover	G2	S2B, SZN	C	SC	BLM, FS	B	2001-04-10

Boundary Justification: The boundary encompasses the areas known to be occupied by breeding Mountain Plovers in April 2001 and includes adjacent areas of suitable breeding habitat. Some areas within the site also are known to have supported breeding Mountain Plovers in previous years. The Squirrel Creek School site is bounded on the north, east, and south sides by relatively hilly or rolling terrain covered by aeolian (wind-deposited) sands and by vegetation (especially sand sage) that render the land unsuitable for use by Mountain Plovers. Mountain Plovers prefer flat, open areas with very low-growing or closely-cropped vegetation (see the Mountain Plover species characterization abstract for details and references).

Protection Rank Comments: All or most of the land within the Squirrel Creek School site is privately owned. Development of a very large residential subdivision already is underway, however, along Myers Road, adjacent to the site. In addition, construction of a new residential subdivision consisting of modular homes placed on small lots is partially completed along the west side of the Ellicott Highway just to the north of the Squirrel Creek School site. Because of their peripheral locations, these residential developments are not expected to exert a substantial negative effect on the persistence or viability of breeding Mountain Plovers on the Squirrel Creek School site.

Management Rank Comments: Current management seems to favor the persistence of the Mountain Plovers, but changes in management practices may be needed in the future to maintain the current quality of the birds' habitat. Factors that might prompt the need for new management actions would include the effects of grazing (or not grazing) and other agricultural practices, additional land development, and the impacts of human activities and disturbances within the site. Continuation of current livestock grazing practices may benefit Mountain Plovers by maintaining the closely-cropped vegetation preferred by these birds.

Squirrel Creek School
Potential Conservation Area

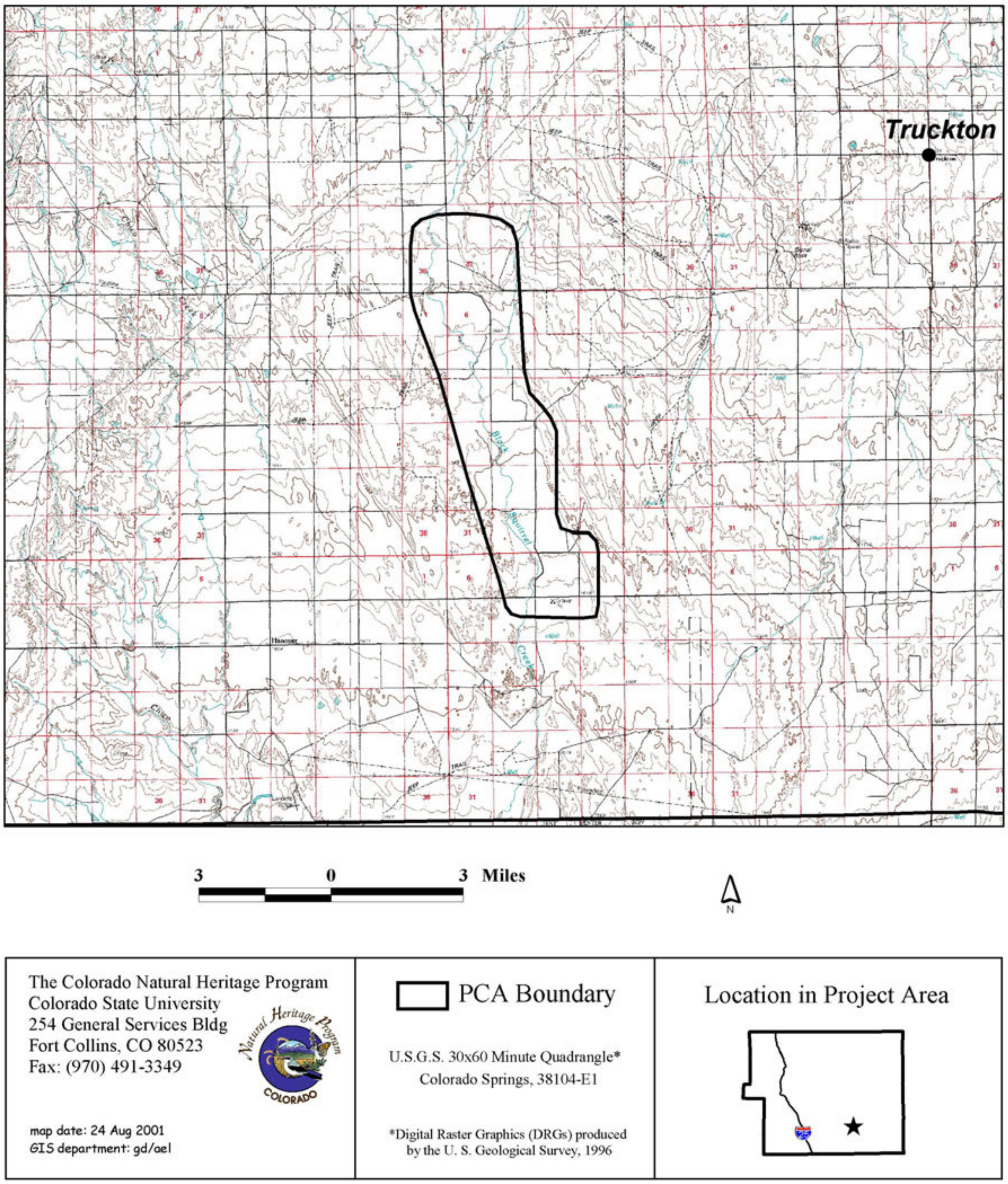


Fig. 21. Squirrel Creek School Potential Conservation Area Map

Truckton Edison

Biodiversity Rank: B2 (Very high significance)
The Truckton Edison site supports a good (B-ranked) occurrence of the globally- and state-imperiled (G2 S2B, SZN) Mountain Plover (*Charadrius montanus*), a species designated as sensitive (BLM, Forest Service), as a candidate for federal listing as threatened/endangered, and as a species of special concern (State of Colorado). Black-tailed prairie dogs and Burrowing Owls also occur within the Truckton Edison site.

Protection Urgency Rank: P3 (Moderate urgency)
The land is privately owned and several portions of this site are very close to residential development.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements on this site, but new management actions may be needed in the future to maintain the current quality of these occurrences.

Location: The Truckton Edison site encompasses an area that is bounded on the north by Sanborn Road, on the east by Whittemore Road, on the south by the El Paso County boundary, and on the west by a vast expanse of aeolian sand deposits that extends westward from an area about 3-5 miles to the west of Boone Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Big Springs Ranch, Yoder, Rush, Hanover NE, Truckton, Truckton NE, Hanover SE, Edison School, Truckton SE
T14S R60W Sections 31-33
T14S R61W Sections 31-36
T15S R60W Sections 4-9, 16-21, 28-33
T15S R61W Sections 1-17, 20-29, 33-36
T16S R60W Sections 4-9, 16-21, 28-33
T16S R61W Sections 1-30, 32-36
T17S R60W Sections 4-9, 16-21, 28-33
T17S R61W Sections 1-5, 8-17, 20-28, 32-36

Size*:* 92,833 ac (37,568 ha).

Elevation*:* 5,220 to 6,245 ft (1,591 to 1,903 m).

General Description: The Truckton Edison site is characterized by a mixture of open, flat areas and gently-rolling terrain and it is covered by a mosaic of soil types (Larsen 1981). Widely-scattered ranches and homes occur on most parts of the site, although some areas are settled more densely and include clusters or neighborhoods of one-family dwellings. The Truckton Edison site generally is very dry. No major creeks or drainages traverse the site, although Pond Creek and several other minor drainages are present.

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although large patches of this vegetation remain, small portions of the site were converted to agricultural croplands during the past 100 years. The cultivation of some of these areas was subsequently abandoned, producing "old-field" (weedy, early-successional) habitats. Small areas of the site remain under cultivation. Grazing of domestic livestock occurred historically on most or all of the site, and today grazing continues on most of the site.

Black-tailed prairie dogs and Burrowing Owls also occupy the Truckton Edison site. See the Edison Road PCA for more information regarding their occurrences in this general vicinity.

Biodiversity Rank Justification: An excellent (A-ranked) occurrence of the globally- and state-imperiled (G2 S2B, SZN) Mountain Plover is known within the Truckton Edison site. Breeding Mountain Plovers have been observed at scattered locations within this site for many years. In early April 2001, breeding plovers again were observed at the Truckton Edison site.

Table 21. Natural Heritage element occurrences at the Truckton Edison PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Charadrius montanus	Mountain Plover	G2	S2B, SZN	C	SC	BLM, FS	A	2001-04-10
Vulpes velox	Swift fox	G3	S3	C	SC	FS	A	2001-08-25

Boundary Justification: The boundary encompasses the numerous locations at which breeding Mountain Plovers were observed during April 2001 or during previous years. The site also includes adjacent areas of suitable breeding habitat. The site is bounded on the west side by relatively rolling terrain covered by aeolian (wind-deposited) sands and by vegetation (especially sand sage) that render the land unsuitable for use by Mountain Plovers. Mountain Plovers prefer flat, open areas with very low-growing or closely-cropped vegetation (see the Mountain Plover species characterization abstract for details and references). The borders of the north, south, and east are less well-defined and may expand as additional information becomes available.

Protection Rank Comments: Most of the land within the Truckton Edison site is privately owned and disturbances to the area within the PCA are infrequent and not intense. Historically, grazing has been the dominant land use. Present land uses are not incompatible with the maintenance of a viable breeding assemblage of Mountain Plovers. However, residential developmental pressures are increasing.

Management Rank Comments: Current management seems to favor the persistence of the Mountain Plovers, but changes in management practices may be needed in the future to maintain the current quality of the birds' habitat. Factors that might prompt the need for new management actions would include the effects of grazing (or not grazing) and other agricultural practices, additional land development, and the impacts of human activities and disturbances within the site. Continuation of current livestock grazing practices may benefit Mountain Plovers by maintaining the closely-cropped vegetation preferred by these birds.

Truckton Edison
Potential Conservation Area

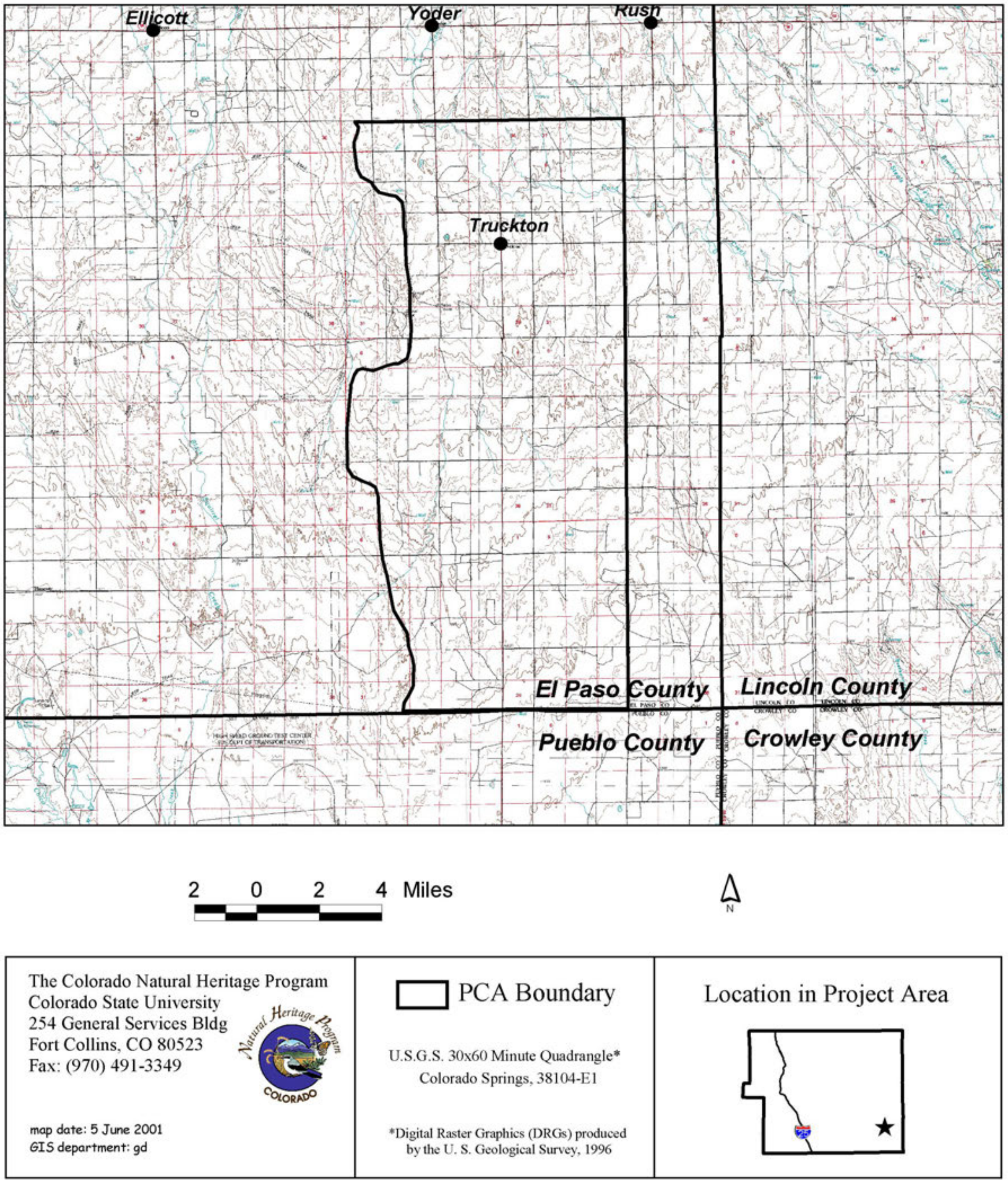


Fig. 22. Truckton Edison Potential Conservation Area Map

Big Sandy Creek at Calhan

Biodiversity Rank: B3 (High significance)
This PCA contains a good (B-ranked) example of the globally-vulnerable (G3 S2) Arkansas darter (*Etheostoma cragini*).

Protection Urgency Rank: P2 (High urgency)
The land within the PCA is privately owned with the exception of Ramah State Wildlife Area. Given the proximity to Colorado Springs, this area could be targeted for increased development, groundwater withdrawals, and flood control structures. Maintenance of the natural hydrologic regime, including flooding, is important in maintaining the Arkansas darter population above the reservoir.

Management Urgency Rank: M4 (Low urgency)
Current management appears excellent for maintenance of the element occurrences**.**

Location: Big Sandy Creek at Calhan PCA is located in northeastern El Paso County about three miles north of Calhan.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Peyton, Calhan, Ramah South.
T11S R61W Sections 1, 2, 9-12, and 14-18
T11S R62W Sections 13-15 and 19-24
T11S R63W Section 24

Size: 4,342 ac (1,757 ha).

Elevation: 6,100 to 6,600 ft (1,859 to 2,011 m).

General Description: Big Sandy Creek begins at the eastern edge of the Black Forest in El Paso County and joins the Arkansas River east of Lamar in Prowers County some 150 miles later. This PCA encompasses the headwaters of the creek and continues downstream to two miles below Ramah Reservoir. This reach of the creek supports Arkansas darter (*Etheostoma cragini*) (G3 S2), a small eastern plains fish native to streams in the Arkansas River basin (Nesler *et al*. 1999; Colorado Division of Wildlife 2001b). These little plains fish are classified as a threatened species in the state of Colorado (Colorado Division of Wildlife 2001c). Arkansas darter are known to inhabit small, shallow, clear streams that are often spring-fed and have sandy substrates, slow current, cooler water, and aquatic vegetation (Nesler *et al*. 1999). Other small plains fishes that occur in Big Sandy Creek include plains killifish (*Fundulus zebrinus*) and fathead minnow (*Pimephales promelas*) (Colorado Division of Wildlife 2001d).

Big Sandy is typical of many plains streams, with high flood peaks of short duration. Late spring and summer thunderstorms produce about 70 percent of the annual precipitation (Labbe *et al*. 1996). Infiltration of floodwaters into the alluvium recharges the alluvial aquifer that sustains the interrupted spring-run habitats where Arkansas darter are most abundant (Labbe *et al*. 1996).

Plains cottonwood (*Populus deltoides* ssp. *monilifera*) occurs in patches within the PCA and is most developed along an approximate 1½ mile reach a few miles above Ramah Reservoir. In this reach, the cottonwood grows with peachleaf willow (*Salix amygdaloides*) and has a dense understory of coyote willow (*Salix exigua*) and native sedges, rushes, and grasses. The plains cottonwood/coyote willow plant community (*Populus deltoides* ssp. *monilifera*-(*Salix amygdaloides*)/*Salix exigua*) is common (G4? S3), but rarely encountered in good condition, primarily due to colonization by invasive non-native species (i.e., tamarisk and Russian olive) and elimination of the flooding required for cottonwood regeneration. This reach is significant in that these invasive species were not noted and there is a wide range of native species present in the understory. Bare sandbars, a wide range of age classes of cottonwood (saplings to mature), and vegetative debris suspended eight feet up in the willows indicate a natural flooding regime. According to the landowner, the channel can be ¼- to ½- mile wide during large floods (G. Fosha, local landowner, pers. comm.).

The active stream channel is narrow (less than two feet) and meandering. The floodplain is generally over 100 feet wide and wider where the channel braids. The stream gradient is low and the bottom is sandy. In September, the stream channel was dry in some areas and wet in others with thick stands of softstem bulrush (*Schoenoplectus lacustris*), and cattail (*Typha* sp.) in the wettest areas. Woolly sedge (*Carex lanuginosa*) occurs in small pure stands intermixed with stands of Nebraska sedge (*Carex nebrascensis*), common threesquare (*Scirpus pungens*), common spikerush (*Eleocharis palustris*), and Baltic rush (*Juncus balticus*). Prairie cordgrass (*Spartina pectinata*) and switchgrass (*Panicum virgatum*) also occur as small patches. American licorice (*Glycyrrhiza lepidota*) occurs in patches on higher banks with cottonwood.

Songbirds are abundant in the riparian area and bird use is heavy during migration times (G. Fosha, local landowner, pers. comm.). Dragonflies, damselflies, and waterstriders are abundant and an aquatic turtle was present in a pond.

The cattle grazing regime in the occurrence for at least the past 50 years has been to winter the cattle in the riparian area and rest the riparian area during the growing season (G. Fosha, pers. comm). The owner is considering extending this management regime downstream of the occurrence.

The adjacent uplands are rolling hills of shortgrass prairie with patches of tallgrass prairie. Within the watershed, some of the uplands are dryland hayed and have been seeded with alfalfa (Medicago sativa) and smooth brome (Bromus inermis), both non-native species. Other areas support primarily native grasses including blue grama, little bluestem, and in isolated patches, prairie sandreed (Calamovilfa longifolia) and big bluestem (*Andropogon gerardii*).

Big Sandy has a long history of human use. The creek was used by Plains Indians as a travel route from the plains to Colorado Springs at Manitou and Ute Pass (Whittemore 1967). The earliest ranch on the Big Sandy near Calhan was established in 1863 (Whittemore 1967) and Big Sandy Creek at Calhan was a stagecoach stop by 1876 (Scott 1999). Ramah Reservoir is owned and managed by Colorado Division of Wildlife as Ramah State Wildlife Area.

Downstream from this PCA there are two documented occurrences of plains cottonwood with switchgrass (*Populus deltoides/Panicum virgatum*), a globally-imperiled (G1G2 S1) riparian community. These occurrences are in Elbert and Cheyenne counties. Maintaining the natural hydrologic processes in the headwaters of Big Sandy Creek may help maintain these downstream occurrences. However, Ramah Reservoir potentially alters the downstream flooding regime enough to make the upstream hydrology irrelevant to the downstream occurrences.

Biodiversity Rank Justification: This site contains a good (B-ranked) occurrence of a globally-vulnerable (G3 S2) fish, the Arkansas darter (*Etheostoma cragini*). The site also contains a good example of an apparently secure (G4? S3) plains cottonwood riparian woodland, plains cottonwood with peachleaf willow and coyote willow (*Populus deltoides* ssp. *monilifera*-(*Salix amygdaloides*)/*Salix exigua*). Good examples of this plant community are rarely encountered.

Table 22. Natural Heritage element occurrences at the Big Sandy Creek at Calhan PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Fish								
Etheostoma cragini	Arkansas darter	G3	S2	C	T	FS	B	1985
Plant Communities								
Populus deltoides ssp *monilifera–(Salix amygdaloides) Salix exigua*	Plains cotton-wood riparian woodland	G4?	S3				B	2000-09-25

Boundary Justification: The boundary encompasses the creek upstream and downstream from Ramah Reservoir which is considered occupied Arkansas darter habitat by the Colorado Division of Wildlife (Colorado Division of Wildlife 2001b). The boundary also encompasses the riparian community and its floodplain located upstream from Ramah Reservoir and a portion of the upstream watershed to account for continued surface flow and periodic flooding. These processes are necessary for the viability of the occurrence and maintenance of ecological functions. The PCA could be expanded to include a greater proportion of the upstream watershed to ensure maintenance of the ecological and hydrological processes.

Protection Rank Comments: The land is privately owned in acreages ranging from about 300 to 1,500 (120 to 600 ha). The primary land use in the watershed is haying and cattle grazing. Given the proximity to Colorado Springs, this area could be targeted for increased development. Additionally, maintenance of the natural flooding regime is important in recharge to the alluvial aquifer that supports the creek and spring-fed ponds sustaining the Arkansas darter.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. The riparian area within the occurrence is grazed by cattle in the winter and rested in the growing season. This management regime has occurred over the past 50 years and appears to greatly benefit the riparian plant community. In other reaches of the creek the riparian vegetation is not in as good condition and modification of grazing and haying regimes could be considered.

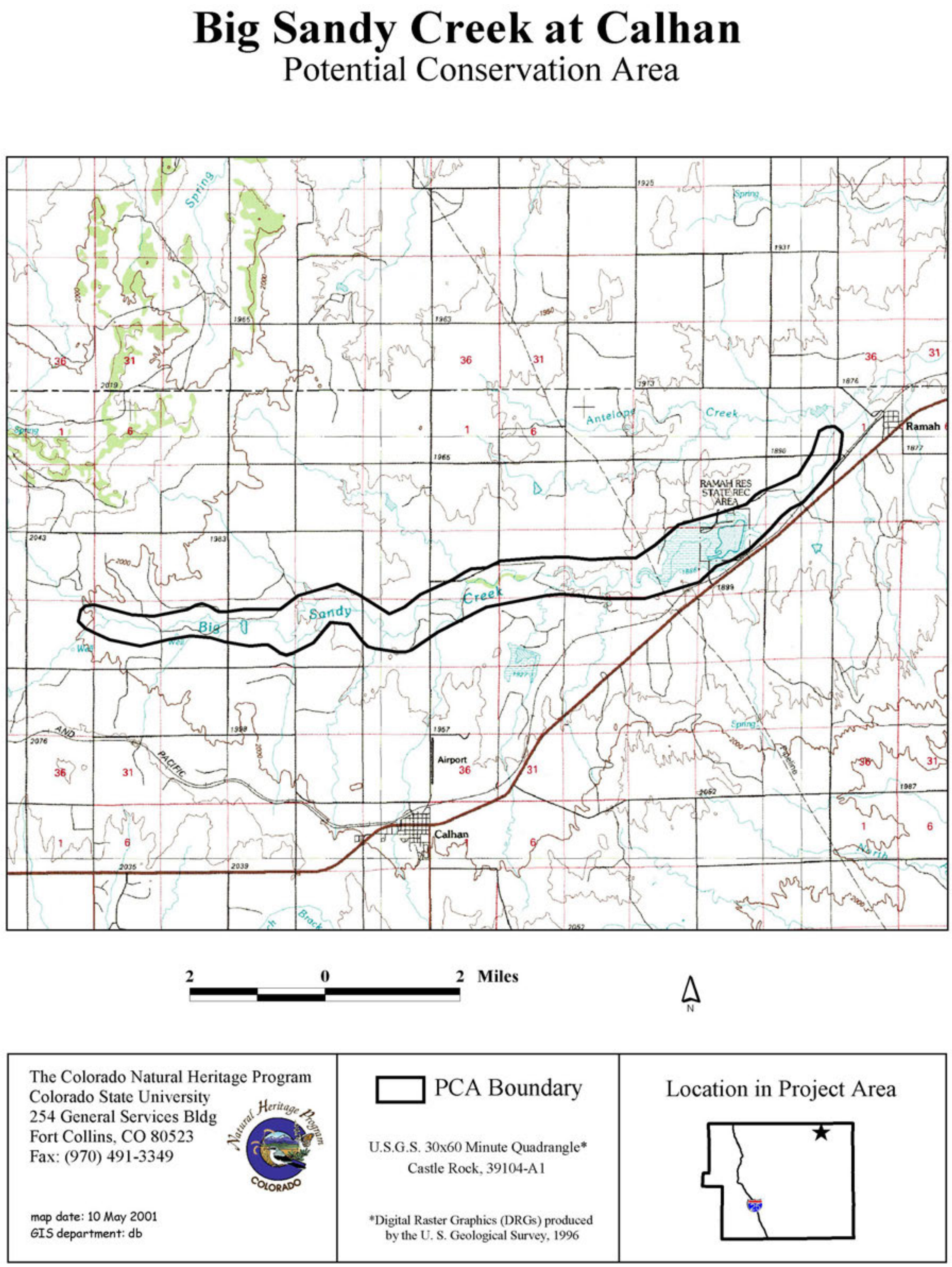


Fig. 23. Big Sandy Creek at Calhan Potential Conservation Area Map

Blue Mountain

Biodiversity Rank: B3 (High significance)
The Blue Mountain site supports a good (B-ranked) occurrence and three unranked occurrences of the globally-vulnerable (G3T3) and state critically imperiled (S1B) Mexican Spotted Owl (*Strix occidentalis lucida*), a species classified as threatened by the state of Colorado and the federal government. The site also supports two unranked occurrences of the globally- and state-vulnerable (G4T3, S2B, SZN) American Peregrine Falcon (*Falco peregrinus anatum*), a federally endangered subspecies. Yellow lady's slipper (*Cypripedium calceolus* ssp. *parviflorum*), a globally-secure (G5) but state-imperiled (S2) species, also occurs (B-ranked occurrence) within the Blue Mountain site.

Protection Urgency Rank: P2 (High urgency)
Land ownership within the Blue Mountain PCA is a mixture of U.S. Forest Service, Bureau of Land Management, State Land Board, and private, with the largest portion lying within the management of the Pike National Forest. Mining planned for portions of the area will likely impact a known Mexican Spotted Owl nesting location.

Management Urgency Rank: M4 (Low urgency)
Forest management practices including logging, mineral extraction, fire suppression, and grazing have the potential to impact Mexican Spotted Owl nest sites. Current management seems to favor the persistence of the zoological elements within the Blue Mountain site, but changes in management actions may be necessary in the future to maintain the current quality of the element occurrences.

Location: This site consists of a large tract of land located in the Pike National Forest to the west of the Fort Carson Military Reservation. Included within the site are portions of four major drainages: Rock Creek, Little Fountain Creek, Little Turkey Creek, and Turkey Creek. Blue Mountain is a prominent landmark within the site. The summit of Mount Pittsburg lies immediately outside the southeastern boundary of the site.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Mount Big Chief, Cheyenne Mountain, Mount Pittsburg
T15S R67W Sections 20-23, 25-36
T16S R67W Sections 1-10, 17-19, 30, 31
T16S R68W Sections 1, 11-14, 22-27, 35, 36
T17S R68W Section 1

Size: 17,313 ac (7,006 ha).

Elevation: 6,640 to 9,850 ft (1,963 to 3,002 m).

General Description: The Blue Mountain site encompasses a vast area of forested, mountainous land located to the west of the Fort Carson Military Reservation. The site is dissected by several major creeks (Rock Creek, Little Fountain Creek, Little Turkey

Creek, and Turkey Creek) which meander through steep, rocky canyons as they flow southeastward to the plains. Areas along the creeks are dominated by mixed riparian forests of Douglas fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), white fir (*Abies concolor*), and alder (*Alnus incana*). Upland areas within the Blue Mountain site include mixed conifers plus ponderosa pine (*Pinus ponderosa*), pinyon pine (*P. edulis*), Rocky Mountain juniper (*Juniperus monosperma* and *J. scopulorum*), and aspen (*Populus tremuloides*).

Biodiversity Rank Justification: Four nests of Mexican Spotted Owls and two nests of American Peregrine Falcons are known within the Blue Mountain PCA. A good (B-ranked) occurrence of yellow lady's slipper also has been documented on the site.

Table 23. Natural Heritage element occurrences at the Blue Mountain PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Strix occidentalis lucida	Mexican Spotted Owl	G3T3	S1B, SUN	LT	T		B	1999-08-13
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S2B, SZN	LE			E	2000
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S2B, SZN	LE			E	2000
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S2B, SZN	LE			E	1998
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S2B, SZN	LE			E	1996
Plants								
Cypripedium calceolus ssp. *parviflorum*	Yellow lady's slipper	G5	S2				B	1997-06-28

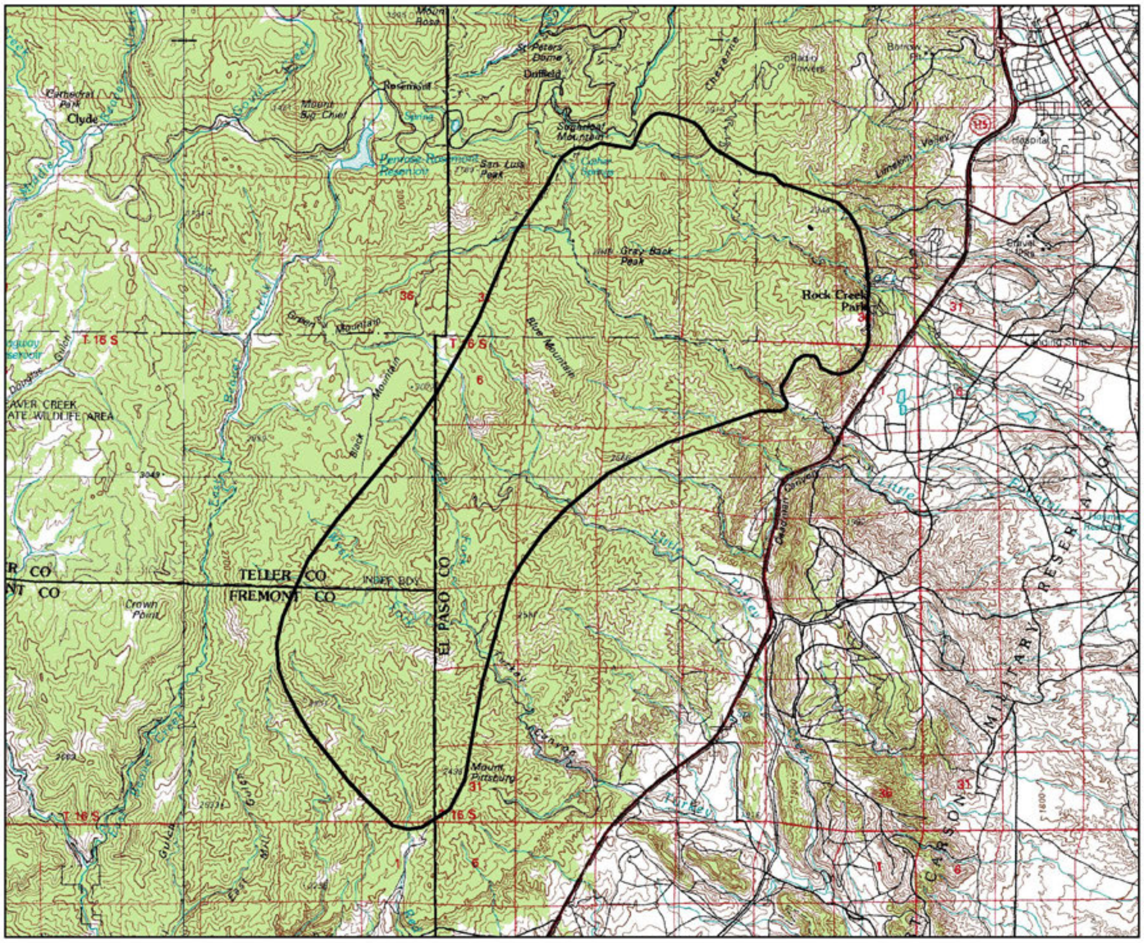
Boundary Justification: The site boundary encompasses four known nest sites of the Mexican Spotted Owl and two known nest locations of the American Peregrine Falcon. Mexican Spotted Owls tend to nest in tall trees with relatively closed canopies in steep, narrow canyons whereas American Peregrine Falcons prefer tall, inaccessible cliffs (for references and additional details, see the species characterization abstracts for these species). For both species, only the nesting habitat is included in the Blue Mountain site. Home ranges and feeding areas for these raptorial species are extensive and reach far beyond the boundaries of the site. The vastness of the areas used by these birds should be considered in the management of the surrounding forest. The area on which the yellow lady's slipper occurs is located in the riparian zone along Little Fountain Creek and lies entirely within the Blue Mountain PCA. Appropriate management of the hydrological processes that originate outside the PCA boundary but affect the quality, quantity, timing, and flow of water within the site would help ensure the local persistence of the yellow lady's slipper.

Protection Rank Comments: Most of the land on this PCA is managed by the U.S. Forest Service or the Bureau of Land Management. Scattered homes and other buildings exist throughout the PCA, although most are located above and below the canyons. Mining planned for a portion of the PCA may impact a known Mexican Spotted Owl nest site.

Management Rank Comments: Forest management practices including logging, mineral extraction, fire suppression, and grazing have the potential to affect Mexican Spotted Owl populations. Hiking and mountain biking occur on several areas within the Blue Mountain site, and human activities and disturbance are common around the scattered cabins and hay meadows that are located at the tops and bottoms of the canyons. The extent to which rock climbing activities impact the nesting American Peregrine Falcons on the Blue Mountain site is unknown. If human activities are negatively affecting the reproduction of American Peregrine Falcons, Mexican Spotted Owls, or Prairie Falcons, then restrictions on human access and activities near nest sites may improve the birds' reproductive success.

Blue Mountain

Potential Conservation Area



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The Colorado Natural Heritage Program Colorado State University 254 General Services Bldg Fort Collins, CO 80523 Fax: (970) 491-3349 map date: 24 Aug 2001 GIS department: gd/ael	PCA Boundary U.S.G.S. 30x60 Minute Quadrangles* Colorado Springs, 38104-E1 Pikes Peak, 38105-E1 *Digital Raster Graphics (DRGs) produced by the U. S. Geological Survey, 1996	Location in Project Area

Fig. 24. Blue Mountain Potential Conservation Area Map

Boehmer Creek

Biodiversity Rank: B3 (High significance)
This site contains a stable, reintroduced population of greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2). It is one of three stable populations in the Arkansas River watershed.

Protection Urgency Rank: P4 (Low urgency)
The creek occurs on the Pike National Forest; however, the watershed is owned by Colorado Springs Utilities, and provides a portion of the city's water supply. Further, Boehmer Creek and its reservoirs are utilized by the U.S. Fish and Wildlife Service as a source population for stocking of the greenback cutthroat trout (*Oncorhynchus clarki stomias*) in reintroduction projects. The management afforded by these entities provides adequate protection of the watershed.

Management Urgency Rank: M4 (Low urgency)
Because Boehmer Creek is a water source for Colorado Springs, all but a small portion of this PCA is closed to the public.

Location: The Boehmer Creek PCA is located in El Paso and Teller counties on the south flank of Pikes Peak.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Pikes Peak
T14S R68W Sections 7, 17-20, and 29-33
T14S R69W Sections 11-14 and 23-26
T15S R68W Sections 4 and 5

Size: 5,688 ac (2,302 ha).

Elevation: 10,880 to 14,110 ft (3,316 to 4,300 m).

General Description: Boehmer Creek, the headwaters of Middle Beaver Creek, is a steep-gradient, perennial stream draining the south flank of Pikes Peak. The Boehmer Creek watershed is owned by Colorado Springs Utilities because the creek and reservoirs along the creek provide a portion of the city's water supply. A tunnel conveys water from East Fork West Beaver Creek, another headwater stream draining the south flank of Pikes Peak, to Boehmer Creek to augment the water supply. Public access to the Boehmer and upper East Fork West Beaver Creek watershed is restricted to maintain the excellent water quality.

In 1985, the Colorado Division of Wildlife introduced greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2) to Boehmer Creek and its reservoirs (U.S. Fish and Wildlife Service 1998). The greenback cutthroat trout population is currently the only reintroduced population in the Arkansas River basin considered stable by the

Colorado Division of Wildlife (Policky *et al*. 1999). This population is used as a source population for stocking in other portions of the state.

Greenback cutthroat trout is the only trout native to the headwaters of the South Platte and Arkansas River drainages. By the early 1900s, the subspecies was believed extinct due to over-harvest, introduction of non-native trout species, and habitat alteration (U.S. Fish and Wildlife Service 1998). Since then, ten native populations of greenback cutthroat trout have been discovered, seven in the South Platte watershed and three in the Arkansas watershed (U.S. Fish and Wildlife Service 1998, Policky *et al*. 1999). Recovery efforts by Colorado Division of Wildlife include reintroduction of the species, and 25 waters within the Arkansas drainage are currently managed for greenback cutthroat trout (Policky *et al*. 1999).

The Pikes Peak Highway accesses the peak from the north. A reservoir maintenance road along Boehmer Creek is not open to the public.

Biodiversity Rank Justification: This site contains one of three stable populations of greenback cutthroat trout (*Oncorhynchus clarki stomias*) (G4T2T3 S2) in the Arkansas drainage (U.S. Fish and Wildlife Service 1998, Policky *et al*. 1999). This population was reintroduced to Boehmer Creek and reservoirs in 1985.

Table 24. Natural Heritage element occurrences at the Boehmer Creek PCA.

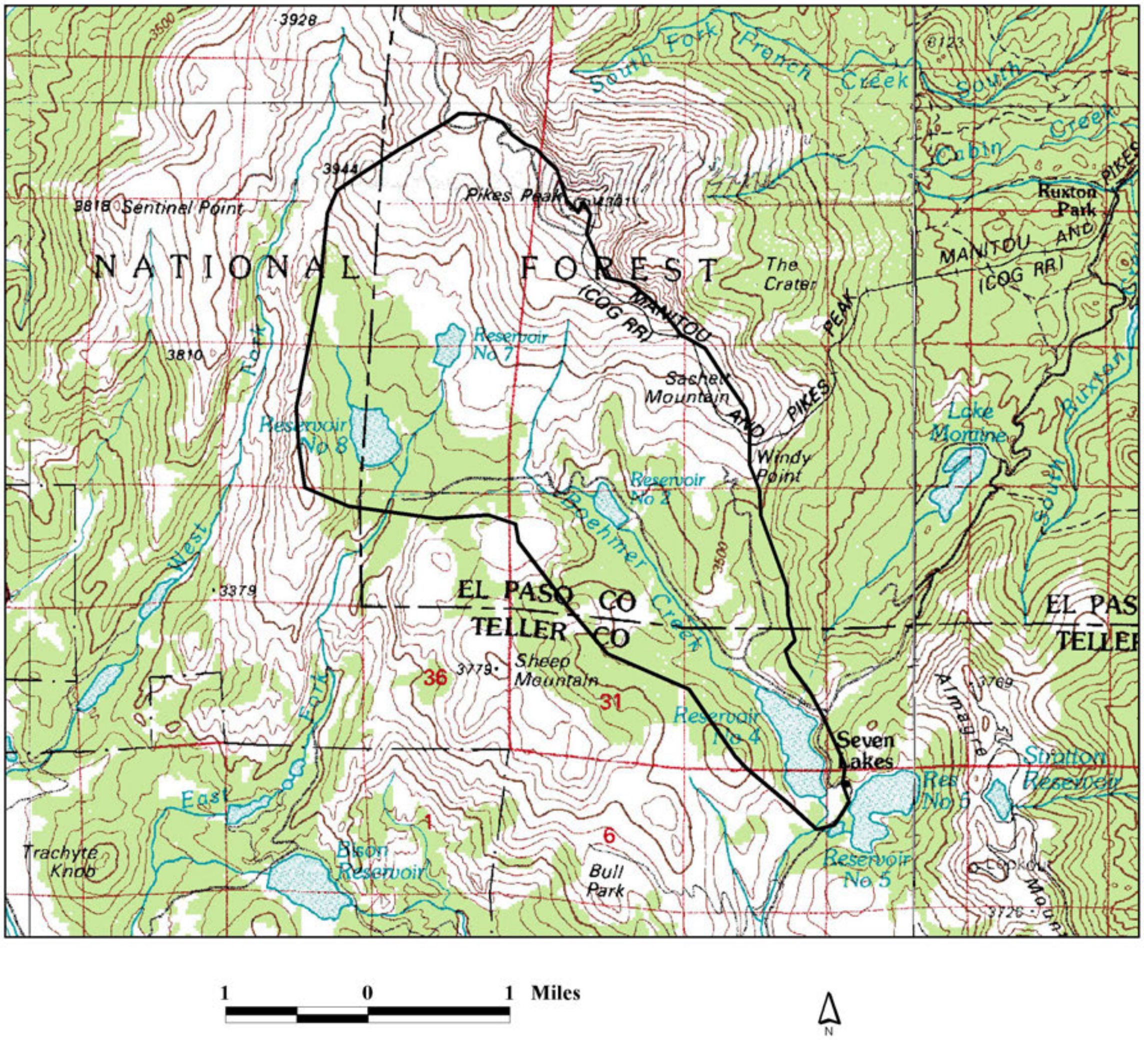
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Fish								
Oncorhynchus clarki stomias	Greenback cutthroat trout	G4T2T3	S2	LT	T		A	1998-07-02

Boundary Justification: The PCA boundary encompasses the watershed of Boehmer Creek, which includes Reservoirs #2 and #4, upper East Fork Middle Beaver Creek, and Reservoirs #7 and #8. East Fork Middle Beaver Creek is included within the PCA due to its connection *via* a tunnel with Boehmer Creek. Thus, water quality issues in East Fork Middle Beaver Creek could affect the greenback cutthroat trout in Boehmer Creek. The watershed boundary was delineated using hydrologic unit GIS coverage (Natural Resources Conservation Service 2000) and the 1:100,000 scale U.S.G.S. topographic map. The entire watershed is included because it is small and any activities within it could potentially affect the fish population and degrade water quality.

Protection Rank Comments: The land within the PCA is owned and managed by Colorado Springs Utilities and the Pike National Forest.

Management Rank Comments: The south slope of Pikes Peak is closed to recreation and unlikely to be developed as long as the land is used as Colorado Springs' water supply. The headwaters of the creeks include the summit of Pikes Peak and the Pikes Peak Highway. Nearby recreation activities as well as erosion and runoff from the road maintenance are potential management issues. Opening of the area to fishing could potentially introduce whirling disease to the greenback cutthroat trout population.

Boehmer Creek
Potential Conservation Area



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map date: 10 May 2001
GIS department: db

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle*
Pikes Peak, 38105-E1

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

Location in Project Area

Fig. 25. Boehmer Creek Potential Conservation Area Map

Bohart Playas

Biodiversity Rank: B3 (High significance)
This PCA contains an excellent (A-ranked) occurrence of a globally-vulnerable (G3 S3) plant, plains ambrosia (*Ambrosia linearis*).

Protection Urgency Rank: P4 (Low urgency)
The land managed as part of 48,000-acre cattle ranch on State Land Board land leased by The Nature Conservancy. The Nature Conservancy has a 25-year lease on the property.

Management Urgency Rank: M4 (Low urgency)
Current management appears excellent for maintenance of the plains ambrosia and its associated playas.

Location: Southeastern El Paso County. On the Bohart Ranch about eight miles south of the town of Ellicott and two miles east of Ellicott Highway.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Hanover NE
TRS 15S 62W Section 28

Size: 235 ac (95 ha).

Elevation: 5,780 to 5,820 ft (1,762 to 1,174 m).

General Description: A few scattered playas occur within the sandsage prairie on the Bohart Ranch in southeastern El Paso County. The Bohart Playas PCA contains two small (0.5 to 3 acre) (0.2-1.2 ha) playas. The small, flat-bottomed depressions occur between rolling hills. No surface channels drain the area and rainfall and runoff collects in these basins, forming ephemeral wetlands. These playas are about five miles west of the greater concentration of playas found in the vicinity of Truckton (Buffalograss Playas PCA). The two playas on the Bohart Ranch are presented as a PCA because of their excellent landscape context, they occur within 48,000 ac (19,425 ha) of State Land Board property leased to The Nature Conservancy.

These basins remain dry throughout most of the year and collect water only after heavy rainfall. In southeastern El Paso County, the heavy rains generally fall in the late summer and in many cases a series of storms are required in order for the playas to retain water (Weathers 2000). Runoff collecting in a dry playa infiltrates cracks in the clay bottom of the playa and swells the clay effectively sealing the playa bottom (Zartman *et al*. 1994). After the clay has been wetted, subsequent storms can result in playa filling. The playas may hold water for periods ranging from days to weeks, depending on the local topography and intensity of the rainstorm (Weathers 2000). In dry years the playas may remain dry year round.

The upland plant community around the playas is sandsage prairie (*Artemisia filifolia/Andropogon hallii*) (G3 S2). Interestingly, even though the upland plant community is different in the playas to the east (shortgrass prairie versus sandsage prairie), the vegetation in the playas is the same. The dominant species in the playas is the perennial warm-season grass buffalograss (*Buchloe dactyloides*). Growing with the buffalograss are the perennial forbs plains ambrosia (*Ambrosia linearis*) (G3 S3) and short-ray prairie coneflower (*Ratibida tagetes*).

The vegetation in the playas occurs in bands where the outermost rim supports the highest density of plains ambrosia and coneflower. Other plants growing in the playas include a dryland sedge (*Carex eleocharis* ssp. *stenophylla*), blue grama (*Bouteloua gracilis*), purple three-awn (*Aristida purpurea*), prostrate vervain (*Verbena bracteata*), frog-fruit (*Phyla cuneifolia*), and Russian thistle (*Salsola iberica*). Buffalograss submerged during the growing season has been known to withstand more than five weeks of inundation (Porterfield 1945).

Plains ambrosia is a shortgrass prairie species that is restricted in range to an area of about 100 miles by 50 miles, primarily in El Paso and Lincoln counties. It requires a little more moisture than most upland plants and as such, the playas appear to be their native habitat as the clay soils of the playas retain moisture longer than the upland soils. Roadsides also appear to provide the extra moisture required by the plains ambrosia and, as such, plains ambrosia is very prevalent on the sides of many unpaved roads in the area. The Bohart playas may be the westernmost playa-occurrence of plains ambrosia.

The playas occur within a mosaic of sandsage prairie providing added heterogeneity to the landscape. Heterogeneity is important biologically to provide for the needs of a wide range of species (Knopf 1996a, Hoagland and Collins 1997). Playas are often considered deflated, or wind-eroded, depressions, though theories on playa formation are controversial (Osterkamp and Wood 1987). Additionally, these playas are consistent with descriptions of buffalo wallows. Wallows are formed by bison pawing the ground, creating patches of bare ground in which to dust bathe (Uno 1989), or perhaps mud bathe to protect against biting insects or aid in shedding their heavy fur (Hornaday 1889, F. Knopf, USGS, pers. comm.). Active wallows range from 10 to 15 feet (3 to 5 m) in diameter and merging of adjacent wallows can create wallows larger than about 0.5 acre (0.2 ha) (Uno, 1989, Knopf, 1996a). Bison were extirpated from the area by 1875 (Hornaday 1889) but evidence of their wallows can remain evident on the landscape for more than a hundred years (Knopf 1996a). Perennial grasses invade wallows not used by bison (Uno 1989). It is possible that the playas result from of a combination of factors including deflation and buffalo wallowing.

Biodiversity Rank Justification: This PCA contains an excellent (A-ranked) occurrence of the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*) and a good (B-ranked) example of a globally-vulnerable (G3 S3) buffalograss playa grassland (*Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis*). The landscape context of the playas is excellent. Plains ambrosia, though locally abundant, has a very limited global range (about 50 miles by 100 miles) and almost all of the habitat is privately owned.

Table 25. Natural Heritage element occurrences at the Bohart Playas PCA.

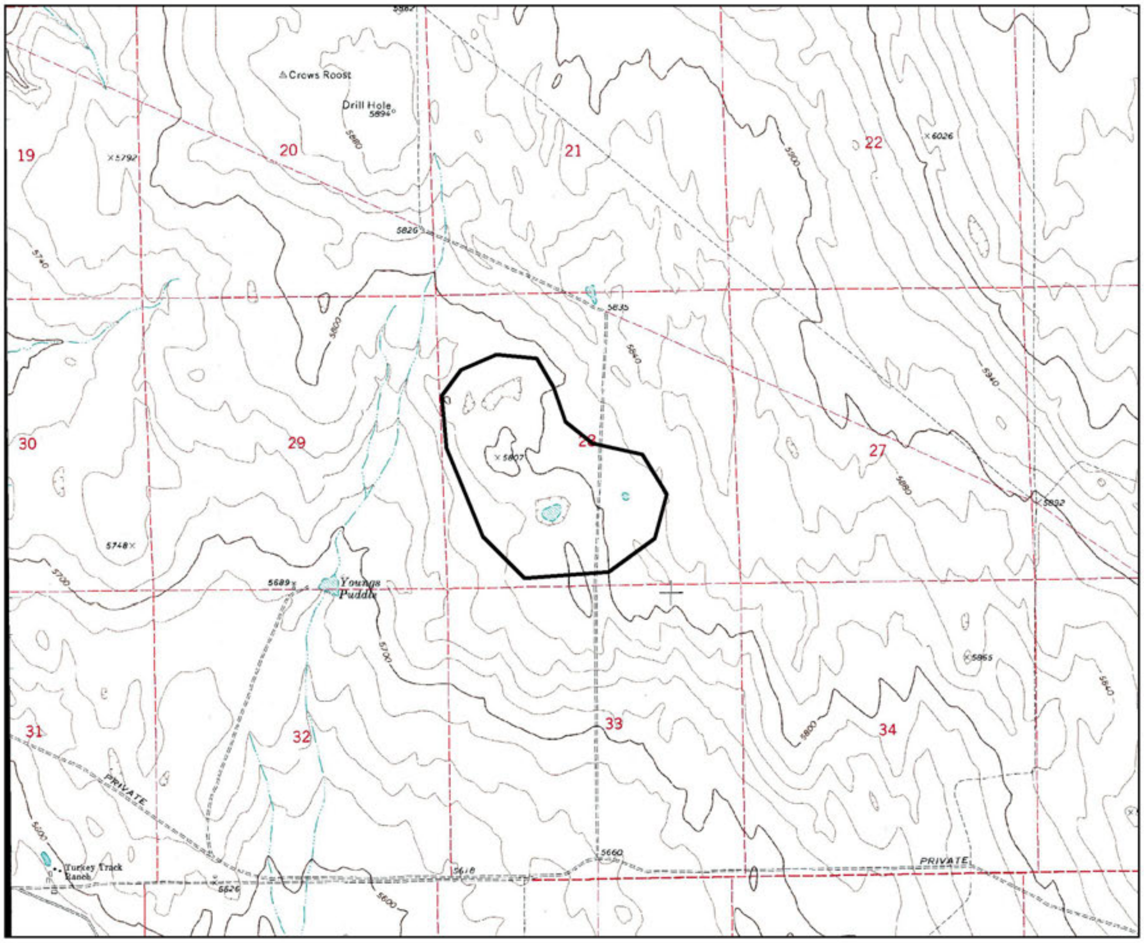
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3			FS	A	2000-06-24
Plant Communities								
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalo grass playa	G3	S3				B	2000-07-26

Boundary Justification: The site boundary for Bohart Playas includes two playas and the surrounding sandsage prairie uplands.

Protection Rank Comments: All the land within this PCA is owned by the State Land Board and leased to The Nature Conservancy for cattle grazing. Livestock grazing is the dominant land use in the PCA.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences.

Bohart Playas
Potential Conservation Area



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map date: 10 May 2001
GIS department: db

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle*
Hanover NE, 38104-F3

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

Location in Project Area

Fig. 26. Bohart Playa Potential Conservation Area Map

Chico Basin Dunes

Biodiversity Rank: B3 (Moderate significance)
This PCA contains a fair (C-ranked) occurrence of a globally-imperiled/vulnerable (G2G3 S2) sand dune community of blowout grass with lemon scurfpea (*Redfieldia flexuosa*–(*Psoralidium lanceolatum*)).

Protection Urgency Rank: P4 (Low urgency)
The dunes are within the 86,000-acre Chico Basin Ranch owned by the State Land Board.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate to maintain the element occurrence.

Location: Chico Basin Dunes PCA is located in southeastern El Paso County just north of the Pueblo County line and near the eastern boundary of the Chico Basin Ranch.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Hanover SE, Edison School
TRS. T17S R61W Sections 19, 20, and 28-33
T17S R62W Sections 25 and 36

Size: 2,585 ac (1,046 ha).

Elevation: 5,280 to 5,433 ft. (1,609 to 1,656 m).

General Description: Within the expansive sandsage prairie described in the Signal Rock Sandhills PCA is a small active sand dune complex contributing to the mosaic pattern of the landscape. The active sand dunes occur in two small patches (about 2 ac or 1 ha each) and one larger patch (about 25 ac (10 ha)) and make up the Chico Dunes PCA. The location and size of the sand dunes probably shift with time in response to climatic variation. During wetter periods, the dunes probably shrink as they are stabilized by vegetation and during drier periods the dunes probably grow as the stabilizing vegetation dies back.

The most active part of the dunes support a plant community of blowout grass with lemon scurfpea (*Redfieldia flexuosa*-(*Psoralidium lanceolatum*)) (G2G3 S2). The vegetative cover is sparse and generally comprises less than one percent cover. Other plants growing on the dunes include sandhill muhly (*Muhlenbergia pungens*), sand bluestem (*Andropogon hallii*), sand dropseed (*Sporobolus cryptandrus*), poverty threeawn (*Aristida divaricata*), longspine sandbur (*Cenchrus longispinus*), sunflower (*Helianthus* sp.), annual buckwheat (*Eriogonum annuum*), and Texas croton (*Croton texensis*). Two globally-common species of tiger beetles were collected on the dunes (*Cicindela formosa* (G5 S5) and *C. splendida* (G5 S3S4)) (Kondratieff and Pineda, Colorado State University, pers. comm.). The largest documented occurrence of *Redfieldia flexuosa-Psoralidium lanceolatum* is located at the 6,000-acre Great Sand Dunes in the San Luis Valley. Like at the Chico Basin Dunes, the *Redfieldia* occurs on the most active part of the dunes. At the Great Sand Dunes, at least six species of insects known only to exist at the Great Sand Dunes are associated with this plant community, including the Great Sand Dunes tiger beetle (*Cicindela theatina*; G1 S1) (Pineda *et al*. 1999), and it is possible that further inventory of the Chico Dunes would reveal the presence of sand-obligate or rare species of insects.

The dunes are on the Chico Basin Ranch, an 86,000-acre property owned by the State Land Board and leased for cattle grazing. The dunes are on the eastern edge of the ranch near the transition from sandsage prairie to shortgrass prairie.

Biodiversity Rank Justification: This PCA contains a fair (C-ranked) occurrence of a globally-vulnerable (G2G3 S2) sand dune community of blowout grass with lemon scurfpea (*Redfieldia flexuosa* – (*Psoralidium lanceolatum*)). The ranking as "fair" is based solely on the small size of the dune complex; the condition and landscape context of the community are considered good to excellent.

Table 26. Natural Heritage element occurrences at the Chico Basin Dunes PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Redfieldia flexuosa-(Psoralidium lanceolatum)	Dunes with blowout grass	G2G3	S2				C	2000-09-26

Boundary Justification: The boundary encompasses the dune complex and intervening sandsage prairie.

Protection Rank Comments: There are no known immediate threats to the sand dunes. The area is part of an 86,000-acre cattle ranch owned by the State Land Board. The natural processes creating and maintaining the dunes are probably relatively intact. A longer-term issue is the possibility of the State Land Board selling the property to maximize their return on the land. Increases in land value resulting from growth of Colorado Springs may cause this to be a major concern in the future.

Management Rank Comments: Current management appears appropriate for maintaining the element occurrence. There is little human visitation to the dunes to cause trampling. Cattle graze the dunes and it is unknown whether trampling of vegetation by livestock is a management issue.

Chico Basin Dunes
Potential Conservation Area

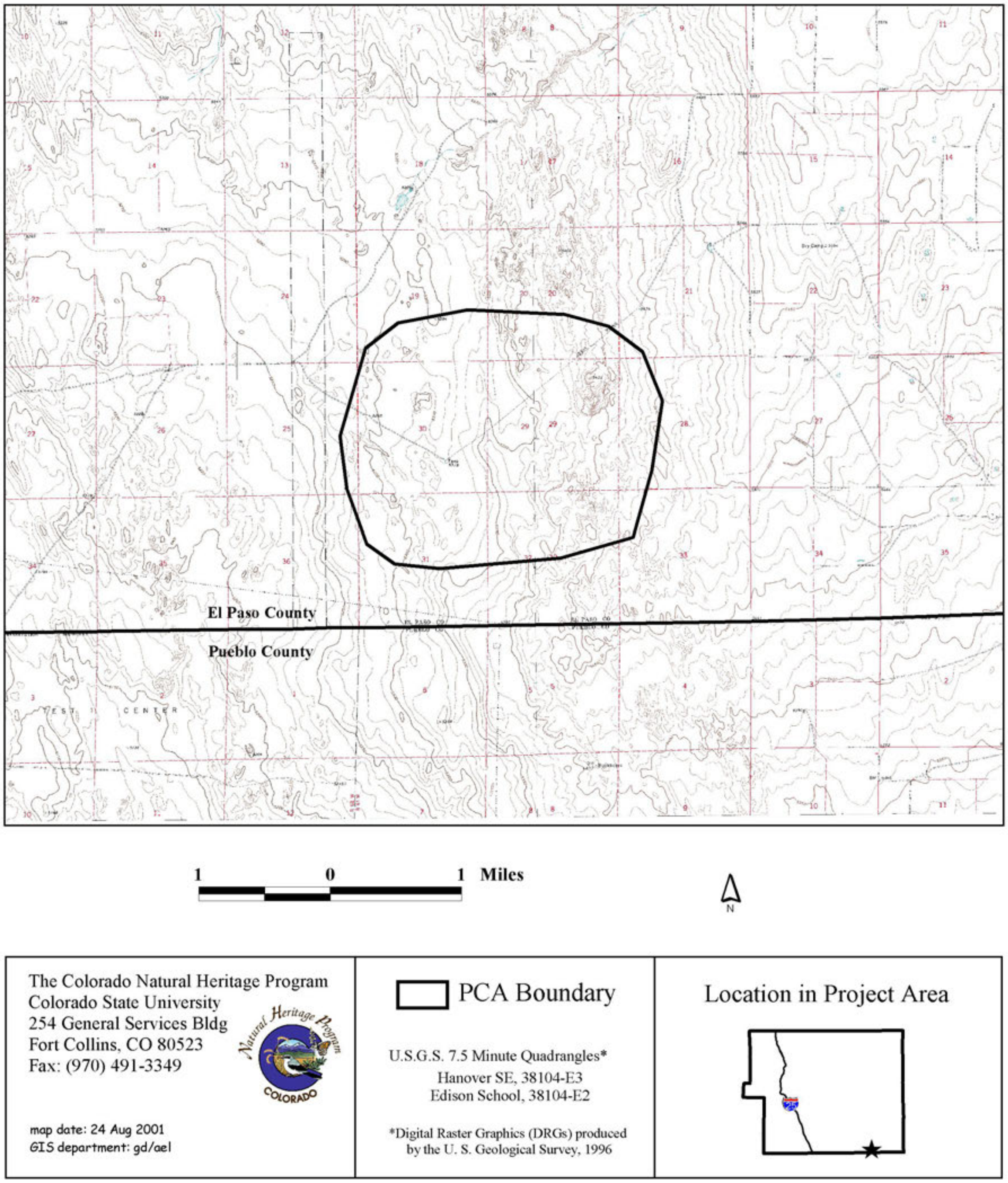


Fig. 27. Chico Basin Dunes Potential Conservation Area Map

Chico Creek

Biodiversity Rank: B3 (High significance)
This PCA contains a good (B-ranked) occurrence of the globally-vulnerable (G3 S2) Arkansas darter (*Etheostoma cragin*i), good (B-ranked) occurrences of two globally-vulnerable (G3) wetland communities (*Spartina pectinata* and *Carex praegracilis*), and a fair (C-ranked) occurrence of a globally-imperiled (G2 S2) cottonwood riparian woodland (*Populus deltoides*/*Pascopyrum smithii-Panicum obtusum*). The large acreage and wide range of wetland communities present in the PCA are unusual for the central shortgrass prairie.

Protection Urgency Rank: P3 (Moderate urgency)
Protection actions are needed to secure long-term conservation. Currently, most of the land within the PCA is owned by the State Land Board and managed with conservation in mind.

Management Urgency Rank: M3 (Moderate urgency)
Current management appears appropriate for maintaining the element occurrences; however, various management options could improve their quality. Chico Basin Ranch is working with the Colorado Division of Wildlife to develop a small fishes management plan. Land managers are considering management of non-native species including tamarisk on Chico Creek. Of larger-scale concern is maintenance of the hydrologic regime necessary to support the wetland communities and Arkansas darter.

Location: Chico Creek PCA is located in north central Pueblo County and extends into El Paso County on Black Squirrel Creek. The PCA extends south along Chico Creek onto the Pueblo Chemical Depot.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Hanover, Hanover SE, Bar JH Ranch, North Avondale NE, Devine, North Avondale
T17S R62W Sections 28, 29, 31, and 32
T18S R62W Sections 5-8, 17-20, and 29-32
T18S R63W Sections 3-5, 8-10, 13-17, 21-27, and 33-36
T19S R62W Sections 5-7, 18, 19, and 29-32
T19S R63W Sections 1-4, 10-14, 23-25, and 36
T20S R62W Sections 5-7, 18, and 19
T20S R63W Sections 1, 12, and 13

Size: 21,580 ac (8,732 ha)

Elevation: 4,580 to 5,200 ft (1,396 to 1,585 m).

General Description: The Chico Creek watershed reaches from the Black Forest to the Arkansas River, encompassing over 580 square miles in El Paso and Pueblo counties. Chico Creek and its tributary, Black Squirrel Creek, are mostly ephemeral throughout most of their length and surface flow reaches the Arkansas River only after heavy precipitation events. In the southern portion of the watershed, various seeps and springs create an extensive Great Plains wetland and riparian complex with perennially ponded portions. Surface water is extremely rare in the basin and the wetlands formed by these seeps and springs are the most significant hydrologic feature of the entire basin (Romero 1992). The Chico Creek PCA encompasses these wetlands and riparian areas.

The range of wetland and riparian plant communities supported by the seeps and springs is extensive. The largest wetland complex covers about 2,700 acres in the Black Squirrel Creek basin. Within the surrounding community of greasewood with alkali sacaton (*Sarcobatus vermiculatus*/*Sporobolus airoides*) (G3? S2) occur wetter portions vegetated with a mosaic of wetland communities including Nebraska sedge (*Carex nebrascensis*) (G4 S3), spikerush (*Eleocharis palustris*) (G5 S4), softstem bulrush and hardstem bulrush (*Scirpus tabernaemontani–Scirpus acutus*) (G3 S2S3), clustered sedge (*Carex praegracilis*) (G3 S2), and prairie cordgrass (*Spartina pectinata*) (G3? S3).

Along the bluffs above the eastern bank of Chico Creek is an interesting wetland complex, manifested as a broken series of seeps. The vegetation on the seeps varies considerably but generally includes common threesquare (*Scirpus pungens*) (G3G4 S3) at up to about 20 percent cover. Other portions of the seeps support a community of alkali sacaton (*Sporobolus airoides*) (G3Q S3). Other plants present on the seeps include mixed sedges (*Carex nebrascensis*, *C. praegracilis*, *C. lanuginosa*, *C. hystericina*), spikerush (*Eleocharis palustris*, *E. acicularis*, *E. quinqueflora*), rushes (*Juncus balticus*), cattail (*Typha latifolia*), bulrush (*Schoenoplectus acutus*), and switchgrass (*Panicum virgatum*). Certain small areas of the seeps have unstable histic soil horizons floating on discharging groundwater that gives the wetlands a spongy feel. Two species of lobelia, not previously known from Pueblo County (*Lobelia cardinalis* ssp. *graminea* and *L. siphilitica* var. *ludoviciana*) were common on the southern seeps during the 2000 field season. In some areas, the bluff top above the seeps has a white crust of alkaline salts with sparse cover of saltgrass (*Distichlis spicata*).

Portions of Chico Creek support cottonwood riparian woodlands. Unfortunately, tamarisk (*Tamarix ramosissima*), an exotic invasive shrub, has colonized much of Chico Creek, crowding out native species. However, many native species are still present including coyote willow (*Salix exigua*), alkali sacaton (*Sporobolus airoides*), western wheatgrass (*Pascopyrum smithii*), and vine mesquite (*Panicum obtusum*). The riparian plant community can be characterized as cottonwood/alkali sacaton (*Populus deltoides*/*Sporobolus airoides*) (G3 S2) with patches of cottonwood/western wheatgrass-vine mesquite (*Populus deltoides*/*Pascopyrum smithii-Panicum obtusum*) (G2 S2). Control of tamarisk would greatly improve the quality of these occurrences and is being considered by the land managers. The creek undergoes natural flooding regimes as evidenced by the presence of cottonwood saplings and flood debris suspended in the riparian vegetation. A large flood in April/May 1999 resulted in scouring of the channel and subsequent sprouting of cottonwood seedlings. On the Pueblo Chemical Depot, the April/May 1999 flood resulted in widening of the Chico Creek stream channel by three times (M. Canestorp, Pueblo Chemical Depot, pers. comm.).

Spring-fed pools in Black Squirrel Creek and a spring-fed tributary to Chico Creek support Arkansas darter (*Etheostoma cragini*) (G3 S2), a small plains fish listed as threatened in the state of Colorado (Colorado Division of Wildlife 2001c). These populations were discovered by Colorado Division of Wildlife in 1998 (Colorado Division of Wildlife 2001c). Arkansas darters are native to small, clear streams tributary to the Arkansas River and can survive in scattered pools that undergo evaporative concentration, high temperatures, and low dissolved oxygen concentrations (Nesler *et al*. 1999). The fish likely distribute between perennial portions of the creeks during high flow events (G. Dowler, CDOW, pers. comm.) therefore, it is likely that all the perennial reaches and pools are potential habitat for this fish. Other native fishes present in the creeks include white sucker (*Catostomus commersoni*), fathead minnow (*Pimephales promelas*), red shiner (*Cyprinella lutrensis*), sand shiner (*Notropis stramineus*), plains killifish (*Fundulus zebrinus*), and stoneroller (*Campostoma anomalum*) (Melby 1998).

Some tributaries to Chico Creek in the northern portion of the PCA have surface impoundments for irrigation and recreational use. The population of Arkansas darter on Chico Creek occurs above an impoundment on a tributary (Melby 1998). The ponds likely result in a decrease of native fishes in the drainage by decreasing the amount of available water in the creek (evaporation and agricultural use) and reducing the native fish habitat (Melby 1998). Non-native fishes introduced to the Chico Creek ponds for recreational fishing include large-mouth bass (*Micropterus salmomides*), and bluegill (*Lepomis macrochirus*), both potential predators on native fish populations. Large-mouth bass have also been collected downstream on the Pueblo Chemical Depot portion of Chico Creek (M. Canestorp, Pueblo Chemical Depot, pers. comm.).

Other wildlife observed within Black Squirrel and Chico Creek wetlands include plains leopard frogs (*Rana blairi*) (G5 S3), northern leopard frogs (*Rana pipiens*) (G5 S3), red-winged blackbirds, and common snipe. The pools also support a wide range of aquatic invertebrates. Sampling of pools on Black Squirrel Creek and the adjacent Burnt Creek resulted in collection of over 45 species of aquatic insects including 26 species of aquatic beetles (Durfee and Kondratieff 2000).

Wildlife noted using Chico Creek riparian area include typical shortgrass prairie species including pronghorn antelope, white-tailed deer, mule deer, coyote, desert cottontail, jackrabbit, American Kestrel, Horned Lark, Lark Bunting, Lark Sparrow, Sage Thrasher, Great Horned Owl, western rattlesnake, and Woodhouse's toad. Also noted were big brown bat, common porcupine, northern leopard frog, red-tailed and Swainson's Hawks, Northern Flicker, Western Kingbird, and Tree Swallow (Gionfriddo 2001). Small mammal trapping on Chico Creek revealed white-footed mice (*Peromyscus leucopus*), deer mice (*P. maniculatus*), Ord's kangaroo rats (*Dipodomys ordii*), western harvest mice (*Reithrodontomys megalotis*), silky pocket mice (*Perognathus flavus*), hispid cotton rats (*Sigmodon hispidus*), woodrats (*Neotoma* sp.), and voles (*Microtus* sp.) (Schorr 1999, Gionfriddo 2001). Two beaver (*Castor canadensis*) were relocated to the PCD portion of Chico Creek in 1997. Non-native bullfrogs (*Rana catesbeiana*) have been present on the PCD portion of Chico Creek (M. Canestorp, Pueblo Chemical Depot, pers. comm.).

Hydrologic investigations by Romero (1992) indicate that the water discharging from the seeps and springs and supporting the perennial pools in the creeks is shallow alluvial groundwater recharged by precipitation over the entire watershed. According to water balance calculations, about 90 percent of precipitation falling on the basin evaporates or is transpired by plants and the remaining 10 percent infiltrates and becomes shallow alluvial groundwater (Romero 1992). The groundwater moves southward toward the Arkansas River and discharges as a broken band of seeps along about five miles of the bluff above the east bank of Chico Creek and as seeps and springs within Chico and Black Squirrel Creeks. The groundwater discharges where the creek has removed the alluvium and the underlying impermeable Pierre Shale bedrock is exposed. Similar seeps that are part of the same system but not included in this PCA occur along Boone Creek on the Pueblo Chemical Depot and south of Pueblo Chemical Depot on bluffs east of the town of North Avondale.

The wetlands and creeks are surrounded by large expanses of relatively natural lands. Upland vegetative communities include sandsage prairie (*Artemisia filifolia/Andropogon hallii*) and blue grama shortgrass prairie (*Bouteloua gracilis-Hilaria jamesii*) (see Signal Rock Sandhills, Olney Prairie, and Midway Prairie PCAs). Bird surveys by Rocky Mountain Bird Observatory tallied over 200 species on the 86,000-acre Chico Basin Ranch (S. York, Chico Basin Ranch, pers. comm.). Mountain plover, a shortgrass prairie species that is proposed for federal listing as a threatened species, is known on and around the Chico Creek PCA, generally associated with black-tailed prairie dog colonies. The size and context of the natural landscape suggest that species assemblages are relatively complete and natural ecological processes are intact or restorable.

An area of over 300 square miles– reaching from the northern boundary of the Bohart Ranch in El Paso County to the southern boundary of Pueblo Chemical Depot and including the Chico Creek PCA – is managed by just five parties. These units include the 86,000-acre Chico Basin Ranch, 48,000-acre Bohart Ranch, 33,000-acre Transportation Technology Center, 23,000-acre Pueblo Chemical Depot, and one privately-owned ranch. The Chico Basin Ranch is leased from the State Land Board by Duke Phillips and operated as a cattle ranch. Similarly, the Bohart Ranch is leased from the State Land Board by The Nature Conservancy and operated as a cattle ranch. The Transportation Technology Center is leased from the State Land Board and operated as a railroad technology development and test facility. Pueblo Chemical Depot is a Department of Defense facility built in 1942 for storage of ammunition and general supplies.

The area has historically been used primarily for livestock grazing. The Chico Basin Ranch, Bohart Ranch, and private ranch are actively grazed. Portions of the 23,000-acre Pueblo Chemical Depot have not been grazed by cattle since the land was purchased in 1942 with grazing continuing on 7,700 acres through June 1998. Limited grazing occurs on portions of Chico Creek located on PCD and the private ranch (M. Canestorp, Pueblo Chemical Depot, pers. comm.). The Transportation Technology Center (TTC) has not been grazed by cattle since the facility began operation in the early 1970s (G. Spons, TTC, pers. comm.).

The hydrological processes of the basin appear to be relatively unaltered with the most important process being recharge to the shallow alluvial aquifer. Recharge supporting the wetlands and riparian areas occurs in both Pueblo and El Paso counties. Processes that might result in decrease in infiltration (i.e., increase in hard surfaces/paving), or increase in water consumption within the basin (more pumping for domestic and agricultural uses), could decrease the amount of water discharging from the seeps and springs. Additionally, factors that might result in a decrease in water quality including increase in use of septic systems and non-point source pollution from roads and other sources, could result in a degradation of water quality discharging from the seeps and springs.

Biodiversity Rank Justification: This site contains a good example of Arkansas darter (*Etheostoma cragini*), a globally-vulnerable eastern plains fish native to small streams in the Arkansas River drainage. The site also includes a fair (C-ranked) occurrence of a globally-imperiled (G2 S2) cottonwood riparian woodland (*Populus deltoides-Pascopyrum smithii-Panicum obtusum*).

Table 27. Natural Heritage element occurrences at the Chico Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Fish								
Etheostoma cragini	Arkansas darter	G3	S2	C	T	FS	B	2000-05-20
Etheostoma cragini	Arkansas darter	G3	S2	C	T	FS	E	1998
Amphibians								
Rana blairi	Plains leopard frog	G5	S3		SC	BLM	E	2000-07-26
Plant Communities								
Populus deltoides / Pascopyrum smithii – Panicum obtusum	Plains cottonwood/ western wheatgrass-vine mesquite	G2	S2				C	2000-07-13
Carex praegracilis	Clustered sedge wetland	G3	S2				B	2000-08-28
Carex praegracilis	Clustered sedge wetland	G3	S2				C	2000-07-26
Scirpus tabernaemontani - Scirpus acutus	Great Plains marsh	G3	S2S3				B	2000-08-28
Populus deltoides/ Sporobolus airoides	Plains cottonwood/ alkali sacaton	G3	S2				C	2000-07-26
Sarcobatus vermiculatus / Sporobolus airoides	Saline bottom shrubland	G3?	SU				C	1997-04-03
Spartina pectinata	Prairie slough grass	G3?	S3				B	2000-08-28
Spartina pectinata	Prairie slough grass	G3?	S3				C	2000-07-26
Scirpus pungens	Bulrush	G3G4	S3				C	2000-09-09

Table 27. Natural Heritage element occurrences at the Chico Creek PCA (cont.).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Sporobolus airoides	Great Plains salt meadows	G3Q	S3				C	1997-04-03
Carex nebrascensis	Wet meadow	G4	S3				B	2000-08-28
Phragmites australis	Marsh	G4	S3				C	1997-04-03
Eleocharis palustris	Emergent wetland	G5	S4				B	2000-08-28

Boundary Justification: The boundary encompasses the northerly extent of the Black Squirrel Creek Arkansas darter population documented by the Colorado Division of Wildlife (2001b) and the wetland and riparian communities supported by the seeps and springs. Although this PCA boundary incorporates the element occurrences, management at the watershed scale is important for their persistence. Conservation attention could include a greater proportion of the groundwater recharge area believed necessary to maintain the seeps and springs supporting the Arkansas darter population and the wetland and riparian plant communities.

Protection Rank Comments: There are definable threats, but none expected to be critical in the next five years. Small lots to the north (near Colorado Springs) are being sold for residential development and continued suburban expansion may threaten the likelihood that large-scale ecological processes such as fire, herbivory, flooding, and groundwater recharge will function naturally. Additionally, development of water supplies for housing subdivisions (i.e., groundwater) could alter the hydrologic regime supporting the wetlands and fishes.

Over 98 percent of the land contained within the PCA is owned by the State Land Board and the Department of Defense. Chico Basin Ranch signed a 25-year lease with the State Land Board in 1999. A longer-term issue is the possibility of the State Land Board selling the property to maximize their return on the land. Increases in land value resulting from growth of Colorado Springs may cause this to be a major concern in the future.

At the Pueblo Chemical Depot, all missions, except storage of chemical munitions, were terminated in 1994 and environmental restoration of the installation is one of the depot's highest priorities. Pueblo Chemical Depot is studying various options for transferring the property to a new owner, potentially a conservation agency or organization willing to manage for native ecosystem values.

Management Rank Comments: From the perspective of natural heritage elements on the PCA, current management appears appropriate for maintaining the element occurrences. Management actions being considered that could improve the quality of the element occurrences include improvement of native small fishes habitat, non-native species management, and grazing management. Chico Basin Ranch land managers will be working with Colorado Division of Wildlife to develop a small fishes management plan (Melby 2000). Control of tamarisk on Chico Creek has the potential to greatly improve the quality of the riparian element occurrences and is being considered by the land managers. Chico Basin Ranch is considering altering the grazing regime in the Chico Creek riparian area. Black Squirrel Creek wetlands on the Transportation Technology Center include large patches of Canada thistle (*Cirsium arvense*) and other potentially noxious weeds and could benefit from weed control efforts.

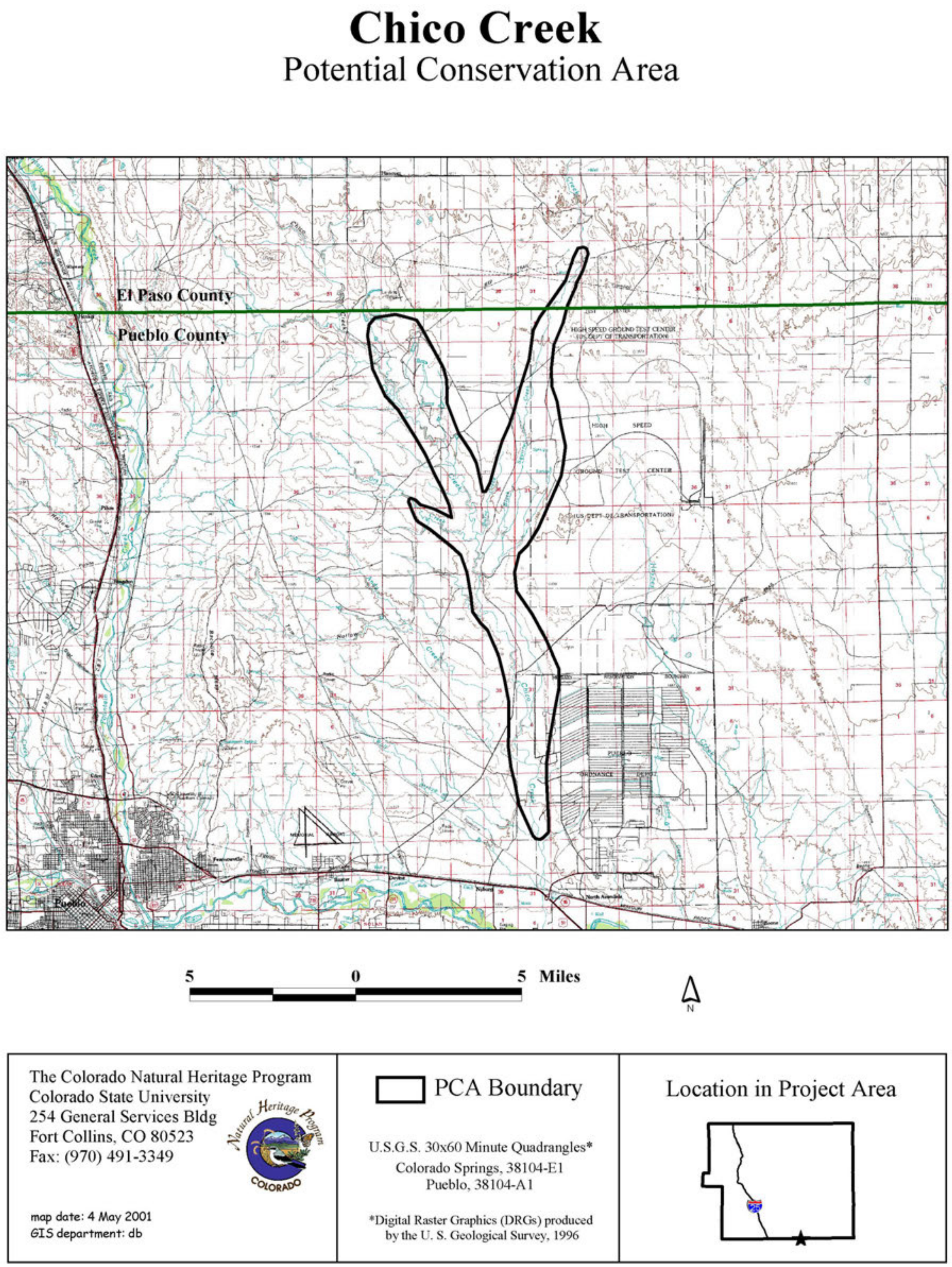


Fig. 28. Chico Creek Potential Conservation Area Map

East Chico Basin Ranch

Biodiversity Rank: B3 (High significance)
This PCA contains excellent (A-ranked) examples of a globally-vulnerable (53 S3) plant species, Plains ambrosia (*Ambrosia linearis*).

Protection Urgency Rank: P4 (Low urgency)
Most of the PCA occurs within leased State Land Board property.

Management Urgency Rank: M4 (Low urgency)
Control non-native species.

Location: El Paso County on the Chico Basin Ranch. South of Meyers Road, approximately 10 miles east-southeast of the main entrance to the Chico Basin Ranch on the Peyton Highway.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Hanover SE
T17S R61W Sections 18, 19, and 30
T17S R62W Sections 13, 22-27, 34, and 35

Size: 3,118 ac (1,262 ha).

Elevation: 5,220 to 5,320 ft (1,591 to 1,622 m).

General Description: This PCA includes islands of shortgrass prairie surrounded by rolling sandhills and sandsage prairie. These islands are poorly drained and relatively flat, though not as flat as the playas to the north and east. Soils are less sandy than in the surrounding area and support vegetation similar to that of playas, with buffalograss (*Buchloe dactyloides*) as the dominant species, and prairie coneflower (*Ratibida tagetes*) also prevalent. Overall, the shortgrass prairie areas have the appearance of extremely large playas due to the similar physiography and vegetation, but may be functionally different from other playas in El Paso County.

This area supports two large, excellent (A-ranked) occurrences of the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*) in the shortgrass basins of the PCA. The western occurrence is located in a basin at the terminus of an ephemeral drainage visible on satellite imagery. This is the largest known natural occurrence of plains ambrosia, with an estimated population size of at least 20,000 individuals. Cover of plains ambrosia throughout the occurrence ranges from nearly 0 to 25 percent throughout most of the occurrence in unaltered areas. Cover exceeds 50 percent in the vicinity of the road, corral, and water tank area within the occurrence, where plains ambrosia is co-dominant with kochia (*Bassia sieversiana*), an annual weed. Such areas, however, make up a very small portion of the occurrence.

To the east is another excellent (A-ranked) occurrence of the plains ambrosia, in an extremely large playa basin. The plains ambrosia is concentrated around the rim of the playa and in a small slight depression in the center. Small patches of buffalograss are also found here but with large areas of bare ground and patchy blue grama (*Bouteloua gracilis)* and three awn (*Aristida purpurea*).

Other plant species observed in the PCA were yucca (*Yucca glauca*), rocky mountain bee plant (*Cleome serrulata*), alkali sacaton (*Sporobolus airoides*), snakeweed (*Gutierrezia sarothrae*), locoweed (*Oxytropis* sp.), and a native thistle (*Cirsium* sp.).

A large prairie dog town also resides in the western basin, and may be excellent Mountain Plover breeding habitat. Mountain Plovers have been observed within the PCA.

Biodiversity Rank Justification: This PCA contains two excellent (A-ranked) occurrences of the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*).

Table 28. Natural Heritage element occurrences at East Chico Basin Ranch PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3				A	2000-09-12
Ambrosia linearis	Plains ambrosia	G3	S3				A	2000-09-26

Boundary Justification: The boundary of the PCA encompasses the known occurrences of plains ambrosia in the Chico Basin Ranch and the surrounding area. Additional surrounding area is included due to the presence of apparently suitable habitat and topography for the plains ambrosia.

Protection Rank Comments: This PCA is entirely included within the Chico Basin Ranch, which is owned by the State Land Board. It is currently leased to managers who are sensitive to the biodiversity significance of this area.

Management Rank Comments: The current management and grazing regime appear to favor the persistence of the plains ambrosia within the PCA. Weeds are present and present some threat to the elements in the PCA, but appear to be limited at this time primarily to roads, corrals, and water tanks in the PCA. Kochia and Russian thistle (*Salsola iberica*) are the two most common weeds in the PCA.

East Chico Basin Ranch
Potential Conservation Area

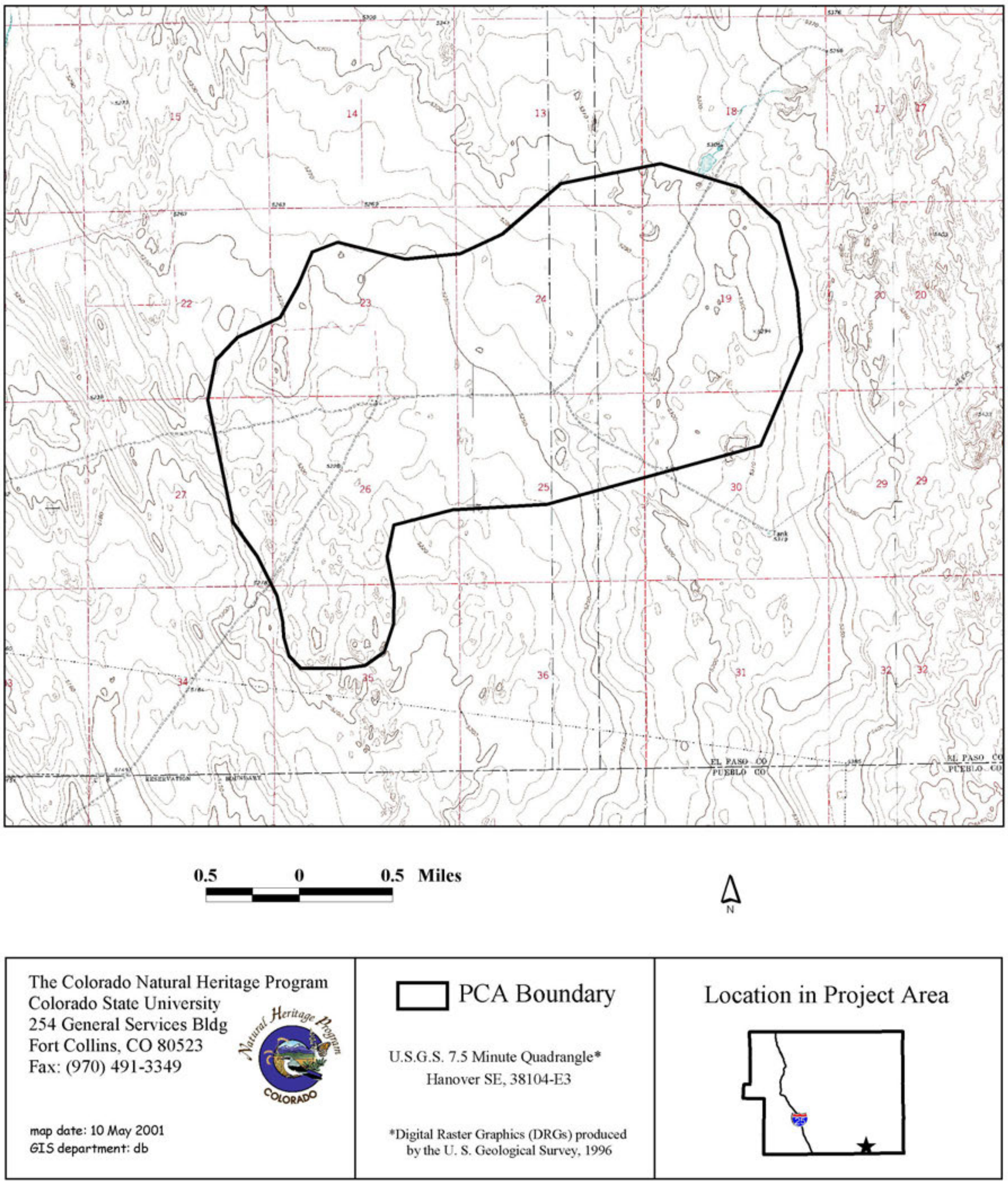


Fig. 29. East Chico Basin Ranch Potential Conservation Area Map

Farish Recreation Area

Biodiversity Rank: B3 (High significance)
This PCA contains a fair (C-ranked) example of the globally-imperiled (G2 S2) Porter's feathergrass (*Ptilagrostis porteri*), a good occurrence (B-ranked) of a globally-vulnerable (G3 S1) dryland sedge (*Carex oreocharis*), and a good (B-ranked) occurrence of a globally-vulnerable (G3 S3) Parry's oatgrass (*Danthonia parryi*) montane grassland.

Protection Urgency Rank: P4 (Low urgency)
Most of the PCA is currently owned by the U.S. Air Force Academy.

Management Urgency Rank: M3 (Moderate urgency)
Control non-native species.

Location: El Paso County, northeast of the town of Woodland Park.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Woodland Park, Cascade, Palmer Lake
T12S R68W Sections 15, 16, 20-22, 28, and 29

Size: 752 ac (304 ha).

Elevation: 9,050 to 9,440 ft (2,758 to 2,877 m).

General Description: This PCA includes much of the Farish Memorial Recreation Area. The landscape within this PCA is diverse, with the steep, rugged topography typical of the Rampart Range. The steep slopes of the area are studded with countless large, rounded granite boulders, giving the slopes a striking lumpy appearance. These uplands support subalpine forests dominated by Engelmann spruce (*Picea engelmannii*) and quaking aspen (*Populus tremuloides*). Among the steep ridges and slopes are mesic meadows, streams, and willow carrs. Several streams have been dammed in the recreation area to create Sapphire Lake, Leo Lake, and Grace Lake. During the summer, afternoon rain showers occur almost daily. West facing slopes are drier than other slopes. The PCA is used heavily by elk in the fall and winter.

This PCA contains the only known occurrence of Porter's feathergrass (*Ptilagrostis porteri*) in El Paso County. This species is known only from Colorado, known currently from only three counties (Park, El Paso, and Summit). The occurrence is located south of Leo Lake in the Farish Memorial Recreation Area. The plants are found in a limited area in deep, peaty soils in a willow carr/sedge meadow peatland. The plants are growing in clumps in a hummocky area,
with tufts of the grass growing on top of the hummocks. The dominant species are willows, including planeleaf willow (*Salix planifolia*), shortfruit willow (*S. brachycarpa* ssp. *brachycarpa*), and possibly mountain willow (*S. cf. monticola*). Shrubby cinquefoil (*Pentaphylloides floribunda*) is also common with the Porter's feathergrass. Other associated taxa include sedges (*Carex utriculata*, *C. aquatilis, C. simulata, C.*

lanuginosa), hairgrass (*Deschampsia caespitosa*), Canadian reedgrass (*Calamagrostis canadensis*), foxtail grass (*Alopecurus aequalis*), and rosecrown (*Clementsia rhodantha*).

The montane grassland community in the southern portion of the PCA occupies one of the largest grass-dominated openings in the forests of the Rampart Range. The grassland community is Parry's oatgrass (*Danthonia parryi*) (G3 S3) with Idaho fescue (*Festuca idahoensis*), fringed sage (*Artemisia frigida*), three-nerved fleabane (*Erigeron subtrinervis*), and hairy aster (*Heterotheca villosa*). A globally-vulnerable (G3 S1) dryland sedge (*Carex oreocharis*) occurs within the Parry's oatgrass meadow.

Biodiversity Rank Justification: This PCA contains a fair (C-ranked) occurrence of Porter's feathergrass, a globally-imperiled (G2 S2) species, a good (B-ranked) occurrence of the globally-vulnerable (G3 S1) dryland sedge (*Carex oreocharis*), and a good (B-ranked) occurrence of the montane grasslands plant community that is vulnerable on a global scale (G3 S3).

Table 29. Natural Heritage element occurrences at the Farish Recreation Area PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ptilagrostis porteri	Porter's feathergrass	G2	S2			FS, BLM	C	2000-09-13
Carex oreocharis	A dryland sedge	G3	S1				B	2000-07-26
Plant communities								
Danthonia parryi	Montane grassland	G3	S3				B	1996-08-28

Boundary Justification: The boundary encompasses the occurrences and adjacent similar habitat not known to be impacted at this time. Open meadows to the north of the Parry's oatgrass montane grassland have been planted with smooth brome and Kentucky bluegrass, while meadows to the south have several roads or trails within them. Both areas have been excluded from the site. The site itself would not include all necessary processes (especially fire) for survival of the montane grassland occurrence, but the processes could be simulated at a smaller scale. The watershed of the creek that supports the occurrence of Porter's feathergrass within the PCA was included to delineate the area needed to ensure the persistence of the proper hydrologic regime for this species.

Protection Rank Comments: Most of the site is currently owned by the Air Force Academy and operated as Farish Recreation Area. The site extends onto Pike National Forest.

Management Rank Comments: Management to control exotic species may be needed within five years to maintain the current quality. Recreation activities could potentially impact the site. A road/campground runs along the boundary of the willow carr/sedge meadow, potentially serving as a conduit for non-native species.

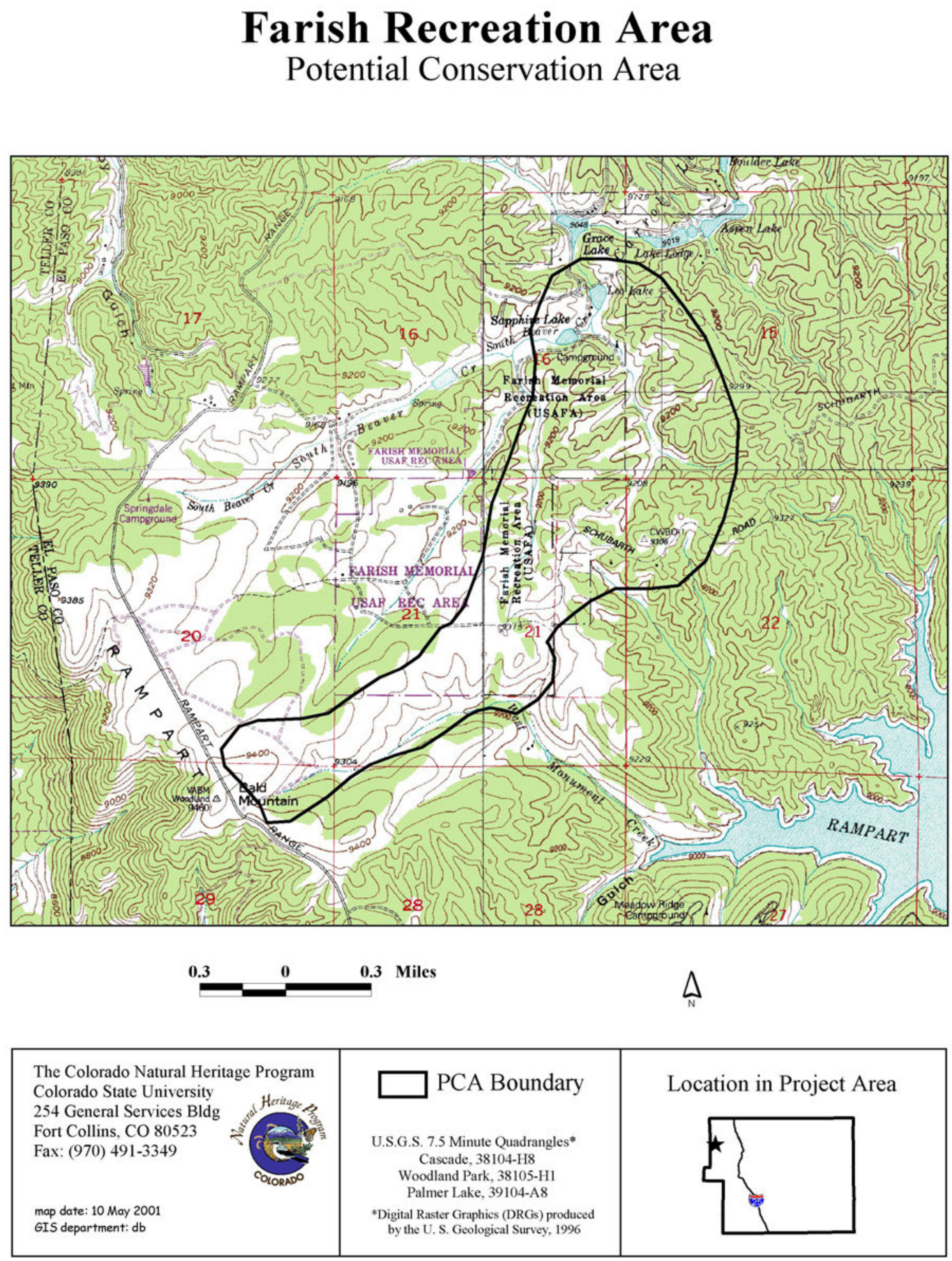


Fig. 30. Farish Recreation Area Potential Conservation Area Map

Fremont Fort

Biodiversity Rank: B3 (High significance)
This PCA contains a good (B-ranked) example of a globally-imperiled (G2 S2) tallgrass community, big bluestem–prairie sandreed (*Andropogon gerardii-Calamovilfa longifolia*). This site also contains a good example of the globally-secure state-rare (G5 S1) Richardson's alumroot (*Heuchera richardsonii*).

Protection Urgency Rank: P4 (Low urgency)
The Fremont Fort PCA is privately owned by a single landowner.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate for maintenance of the element occurrences. Managing grazing by livestock to promote the existence and expansion of the community would be beneficial. Although weeds did not appear to be prevalent at the time of our visit, an active weed management program is important to ensure that invasion by exotic weedy species does not occur.

Location: Fremont Fort PCA is located in north-central El Paso County near the El Paso-Elbert County line about eight miles northeast of Peyton.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Peyton
T11S R63W Sections 2 and 11

Size: 1,088 ac (440 ha).

Elevation: 6,890 ft (2,100 m).

General Description: This site contains a good occurrence of a globally-imperiled (G2 S2) big bluestem prairie sandreed tallgrass prairie plant community (*Andropogon gerardii – Calamovilfa longifolia* tallgrass prairie). In Colorado, two occurrences of this community type have been recorded, both in El Paso County. Although this occurrence is fairly small, it is in good condition and seems to have escaped heavy grazing in recent times.

The big bluestem prairie sandreed tallgrass community occurs on the upper slopes, drainage swales, and saddles surrounding the main rock outcrops of the Fremont Fort and associated geologic formations. The community primarily occurs on areas with deeper soils, and is often adjacent to or interspersed with open stands of ponderosa pine (*Pinus ponderosa*). Large portions of the site are managed as a private game hunting preserve and likely also contain additional stands of this community type. Due to its management for game hunting, we were unable to gain access to those areas at the time of the survey.

Associated with tallgrass prairie are at least five species of skippers (butterflies in the family Hesperiidae) known to rely on big bluestem as their primary host plant (Opler and

Wright, 1999). These eastern Great Plains skippers occur, like tallgrass prairie, as disjunct populations along the Colorado Front Range. Though we have no current records of these species within the Fremont Fort PCA, three skippers tracked by CNHP have been documented in El Paso County (Colorado Natural Heritage Program, 2001; Opler *et al*., 1995). These include the dusted skipper (*Atrytonopsis hianna*) (G4G5 S2), crossline skipper (*Polites origines*) (G5 S3), and Ottoe skipper (*Hesperia ottoe*) (G3G4 S2). Future surveys have the potential to reveal populations of these rare butterflies at the Fremont Fort site.

This site also supports an excellent occurrence of the globally-secure (G5) plant species (*Heuchera richardsonii*). The Richardson's alumroot occurs on the steep and rocky approaches to the top of the mesa. We identified a large number of plants on the north facing slope, but it is possible that additional survey of the surrounding slopes will reveal additional occurrences.

Table 30. Natural Heritage element occurrences at the Fremont Fort PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Heuchera richardsonii	Richardson's alumroot	G5	S1				A	2000-10-25
Plant Communities								
Andropogon gerardii-Calamovilfa longifolia	Western Great Plains tallgrass prairies	G2	S2				B	2000-10-25

Biodiversity Comments: This site contains a good (B-ranked) occurrence of a globally-imperiled (G2 S2) big bluestem prairie sandreed tallgrass prairie community (*Andropogon gerardii-Calamovilfa longifolia*) and an excellent (A-ranked) occurrence of the globally-secure (G5 S1) Richardson's alumroot (*Heuchera richardsonii*). Large occurrences of the tallgrass prairie community type are rarely encountered in Colorado and no A-ranked occurrences remain. In Colorado, the *Andropogon gerardii-Calamovilfa longifolia* prairie has only been reported from El Paso County. Similar plant communities have been seen in Douglas and Elbert counties but they are generally very small (usually less than five acres) and degraded by invasion of exotic plant species (S. Kettler, The Nature Conservancy, pers. comm.).

Boundary Justification: The boundary encompasses the tallgrass prairie and adjacent habitat types that typify this prairie system. This includes the mesa tops and upslope areas that provide runoff and infiltration to the existing stands and areas also likely to support this community.

Protection Rank Comments: The land is privately owned by a single landowner. Currently (2001), the primary land uses in the PCA are cattle grazing and big game hunting; however, development pressures are extremely high throughout the area, making this property vulnerable to future development.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. Non-native plants were not overly evident at the time of our site visit. An active management program to control invasive non-native species will be important over the long-term.

Fremont Fort
Potential Conservation Area

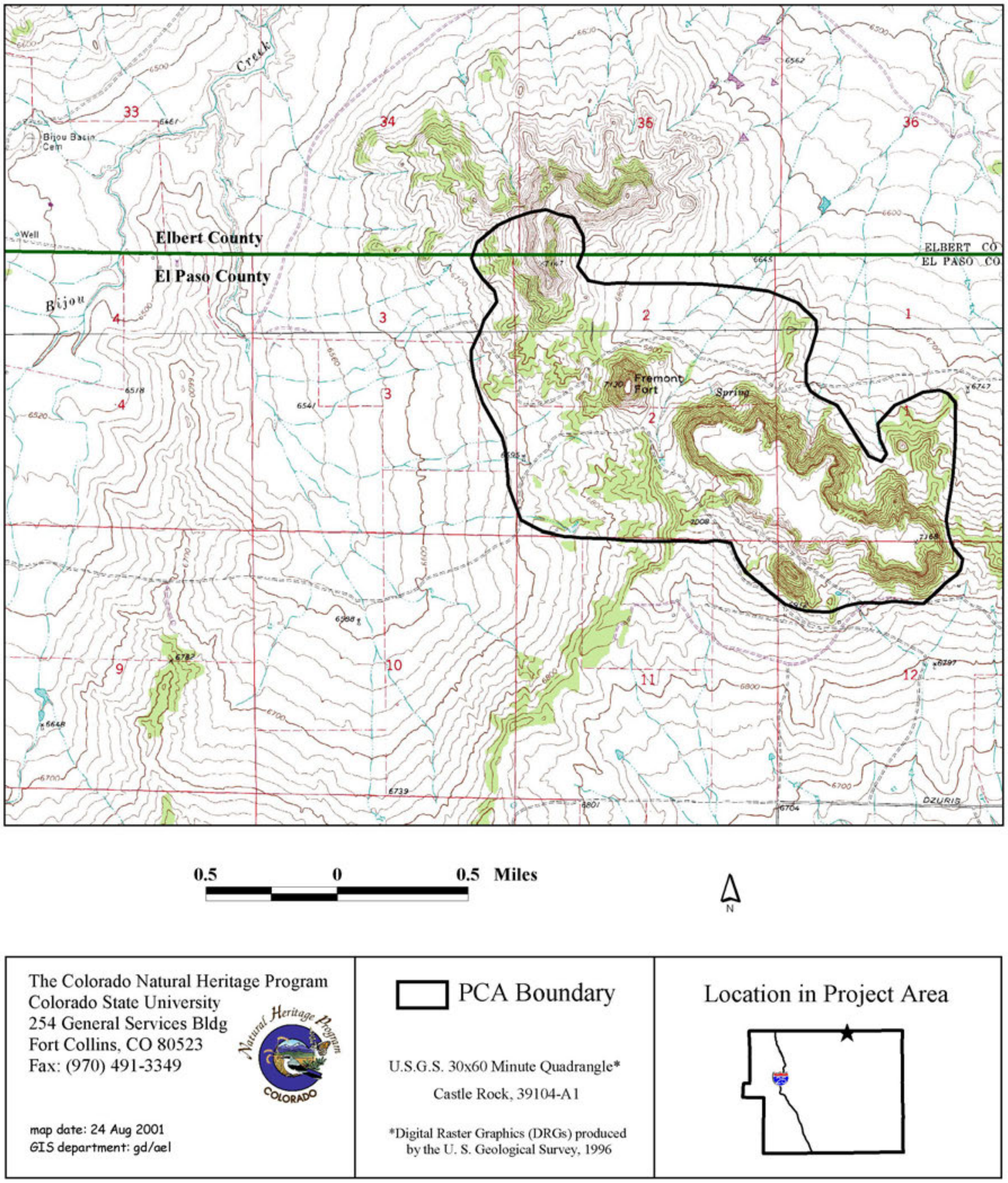


Fig. 31. Fremont Fort Potential Conservation Area Map

Olney Prairie

Biodiversity Rank: B3 (High significance)
The Olney Prairie site supports an unranked occurrence of the globally- and state-imperiled (G2 S2B, SZN) Mountain Plover (*Charadrius montanus*), a species designated as sensitive (BLM, Forest Service), as a candidate for federal listing as threatened/endangered, and as a species of special concern (State of Colorado). Black-tailed prairie dogs (G4 S4) and Burrowing Owls (G4 S4B) also occur within the Olney Prairie site.

Protection Urgency Rank: P4 (Low urgency)
Protection actions are needed to secure long-term conservation. Currently, the land owned by the State Land Board is managed with conservation in mind.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements on this site, but new management actions may be needed in the future to maintain the current quality of these occurrences.

Location: The Olney Prairie site is located in El Paso and Pueblo counties to the north and west of the U.S. Department of Transportation's High Speed Ground Test Center. Most of the site lies to the west of Black Squirrel Creek, although a portion of the site extends eastward across the creek. Much of the north-central portion of the Chico Basin Ranch lies within the Olney Prairie site.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Hanover, Hanover SE, Bar JH Ranch
T17S R62W Sections 21-34.
T17S R63W Sections 25, 26, 34-36.
T18S R62W Sections 6, 30.
T18S R63W Sections 1-3, 10-14, 23-26, 35, 36.
T19S R63W Sections 1, 2.

Size: 11,582 ac (4,687 ha).

Elevation: 4,950 to 5,250 ft (1,509 to 1,600 m).

General Description: The Olney Prairie site encompasses an extensive tract of native shortgrass prairie with ground cover that consists primarily of closely-grazed stands of blue grama (*Bouteloua gracilis*). Cholla (*Opuntia imbricata*) and soapweed (*Yucca glauca*) occur in scattered to moderately-dense stands on some portions of the site. Plant species diversity generally is low throughout the Olney Prairie site. Soils, which are part of the Stoneham-Adena-Manzanola association, consist mainly of deep, well-drained loams, clay loams, sandy loams, and silty clay loams. Grazing of domestic livestock occurred historically on most or all of the site, and today grazing continues on most of the site.

Black-tailed prairie dogs (a C-ranked occurrence) and Burrowing Owls (an unranked occurrence) also inhabit the Olney Prairie site.

Biodiversity Rank Justification: An unranked occurrence of the globally- and state-imperiled (G2 S2B, SZN) Mountain Plover is known within the Olney Prairie site. Breeding Mountain Plovers have been observed at scattered locations within this site for many years. In April and May 2001, breeding plovers again were observed at the Olney Prairie site.

Table 31. Natural Heritage element occurrences at the Olney Prairie PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Charadrius montanus	Mountain Plover	G2	S2B, SZN	C	SC	BLM, FS	E	2001-04-20
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-20
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	E	2001-06-03

Boundary Justification: The boundary encompasses the numerous locations at which breeding Mountain Plovers were observed during April-May 2001 or during previous years. The site also includes adjacent areas of suitable breeding habitat.

Protection Rank Comments: The entire site is owned by the Colorado State Land Board. No protection actions are thought to be necessary in the foreseeable future, but protection actions are needed to secure long-term conservation. Present land uses are not incompatible with the maintenance of a viable breeding assemblage of Mountain Plovers on the site.

Management Rank Comments: Current management seems to favor the persistence of the Mountain Plovers, but changes in management practices may be needed in the future to maintain the current quality of the birds' habitat. Factors that might prompt the need for new management actions might include the effects of grazing and other agricultural practices, additional land development, and the impacts of human activities and disturbances within the site. Continuation of current livestock grazing practices may benefit Mountain Plovers by maintaining the closely-cropped vegetation preferred by these birds.

Olney Prairie
Potential Conservation Area

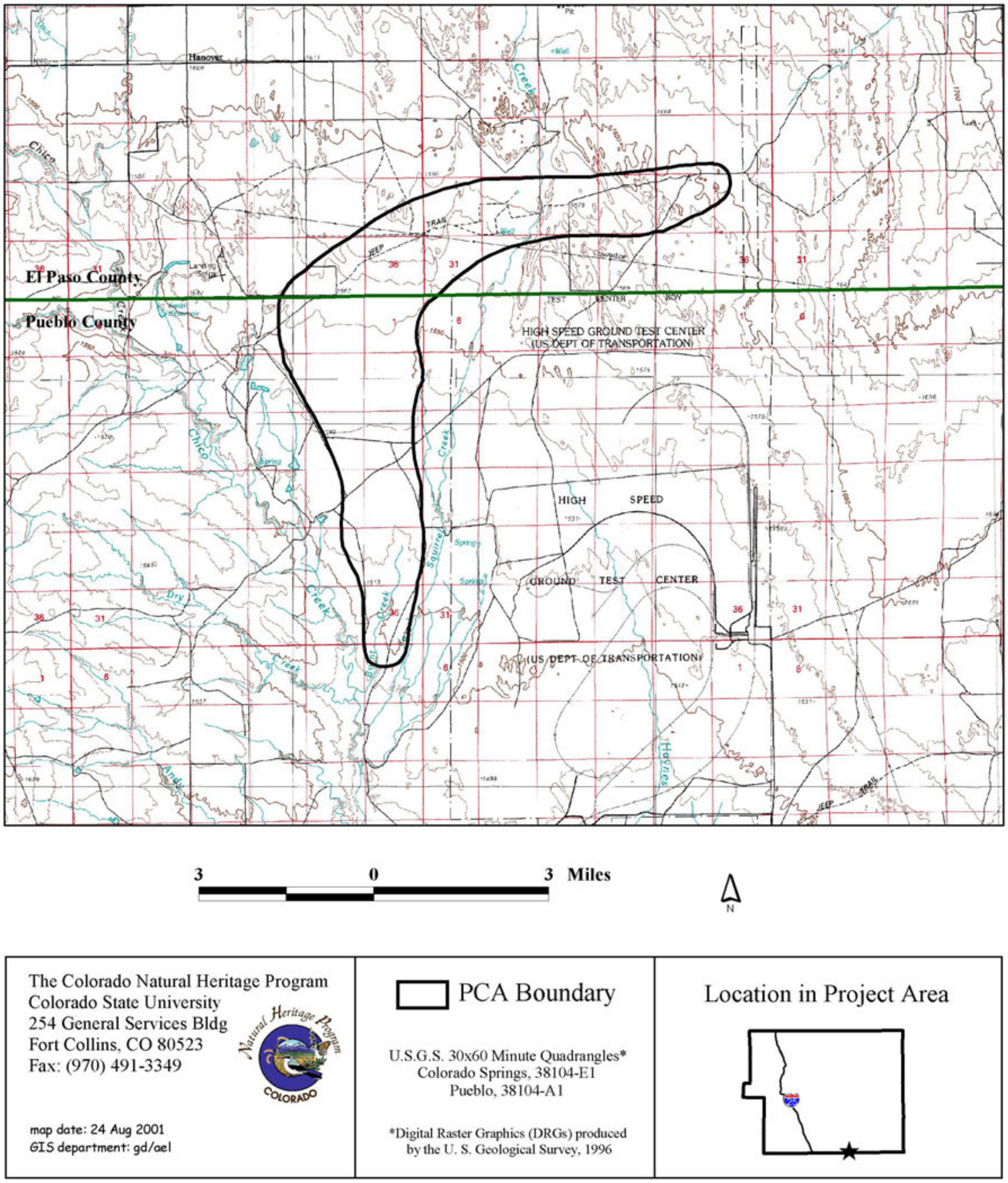


Fig. 32. Olney Prairie Potential Conservation Area Map

Riser at Calhan

Biodiversity Rank: B3 (High significance)
The Riser at Calhan PCA supports two good (B-ranked) occurrences of plains ambrosia (*Ambrosia linearis*), a globally-vulnerable (G3 S3) plant species.

Protection Urgency Rank: P3 (Moderate urgency)
This PCA may become increasingly threatened by expanding residential development when US 24 is widened.

Management Urgency Rank: M3 (Moderate urgency)
Current management may be congruent with the persistence of the plains ambrosia at this location. Management that promotes natural hydrologic conditions is likely to ensure the persistence of this element in this PCA.

Location: El Paso County, northeast of Calhan. The PCA is bisected by US Highway 24 and the Chicago Rock Island and Pacific Railroad line.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Calhan and Ramah South
T11S R61W Sections 28-32
T11S R62W Sections 25 and 36
T12S R61W Sections 5 and 6
T12S R62W Section 1

Size: 2,564 ac (1,038 ha).

Elevation: 6,300 to 6,700 ft (1,920 to 2,042 m).

General Description: The Riser at Calhan PCA is located within a mile northeast of the incorporated area of Calhan, and continues north and northeast for approximately three miles. All of the area within the PCA is privately owned except for the right-of-way areas. The area is near the upper elevational extent of shortgrass and midgrass prairies in El Paso County, approaching 6,600 ft (2,035 m) at its southeastern boundary. This area includes the highest of the high plains in El Paso County. The landscape is topographically diverse in this area, with high rolling hills in the eastern portion overlooking the bottomlands upslope from an unnamed reservoir at the northwestern edge of the PCA. Numerous drainages flow in a generally northern direction from the PCA towards Big Sandy Creek.

The PCA includes two good (B-ranked) occurrences of plains ambrosia (*Ambrosia linearis*). The habitat for the plains ambrosia in this area is somewhat different than that further south, where this species inhabits playas (dry lakes). In the Riser at Calhan PCA this species is found in shallow draws and in a depression in a pasture. These occurrences also mark the upper elevational limit of occurrences known to be extant at this time. Plains ambrosia is also common on the roadsides within this PCA, including US Highway 24 and Harrisville Road.

Biodiversity Rank Justification: Two good (B-ranked) occurrences of the globally-vulnerable (G3 S3) plains ambrosia (*Ambrosia linearis*) are present within the PCA. These occurrences are ecologically significant because the plant is found at high elevation and in slightly different habitat than elsewhere in El Paso County.

Table 32. Natural Heritage element occurrences at the Riser at Calhan PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	1989
Ambrosia linearis	Plains ambrosia	G3	S3			FS	B	1989-07-27

Boundary Justification: The boundary encompasses the two known occurrences of plains ambrosia in the area and additional suitable habitat in draws and bottomlands around the occurrences. The roadside occurrences of the species are also included in the PCA, although it was not drawn specifically to include these occurrences.

Protection Rank Comments: With the exception of right-of-way areas, all of the land within this PCA is privately owned. Residential development is already occurring in the vicinity of this PCA. It is likely to increase rapidly in the future as Colorado Springs grows and US 24 is upgraded to a four lane road. Currently most of the land within the site is used for cattle grazing.

Management Rank Comments: Management needs may arise if further hydrological alterations are implemented within the PCA. Weeds present at the site, such as musk thistle (*Carduus nutans*) and white top (*Cardaria draba*) have the potential to negatively impact the occurrences of plains ambrosia here.

Riser at Calhan
Potential Conservation Area

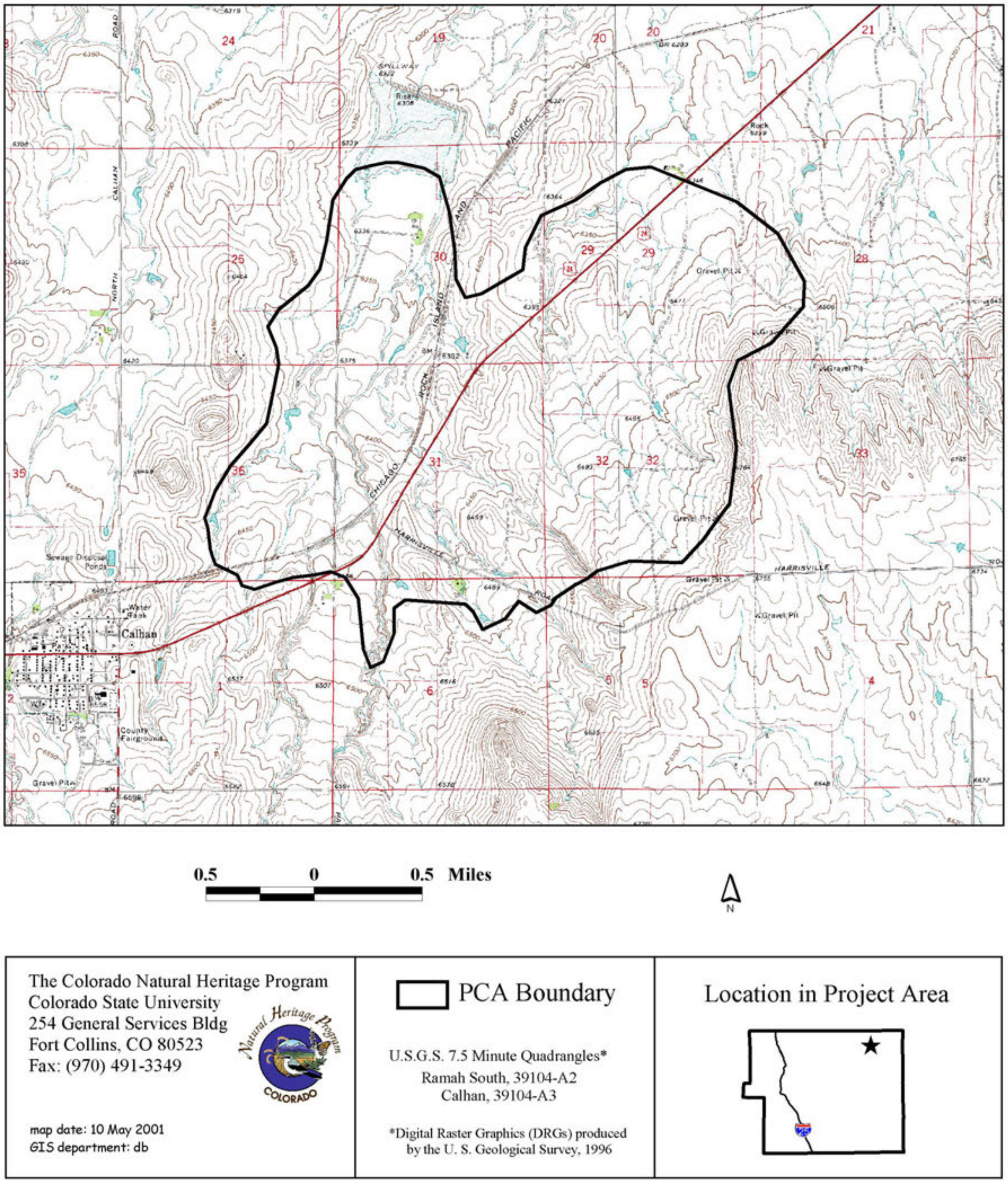


Fig. 33. Riser at Calhan Potential Conservation Area Map

Table Rock

Biodiversity Rank: B3 (High significance)
The Table Rock PCA supports a fair (C-ranked) occurrence of the big bluestem – prairie dropseed xeric tallgrass community (*Andropogon gerardii-Sporobolus heterolepis*), a globally- imperiled (G2) community type that is also critically imperiled/imperiled (S1S2) in the state. This PCA also supports an excellent (A-ranked) occurrence of Richardson's alumroot (*Heuchera richardsonii*) a globally-secure (G5) species that is critically imperiled (S1) in Colorado.

Protection Urgency Rank: P2 (High urgency)
The elements in this PCA are threatened by expansion of low-density residential development onto previously undeveloped mesas, mesa slopes, and surrounding meadows.

Management Urgency Rank: M2 (High urgency)
The elements in this PCA are threatened by invasive species, which have already progressed significantly in the areas adjacent to the PCA.

Location: In north-central El Paso County near the junction of Douglas, Elbert, and El Paso counties. Approximately eight miles north of the town of Black Forest.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Black Forest and Cherry Valley School
T11S R65W Sections 3 and 4.

Size: 192 ac (78 ha).

Elevation: 7,250 to 7,467 ft (2,210 to 2,276 m).

General Description: Table Rock is a distinctive landmark in northern El Paso County. Set in the northeastern portion of the Black Forest area, this wooded mesa overlooks the headwater reaches of East Cherry Creek. It is visible for miles from the south and west as a large flat-topped mesa. Castlerock conglomerate forms the flat top of Table Rock that overlays Paleocene deposits below. The bedrock is exposed on most of the top of Table Rock, leaving only cracks and small patches of soil for a few tenacious herbaceous plants to grow in. The flanks are forested with ponderosa pine (*Pinus ponderosa*), particularly on the north-facing slope, where some large, old trees occur.

In this area, the ponderosa pine woodlands of the Black Forest intersperse with broad areas of prairie grasslands. The prairie grassland matrix is composed primarily of shortgrass species, with scattered patches of mid- and tallgrass species present. A specimen of prairie dropseed (*Sporobolus heterolepis*) was collected from Table Rock in 1891 and indicated the possibility that tallgrass prairie communities would be present there. In 2000, field survey of Table Rock identified small remnant patches of the big bluestem – prairie dropseed prairie (*Andropogon gerardii-Sporobolus heterolepis*) from which the 1891 specimen may have been collected. Several patches of approximately 1,000 square feet or less were noted on the north and east slopes of the mesa. Additional areas to the north likely support this same community type but could not be confirmed due to different land ownership and intensive grazing practices.

Richardson's alumroot (*Heuchera richardsonii*) was also collected at Table Rock in 1891. In 2000, this species was found in the forested area on the north-facing slope of Table Rock. One hundred-and-thirty plants were counted, but many more are likely to occur at this site. Prairie goldenrod (*Unamia alba*) was also collected here in 1891 but this species was not seen in 2000, possibly because it was not flowering when the site was visited. Appropriate habitat was located for this species and it may still be present at this location.

Biodiversity Rank Justification: This PCA supports one fair occurrence (C-ranked) and one historic occurrence of the globally-imperiled (G2 S1S2) big bluestem – prairie dropseed xeric tallgrass prairie community (*Andropogon gerardii-Sporobolus heterolepis*). This xeric tallgrass prairie grassland is found primarily in isolated habitats along the boundary of the Rocky Mountain foothills and western Great Plains. It may also occur at some locations eastward, particularly in Colorado and possibly adjacent states east of Colorado. Fewer than 15 locations of this community are known in Colorado, and these probably represent less than 10 percent of its former range (NatureServe 2001). It occurs in somewhat protected areas where conditions tend to be more mesic than the surrounding shortgrass prairie. Often areas where it is found have been heavily utilized for agriculture and development. In Colorado, this community occurs primarily in habitats that are impacted by grazing, fire suppression, exotic species invasion, and urban development.

It also supports an excellent (A-ranked) occurrence of Richardson's alumroot, a globally-secure (G5) species that is critically imperiled (S1) in Colorado. The prairie goldenrod, another state-rare species (G5 S2S3) was documented here in 1891 and may still occur within the PCA.

Table 33. Natural Heritage element occurrences at the Table Rock PCA.

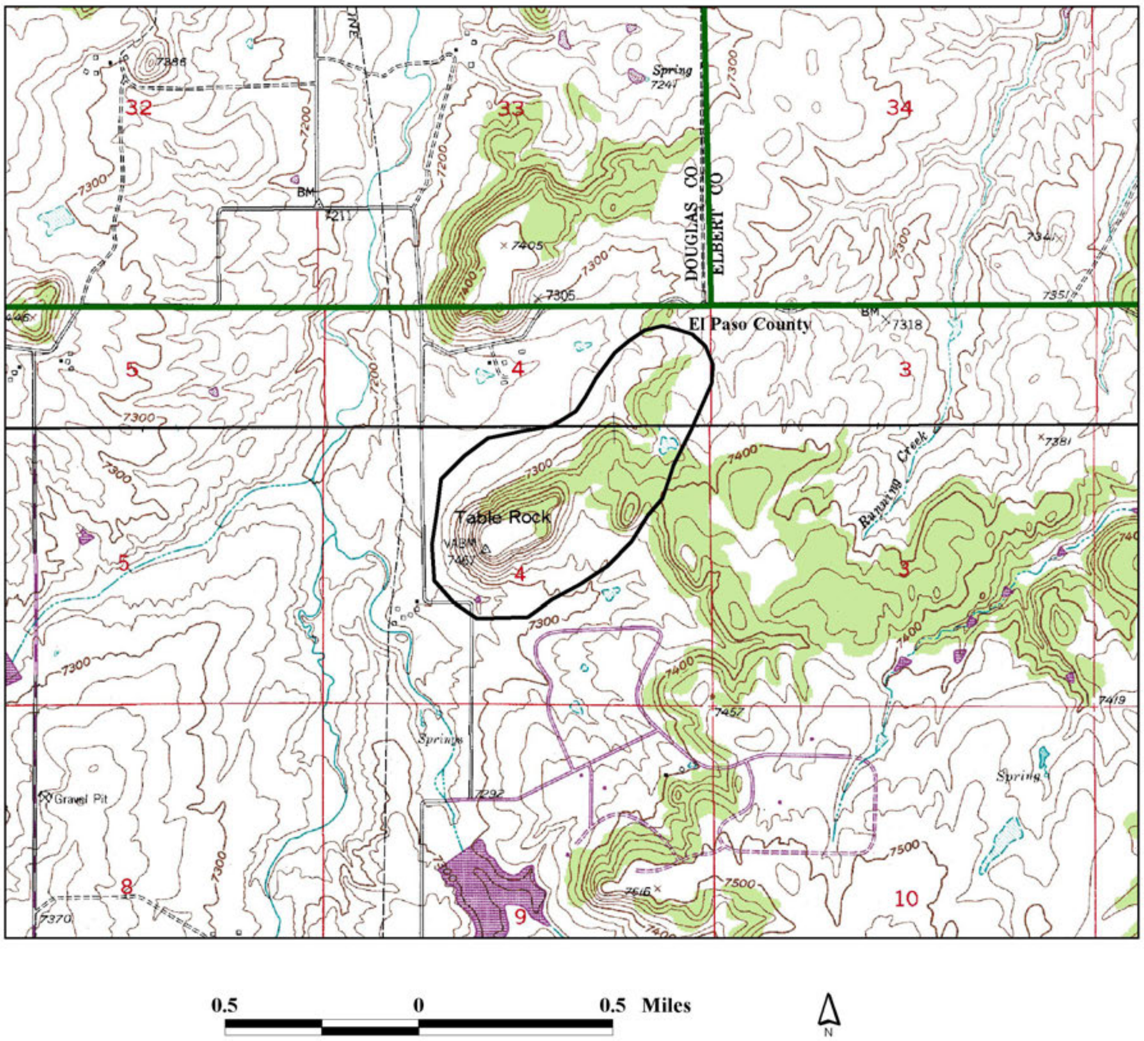
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Andropogon gerardii-Sporobolus heterolepis	Big bluestem – prairie dropseed xeric tallgrass community	G2	S1S2				C	2000-10-21
Plants								
Heuchera richardsonii	Richardson’s alumroot	G5	S1				A	2000-09-11
Unamia alba	Prairie goldenrod	G5	S2S3				H	July 1891

Boundary Justification: The PCA boundary encompasses the known occurrences at Table Rock plus a small buffer. Although the occurrences are not found on the mesa top, it is also included because any disturbance to this portion of the PCA such as residential development would have deleterious effects on the elements present downslope.

Protection Rank Comments: This PCA is entirely privately-owned. Residential development is progressing rapidly in this area. Purchase of conservation easements by the county or land trusts would ensure the persistence of this island of interesting plants and plant communities.

Management Rank Comments: Non-native and invasive species have invaded much of the PCA and surrounding area, represent a serious concern, and will require active management. The most problematic species noted were yellow toadflax (*Linaria vulgaris*), leafy spurge (*Euphorbia esula*), musk thistle (*Carduus nutans*), cheatgrass (*Bromus tectorum*), and non-native pasture grasses such as timothy grass (*Phleum pratense*), and smooth brome (*Bromopsis inermis*). Parts of the PCA are currently fenced off to prevent cattle grazing.

Table Rock
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: 24 Aug 2001
GIS department: gd/ael

PCA Boundary

U.S.G.S. 7.5 Minute Quadrangle*
Black Forest, 39104-A6
Cherry Valley School, 39104-B6

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

Location in Project Area

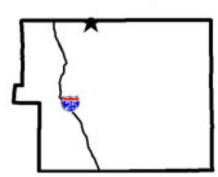


Fig. 34. Table Rock Potential Conservation Area Map

West Kiowa Creek at Elbert

Biodiversity Rank: B3 (High significance)
This PCA contains a good (B-ranked) example of a globally-vulnerable (G3Q S2S3) riparian willow community and two fair (C-ranked) examples of globally-imperiled (G2) riparian willow communities.

Protection Urgency Rank: P2 (High urgency)
The occurrences are directly threatened by development in the towns of Kiowa and Elizabeth. Alteration of the hydrologic regime in Black Forest in El Paso County can affect the occurrences in Elbert County.

Management Urgency Rank: M2 (High urgency)
Sections within the PCA boundary are severely degraded but recoverable.

Location: Elbert and El Paso counties. West Kiowa Creek PCA is located primarily in Elbert County. The stream originates within the Black Forest in El Paso County.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Elbert, Eastonville
T9S R64W Sections 34 and 35
T10S R64W Sections 2-4, 8-11, 16, 17, 31, and 32
T11S R64W Sections 5 and 6

Size: 1,742 ac (705 ha).

Elevation: 6,720 to 7,200 ft (2,048 to 2,195 m).

General Description: This PCA encompasses a foothills ephemeral stream with meanders and pockets of thick willows and stands of plains cottonwood (*Populus deltoides* ssp. *monilifera*). This is a high quality low elevation riparian area. Only a small portion of the site lies within El Paso County; however, El Paso County comprises the headwaters of the creek and is therefore very important to the lower reaches of the creek.

Biodiversity Comments: This PCA contains a good (B-ranked) example of a globally-vulnerable (G3Q S2S3) riparian willow community and a fair (C-ranked) example of globally- imperiled/vulnerable (G2G3 SU) riparian willow community.

Boundary Justification: The alluvial floodplain and riparian area is constricted by roads. The downstream boundary of the PCA is the town of Elbert. The upstream boundary marks the start of compatible management. Further upstream the creek bottom is severely degraded.

Table 34. Natural Heritage element occurrences at the West Kiowa Creek at Elbert PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Salix eriocephala var. *ligulifolia*	Willow carr	G2G3	S2S3				C	1995-07-02
Salix amygdaloides/ Carex lanuginosa	Peachleaf willow alliance	G3	SU				C	1995-07-01
Salix lucida ssp. *caudata*	Montane riparian shrubland	G3Q	S2S3				B	1995-07-01
Populus deltoides ssp. *monilifera-(Salix amygdaloides)/ Salix exigua*	Plains cottonwood riparian woodland	G4?	S3				E	1995-06-29

Protection Rank Comments: This PCA may be threatened by development in the towns of Kiowa and Elizabeth.

Management Rank Comments: Sections within the PCA boundaries are severely degraded but recoverable.

West Kiowa Creek at Elbert

Potential Conservation Area

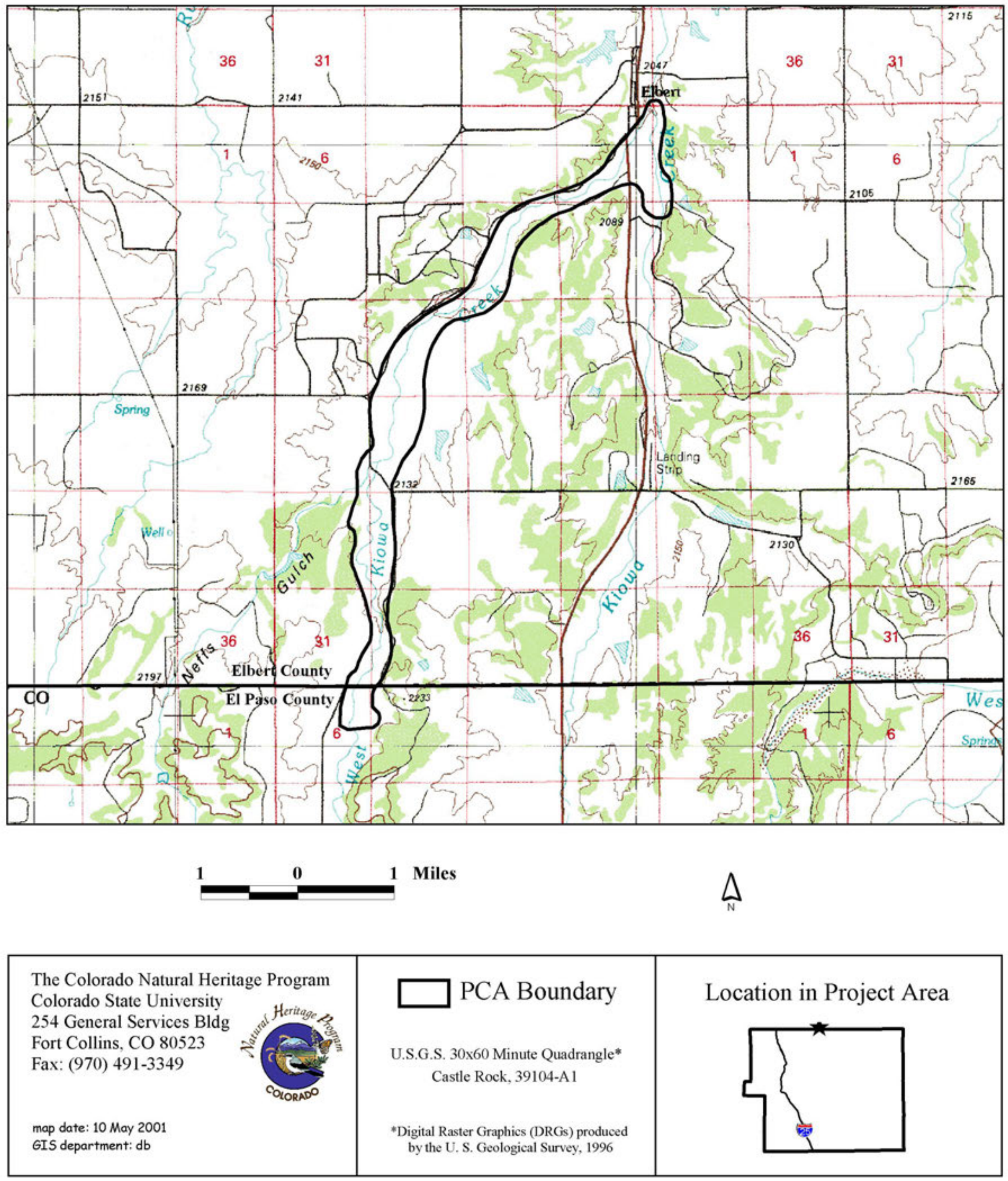


Fig. 35. West Kiowa Creek at Elbert Potential Conservation Area Map

Black Forest

Biodiversity Rank: B4 (Moderate significance)
The Black Forest site contains a fair (C-ranked) occurrence of the globally-vulnerable (G3) Southern Rocky Mountain cinquefoil (*Potentilla ambigens*) and numerous good-to-poor occurrences of woodland prairie relict plant species. Overall, ten occurrences of five state-rare plant species are included within the Black Forest site.

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years. It is estimated that within five years, stresses may reduce the viability of the elements in the Black Forest PCA.

Management Urgency Rank: M2 (High urgency)
New management actions may be needed within five years to prevent the loss of the element occurrences in the Black Forest PCA.

Location*:* El Paso County, including Vollmer Hill and the town of Black Forest, northeast of Colorado Springs. Shoup Road traverses the PCA.

Legal Description:
U.S.G.S. 7.5-Minute Quadrangles: Black Forest, Falcon NW
T12S R65W Sections 2, 3, 7-11, 14-22, 28-30.
T12S R66W Sections 12-14, 23-25.

Size: 8,511 ac (3,444 ha).

Elevation: 7,080 to 7,704 ft (2,158 to 2,348 m).

General Description: Near its northernmost limit, the Black Forest PCA includes the highest point in the Black Forest (Vollmer Hill at 7,704 ft; 2,376 m) and drops in elevation to the south to 7,080 ft (2,183 m) at its southern boundary. The headwaters of numerous creeks and streams radiate from this PCA, including Black Squirrel Creek, Kettle Creek, Cherry Creek, and Sand Creek. The Black Forest is unique in that it is the only place in Colorado where montane forest grows east of the Front Range and foothills. On vegetation maps, satellite images, and even from the summit of Pikes Peak, this extension of forest into the plains is very conspicuous. The flora and structure of this forest resemble that of the Black Hills in South Dakota. Additionally, many species found within the Black Forest are also found disjunctly in the Black Hills.

Many of the plant species that this PCA includes are considered "woodland prairie relicts" which were once more common in Colorado and have diminished here due to climatic change. The Black Forest offers these species a refuge in which they can persist, widely disjunct from other populations of the same species. Long-term separation of populations of this sort can lead to allopatric speciation (the formation of new species *via* geographic isolation from parent populations), and for this and other reasons these disjunct populations are interesting and worthy of conservation attention. The Richardson alumroot (*Heuchera richardsonii*), prairie goldenrod (*Unamia alba*), birdfoot violet (*Viola pedatifida*), and Selkirk's violet (*V. selkirkii*) are all common elsewhere but rare in Colorado. Although no occurrences are present in this PCA, the gay feather (*Liatris ligulistylis*) is another species that is found in the Black Forest that falls into this category. It prefers open meadows in the Black Forest and appears to have diminished greatly there due to fire suppression and ecosystem transformation.

One occurrence of the Southern Rocky Mountain cinquefoil (*Potentilla ambigens*) was found during 2000 in this PCA. This species is restricted in range to the Southern Rocky Mountains and is only found in isolated areas in New Mexico and Colorado.

Biodiversity Rank Justification: This PCA contains a fair (C-ranked) occurrence of the globally-vulnerable (G3) Southern Rocky Mountain cinquefoil. This PCA also contains numerous good-to-poor occurrences of woodland prairie relict plant species. These species are state-rare and disjunct from other parts of their range. Overall, ten occurrences of five state-rare species are included within this PCA.

Table 35. Natural Heritage element occurrences at the Black Forest PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Potentilla ambigens	Southern Rocky Mountain cinquefoil	G3	S1S2				C	2000-09-14
Heuchera richardsonii	Richardson alumroot	G5	S1				C	2000-09-14
Viola pedatifida	Birdfoot violet	G5	S2				A	2000-09-14
Viola pedatifida	Birdfoot violet	G5	S2				B	2000-05-12
Viola pedatifida	Birdfoot violet	G5	S2				C	1991-06-05
Unamia alba	Prairie goldenrod	G5	S2S3				C	1996-08-29
Unamia alba	Prairie goldenrod	G5	S2S3				C	2000-09-14
Unamia alba	Prairie goldenrod	G5	S2S3				E	1983-08-16
Unamia alba	Prairie goldenrod	G5	S2S3				E	1990-07-17
Viola selkirkii	Selkirk's violet	G5?	S1				E	1996-09-06

Boundary Justification: The PCA boundary for Black Forest includes all the known occurrences within the area for the target plant species. Suitable habitat areas surrounding the occurrences are included due to the high probability that other occurrences remain undiscovered in the vicinity.

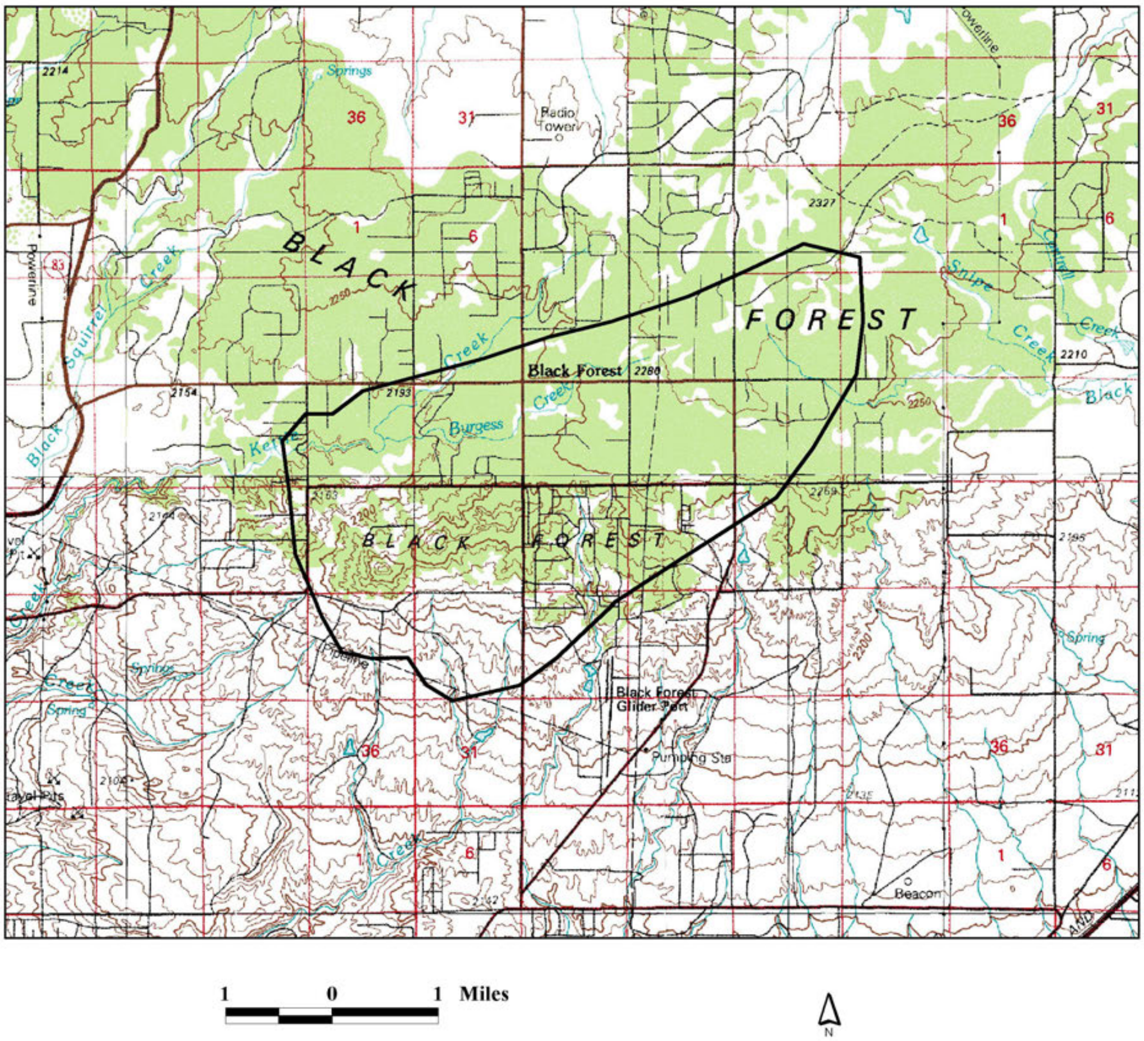
Protection and Management Comments: Most of the land within the Black Forest PCA is privately owned. One section (section 16) is owned by the Colorado State Land Board and is leased to the School in the Woods. Five of the ten element occurrences in the PCA are contained within this section. Current management practices in this section favor the persistence of the elements located there, whereas surrounding areas are threatened by rapid, ongoing residential development.

Weeds threaten all of the occurrences in the PCA. Particularly menacing is yellow toadflax (*Linaria vulgaris*). This species was found near all of the occurrences revisited in 2000 and grows vigorously in natural and disturbed areas throughout the Black Forest, and can displace native species.

Private lands within the PCA are in moderate to poor condition overall, but improvement is possible. In most areas, fire suppression has resulted in dense, doghair stands of ponderosa pine (*Pinus ponderosa*). The fire-maintained open savannahs that historically dominated the area have largely succeeded to closed canopy forest, reducing the quality and availability of habitat for the elements in the PCA. The potential for destructive crown fires appears high in many areas.

Part of the occurrence of the birdfoot violet at La Forêt is growing on a mowed lawn that is surrounded by ponderosa forest and an adjacent riparian area. The birdfoot violet likely was present prior to human alteration of the area, and may persist as a response to the removal of competing taller grass and forb species as a result of mowing.

Black Forest
Potential Conservation Area



The Colorado Natural Heritage Program
Colorado State University
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Fax: (970) 491-3349

map date: 24 Aug 2001
GIS department: gd/ael

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangles*
Colorado Springs, 38104-E1
Castle Rock, 39104-A1

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

Location in Project Area

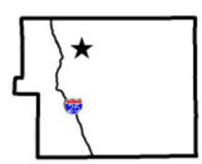


Fig. 36. Black Forest Potential Conservation Area Map

Cheyenne Mountain

Biodiversity Rank: B4 (Moderate significance)
This PCA contains an excellent (B-ranked) example of a globally-secure (G5 S4) mixed-grass community, western wheatgrass-blue grama grass (*Pascopyrum smithii-Bouteloua gracilis*) and an excellent (A-ranked) example of an unranked (GU SU) Gambel's oak-sun sedge shrubland community (*Quercus gambelii/Carex inops* ssp. *heliophila*). Additional elements contained within the site are the golden columbine (*Aquilegia chrysantha* var. *rydbergii*), crossline skipper (*Polites origines*), black-tailed prairie dog (*Cynomys ludovicianus*), Mountain Plover (*Charadrius montanus*), Peregrine Falcon (*Falco peregrinus*), and Ovenbird (*Seiurus aurocapillus*).

Protection Urgency Rank: P3 (Moderate urgency)
A large portion of the Cheyenne Mountain site is within the newly created Cheyenne Mountain State Park. Additional lands to the north and west of the state park are in private and federal (U.S. Air Force) ownership. Planned development of the Cheyenne Mountain State Park has the potential to impact the elements and significantly reduce their overall viability and quality. Portions of the site on federal and private land outside of the state park are susceptible to development and impact from maintenance operations.

Management Urgency Rank: M3 (Moderate urgency)
Construction and use of the newly created Cheyenne Mountain State Park could impact the elements at the site. Park planners and managers will need to consider the location and sensitivities of the elements to minimize negative impacts from park development. Currently the site is relatively free of invasive species; however, with additional development and traffic into the site, weeds have the potential to become more prevalent. Effort should be taken to ensure that an effective weed management program is established to prevent the introduction and spread of invasive species on the site.

Location: Cheyenne Mountain PCA is located in the foothills of west-central El Paso County, south of Colorado Springs, and just west of the northern end of the Fort Carson Military Reservation. It extends from the edge of the rolling prairie grasslands near Highway 115 to nearly the top of Cheyenne Mountain. It includes most of the Limekiln Valley, portions of the Cheyenne Mountain Air Force Station, and private and federal lands to the north and west.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Cheyenne Mountain, Colorado Springs
T15S R66W Sections 7, 17-20, and 30
T15S R67W Sections 11-14, 23-26

Size: 3,794 ac (1,535 ha).

Elevation: 5,965 to 9,000 ft (1,818 to 2,743 m).

General Description: The Cheyenne Mountain PCA occupies an area at the ecotone between the prairie grasslands of the Great Plains and the lower montane foothill forests of the Front Range. It encompasses portions of both the prairie and the foothill forest ecosystems and as a result it supports a very diverse flora and fauna. It supports one of the best remaining examples of the Front Range foothills mesic oak-shrub ecosystems, as well as remnants of tallgrass prairie. Remnant foothill grasslands of big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and mountain muhly (*Muhlenbergia montana*) support a variety of butterfly species, including the crossline skipper (*Polites origines*). The lower elevation portions of the Cheyenne Mountain PCA are dominated by prairie grasslands with shortgrass and midgrass species interspersed with scattered islands of Gambel's oak (*Quercus gambelii*). In these areas, several black-tailed prairie dog (*Cynomys ludovicianus*) towns are present, and these towns support other species such as Mountain Plovers and possibly Burrowing Owls.

On higher elevation areas, of ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), and white fir (*Abies concolor*) forests dominate steep, rocky slopes. A mosaic of mixed woodlands and shrublands of Douglas fir, ponderosa pine, one-seeded juniper (*Juniperus monosperma*), pinyon pine (*Pinus edulis*), Gambel's oak, mountain mahogany (*Cercocarpus montanus*), skunkbush sumac (*Rhus trilobata*), and yucca (*Yucca glauca*) forms an interface between the prairie and woodland ecosystems.

Biodiversity Rank Justification: This site contains a good (B-ranked) occurrence of a globally-secure (G5 S4) western wheatgrass-blue grama (*Pascopyrum smithii-Bouteloua gracilis*) shortgrass prairie community and an excellent (A-ranked) occurrence of an unranked (GU SU) mesic oak thickets community (*Quercus gambelii*/*Carex inops* ssp. *heliophila*). This site also supports a good (B-ranked) occurrence of an apparently globally-secure (G4T1Q S1) golden columbine subspecies (*Aquilegia chrysantha* var. *rydbergii*). The site was designated for the plant communities and those elements were used to determine the biodiversity rank. Additionally, the site includes several black-tailed prairie dog towns that support other species such as Mountain Plover.

Boundary Justification: The boundary encompasses the lower elevation prairie grasslands and extends up toward the top of the Cheyenne Mountain basin to include the higher elevation forests of Douglas fir and ponderosa pine. On the east, the boundary extends up to Highway 115 to include the shortgrass prairies and associated prairie dog towns. To the north, the boundary extends beyond the border of the state park up to the areas previously converted to residential development. Though the site contains an occurrence of golden columbine, the site boundary was not drawn for that occurrence.

Protection Rank Comments: The Cheyenne Mountain PCA is partially contained within the newly created Cheyenne Mountain State Park. Currently the land is undeveloped with the exception of some small ranch trails and other historical ranch infrastructure. Development plans for the state park call for the construction of visitor, maintenance, and park management facilities, as well as residential and retail areas. Final design and scope of those facilities will determine the degree of impact to the site elements.

Table 36. Natural Heritage element occurrences at the Cheyenne Mountain PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Aquilegia chrysantha var. *rydbergii*	Golden columbine	G4T1Q	S1				B	1998-11-23
Plant Communities								
Pascopyrum smithii-Bouteloua gracilis	Great Plains shortgrass prairie	G5	S4				B	2000-09-24
Quercus gambelii/ Carex inops ssp. *heliophila*	Mesic oak shrublands	GU	SU				B	2000-09-24
Animals								
Polites origines	Crossline skipper	G5	S3				E	2000-06-22
Seiurus aurocapillus	Ovenbird	G5	S2B, SZN				E	2000-06

Management Rank Comments: Future management of the park could consider minimizing fragmentation of grasslands and other habitats. Also, future plans for the Park might include an active weed management program to minimize the introduction of invasive species and ensure rapid and effective control.

Cheyenne Mountain
Potential Conservation Area

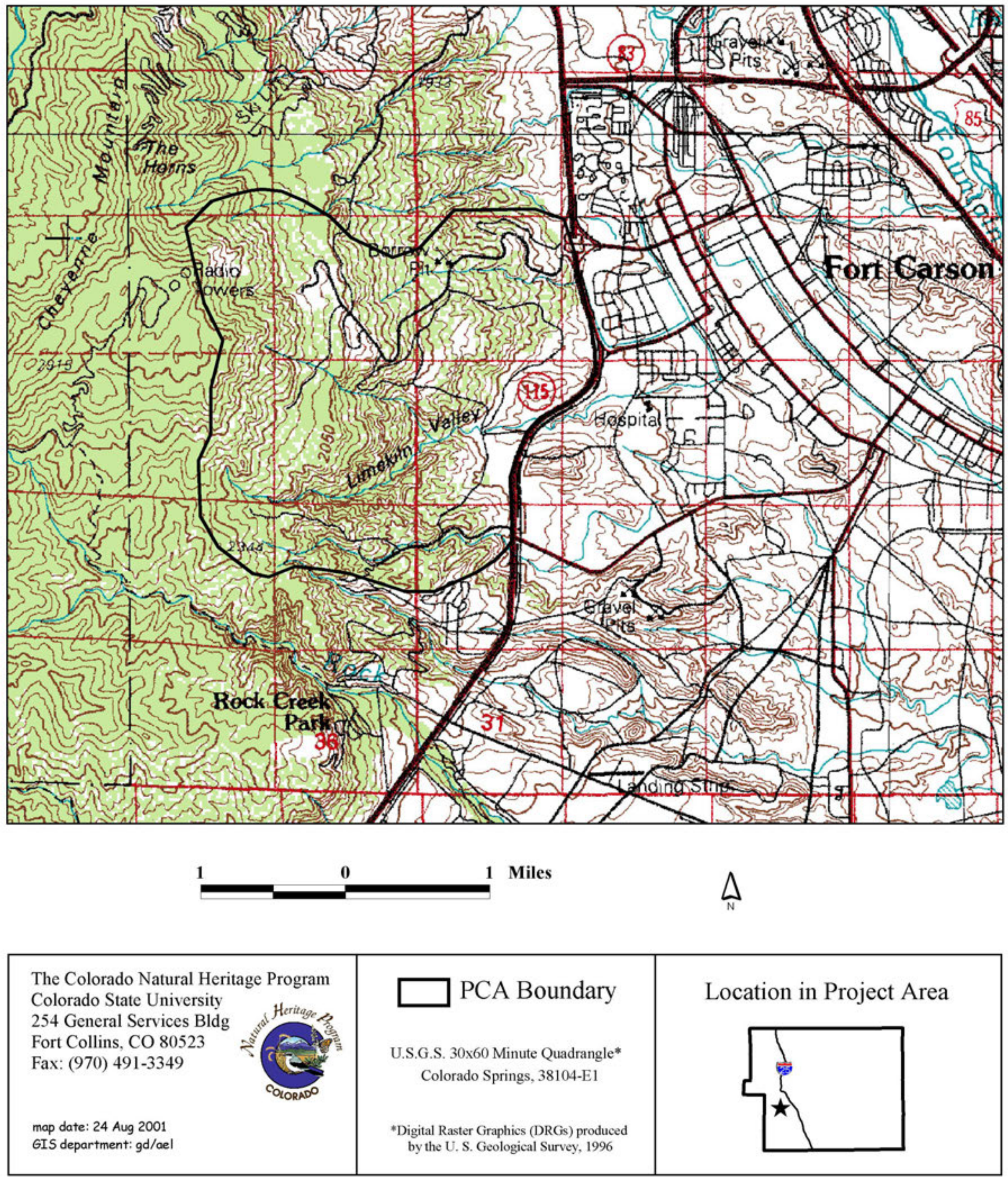


Fig. 37. Cheyenne Mountain Potential Conservation Area Map

Fountain and Jimmy Camp Creeks

Biodiversity Rank: B4 (Moderate significance)
This PCA contains an extant (E-ranked) example of Arkansas darter (*Etheostoma cragini*), a globally-vulnerable (G3 S2) fish species.

Protection Urgency Rank: P2 (High urgency)
Changes in the hydrologic regime of Fountain Creek and development on the banks of Fountain and Jimmy Camp creeks have the potential to extirpate Arkansas darters from these reaches.

Management Urgency Rank: M2 (High urgency)
New management actions may be needed to prevent the loss of this species from these stream reaches.

Location: Portions of Fountain Creek and Jimmy Camp Creek in southern El Paso County. Fountain Creek north of the Williams Creek confluence to Fountain Creek Regional Park. Jimmy Camp Creek north from its confluence with Fountain Creek to the Colorado Springs Airport.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Elsmere, Fountain, Buttes, Fountain SE
T14S R65W Sections 34 and 35
T15S R65W Sections 2, 3, 10, 11, 14, 15, 22, 23, 26-28, and 30-34
T15S R66W Sections 25 and 36
T16S R65W Sections 4-8, 17, 20, 21, 28, 29, 32, and 33
T17S R65W Sections 3, 4, 9-11, 13-15, 23, and 24

Size: 5,221 ac (2,113 ha).

Elevation: 5,240 to 5,900 ft (1,597 to 1,798 m).

General Description: This PCA is encompassed within the Fountain Creek watershed, which is comprised of 927 square miles. The Fountain Creek watershed includes portions within eleven governmental jurisdictions (Monument, Palmer Lake, Fountain, Woodland Park, Manitou Springs, Green Mountain Falls, City and County of Pueblo, Colorado Springs, Teller County, and El Paso County). The Colorado Division of Wildlife has documented the Arkansas darter, a globally-vulnerable (G3 S2) small plains fish, in two reaches of Fountain Creek. This PCA encompasses the more northerly occurrence of the two Fountain Creek occurrences of Arkansas darter.

The Arkansas darter occurs within portions of the riparian corridor of Fountain Creek from Williams Creek north to a point between the towns of Widefield and Fountain (Colorado Division of Wildlife 2001b). Additionally, the Arkansas darter occurs within portions of the Jimmy Camp Creek riparian corridor north to the Colorado Springs Airport (Colorado Division of Wildlife 2001b). Arkansas darters are small Great Plains fish native to streams in the Arkansas River basin and are known to inhabit small, shallow, clear streams that are often spring-fed and have sandy substrates, slow current, cool water, and aquatic vegetation (Nesler *et al*. 1999). In Fountain and Jimmy Camp creeks, Arkansas darters are probably most abundant in spring-fed marshes adjacent to the creeks and not within the main channels. Other fish species that have been documented to occur with the Arkansas darter include fathead minnows (*Pimephales promelas*), flathead chubs (*Platygobio gracilis*), longnose daces (*Rhinichthys cataractae*), and brook sticklebacks (*Culaea inconstans*) (Colorado Division of Wildlife 2001d).

As the Fountain Creek Watershed has become increasingly urbanized, problems associated with Fountain and Monument Creeks and their tributaries have become apparent. Erosition, sedimentation, and flooding problems have highlighted the need to understand the consequences of development in the watershed on channel stability and habitat changes. Factors contributing to the watershed changes have resulted primarily from rapid area growth and include:

- An increase in impervious surfaces (i.e., roads, rooftops, parking lots) which lead to increased stormwater runoff;
- Flood plain encroachment;
- Increased urban irrigation;
- Creek restraints;
- Increased wastewater treatment plant discharges;

These problems and issues are being addressed by a group composed of local governments in the water shed (City of Colorado Springs, El Paso County, City of Fountain, Green Mountain Falls, Manitou Springs, Town of Monument, Palmer Lake, City of Pueblo, Pueblo County, Teller County, Woodland Park, Colorado Springs Utilities), state and federal agencies (U.S. Army Corps of Engineers, Colorado Department of Public Health and Environment, Soil Conservation Districts, military installations), Pikes Peak Area Council of Governments, and Pueblo Area Council Governments. The primary goal of this group is to take a regional and coordinated approach to protection and restoration of the Fountain Creek Watershed. To date, the watershed group (and related ancillary groups) has:

- Established an outreach program by: producing a webpage www.fountain-crk.org, starting a quarterly newsletter, holding public outreach and planning meetings, giving speaking engagements, and writing press releases and articles;
- Developed a work scope and timeline;
- Completed Phase I of the “Fountain Creek Watershed Plan”;

- Developed a Fountain Creek Watershed GIS report;
- Ensured a federal interest and identified a local sponsor (City of Colorado Springs);
- Determined a funding structure for future work.

In the next several years, this group will:

- Identify and prioritize regional projects to improve the watershed condition;
- Determine spatial and temporal changes along Fountain and Monument Creeks;
- Add information to the existing watershed information database;
- Develop technical and policy strategies for watershed management.

This forum will be an excellent tool to assist in conservation of the plants, animals, and plant communities that are native to this region.

Reaches of Fountain Creek support a riparian forest of plains cottonwood with coyote willow. Unfortunately, Russian olive (*Elaeagnus angustifolia*), crack willow (*Salix fragilis*), and tamarisk (*Tamarix ramosissima*), all invasive exotic species, comprise much of the vegetative cover and thus contribute to ecosystem degradation. However, the riparian vegetation provides important habitat for a range of bird species and is an important migration corridor along the Front Range. In fact, Fountain Creek Regional Park, located within the PCA, has been designated by the National Audubon Society as an Important Bird Area (IBA) of Colorado (Cafaro 2000). The IBA designation is based on the area's providing essential wetland habitat and resources for resident and migrant species. Observers have recorded over 250 bird species in the park. A Great Blue Heron rookery supporting over 50 pairs is located in the riparian area. Also documented as breeding within the Fountain Creek riparian area are Bullock's Orioles and Swainson's Hawks (Cafaro 2000). Other wildlife known in the riparian area includes beavers, muskrats, and white-tailed deer. A bike trail runs along portions of Monument and Fountain Creeks and interpretive programs focusing on hands-on environmental education occur within Fountain Creek Regional Park.

Biodiversity Rank Justification: This site contains an extant (E-ranked) occurrence of a globally-vulnerable (G3 S2) fish, the Arkansas darter.

Table 37. Natural Heritage element occurrences at the Fountain and Jimmy Camp Creeks PCA.

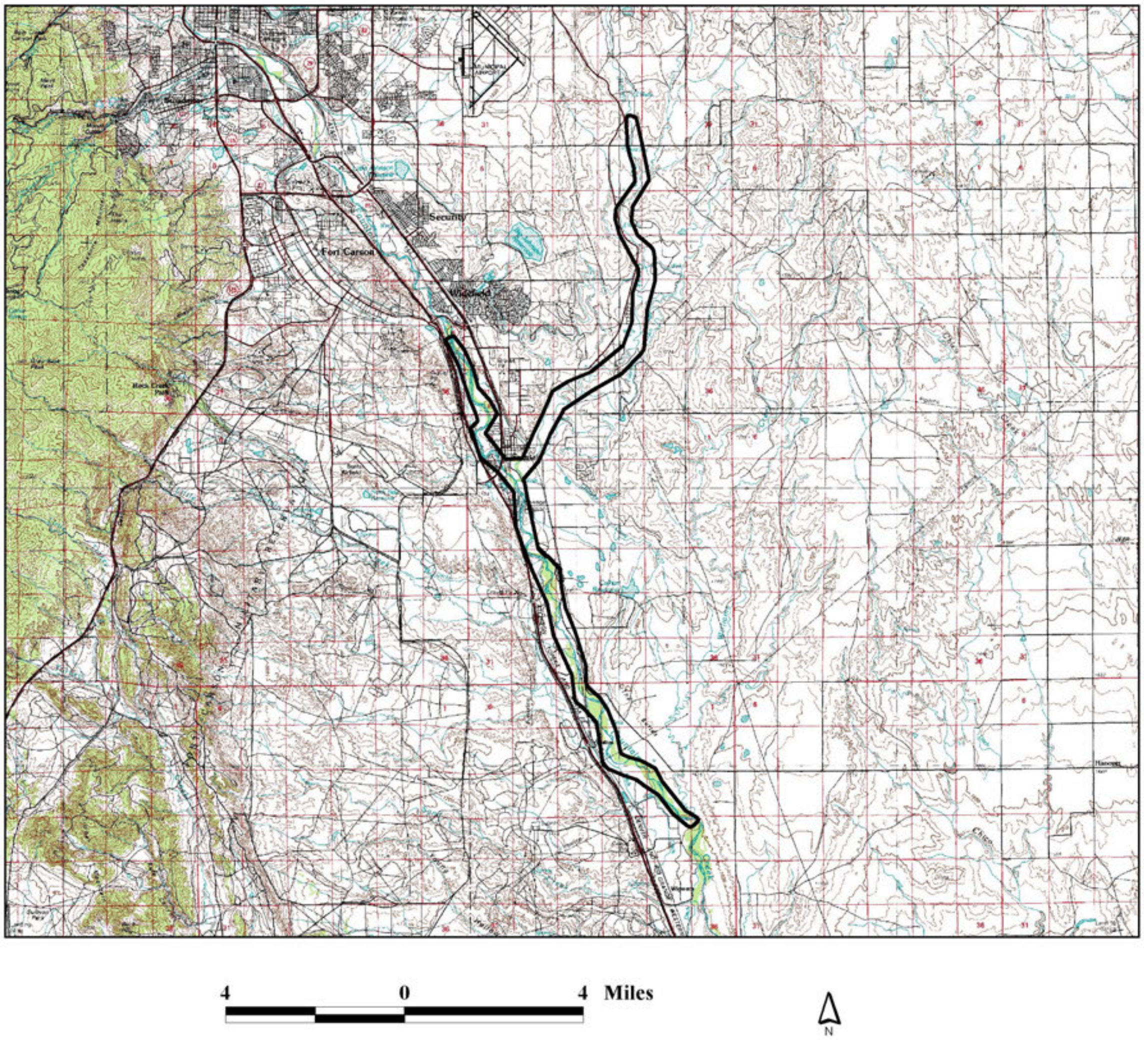
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Etheostoma cragini	Arkansas darter	G3	S2	C	T	FS	E	1980 – see CDOW

Boundary Justification: The boundary encompasses the reaches of Fountain and Jimmy Camp creeks considered to be occupied Arkansas darter habitat by the Colorado Division of Wildlife (Colorado Division of Wildlife 2001b). The PCA could be expanded to include a greater proportion of the upstream watershed to ensure maintenance of the ecological and hydrological processes necessary to support the Arkansas darter population. Alterations to the hydrologic regime outside the PCA boundary could impact the Arkansas darter.

Protection Rank Comments: The land is primarily privately owned with a portion managed by El Paso County Parks as Fountain Creek Regional Park. Residential and industrial development is occurring within the watershed and on creek banks at a rapid pace, decreasing the creek's natural ability to accommodate flooding. Recent (i.e., April/May 1999) flooding along Fountain Creek removed large acreages of wetlands and adjacent riparian habitat. Another issue within the Fountain Creek watershed is water quality with increased point source and non-point source pollution loading to the creek.

Management Rank Comments: Group efforts at devising management strategies for the Fountain Creek watershed are underway. The principal issues are flooding and streambank erosion, sedimentation, and water quality degradation.

Fountain and Jimmy Camp Creeks
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: 10 May 2001
GIS department: db

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle*
Colorado Springs, 38104-E1

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

Location in Project Area

Fig. 38. Fountain and Jimmy Camp Creek Potential Conservation Area Map

Pineries at Black Forest

Biodiversity Rank: B4 (Moderate significance)
The Pineries at Black Forest PCA supports a fair (C-ranked) occurrence of the globally-vulnerable/apparently secure (G3G4) ponderosa pine and sun sedge woodland (*Pinus ponderosa/Carex inops* ssp. *heliophila*) which is imperiled (S2) in Colorado; a fair (C-ranked) occurrence of the globally-vulnerable/apparently secure (G3G4) ponderosa pine and little bluestem woodland (*Pinus ponderosa/Schizachyrium scoparium*) which is critically imperiled (S1) in Colorado; and a good (B-ranked) occurrence of Richardson's alumroot (*Heuchera richardsonii*) a globally-secure (G5) species that is critically imperiled (S1) in Colorado.

Protection Urgency Rank: P2 (High urgency)
The elements in this PCA are threatened by low-density residential development that is proceeding rapidly in this area.

Management Urgency Rank: M3 (Moderate urgency)
The elements in this PCA are threatened by weed invasion, which has already progressed significantly here.

Location: This PCA is in northcentral El Paso County near the northeast side of the Black Forest. Located south of Hodgen Road, approximately 1.75 miles east of Meridian Road, and nine miles north of the town of Falcon.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Black Forest and Eastonville
T11S R64W Sections 19 and 30
T11S R65W Sections 21-28, 33-36
T12S R65W Sections 1-3, 10-12, 14, 15

Size: 6,115 ac (2,475 ha).

Elevation: 7,400 to 7,700 ft (2,995 to 3,116 m).

General Description: The Pineries at Black Forest PCA occupies an area of the Black Forest from just east of Vollmer Hill and extending east and northeast over the headwater reaches of West Kiowa Creek, Black Squirrel Creek, and Snipe Creek. The Black Forest consists of a mosaic of woodlands and forest dominated almost exclusively by ponderosa pine, and occasionally including individual trees of Rocky Mountain juniper *(Juniperus scopulorum*) and, less frequently, small patches of aspen (*Populus tremuloides*). The forested areas are frequently broken by meadows of shortgrass, midgrass, and tallgrass species including little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), prairie sandreed (*Calamovilfa longifolia*), porcupine needlegrass (*Stipa spartea*), northern dropseed (*Sporobolus heterolepis*), poverty oatgrass (*Danthonia spicata*), blue grama (*Bouteloua gracilis*), and buffalograss (*Buchloe dactyloides*). The Black Forest area is unique in being the only place in Colorado where montane ponderosa pine (*Pinus ponderosa*) forest grows east of the Front Range foothills. Although previous land uses have modified the composition and structure of the Black Forest, the Pineries at Black Forest PCA supports fair examples of two ponderosa pine woodland communities: ponderosa pine with sunsedge and ponderosa pine with little bluestem. The ponderosa pine with sunsedge community is characterized by a tree canopy exclusively dominated by ponderosa pine and an open understory relatively devoid of shrubs. In areas with a more closed canopy, the herbaceous layer is dominated by sun sedge (*Carex inops* ssp. *heliophila*). In smaller meadows and areas with a somewhat more open canopy, the herbaceous layer is dominated by little bluestem (*Schizachyrium scoparium*) within a matrix of blue grama (*Bouteloua gracilis*) and bare ground. Other graminoid species commonly present include big bluestem (*Andropogon gerardii*), prairie sandreed (*Calamovilfa longifolia*), poverty oatgrass (*Danthonia spicata*), and buffalograss (*Buchloe dactyloides*).

The ponderosa pine with little bluestem woodland type is very similar in structure to the ponderosa pine with sun sedge/woodland community type in that the tree overstory is dominated exclusively by ponderosa pine and the open understory is nearly devoid of shrubs. Unlike the ponderosa pine with sun sedge woodland community type, the herbaceous understory of this community type is dominated by little bluestem. This type is considered a dry woodland type more common to the Great Plains of the United States. Occurrences of this type in the more eastern portions of its range are believed to develop as pines become established in little bluestem prairie areas lacking recent disturbance (NatureServe 2001). Although prairies dominated by little bluestem do not currently occur around or within the Black Forest, extensive areas of mixed-grass prairie containing little bluestem do occur throughout the area.

The Pineries at Black Forest PCA also supports a good (B-ranked) occurrence of Richardson's alumroot (*Heuchera richardsonii*). Since it is common throughout the rest of its range and since the Colorado portion of the range is isolated to the west of the rest of the range, Richardson’s alumroot is considered disjunct in Colorado.

The Black Forest PCA is approximately two miles west-southwest of this PCA, and many of the plant species supported in the Black Forest PCA could very likely also occur here as well. In addition to Richardson’s alumroot, other disjunct species that may be present in the Pineries at Black Forest PCA include, prairie goldenrod (*Unamia alba*), birdfoot violet (*Viola pedatifida*), Selkirk's violet (*V. selkirkii*), and gay feather (*Liatris ligulistylis*). These species are all common elsewhere but are rare in Colorado.

Biodiversity Rank Justification: This PCA supports a fair (C-ranked) occurrence of the globally-vulnerable/apparently secure (G3G4) ponderosa pine/sun sedge woodland (*Pinus ponderosa/Carex inops* ssp. *heliophila*) which is imperiled (S2) in Colorado; a fair (C-ranked) occurrence of the globally-vulnerable/apparently secure (G3G4) ponderosa pine/little bluestem woodland (*Pinus ponderosa/Schizachyrium scoparium*) which is critically imperiled (S1) in Colorado; and a good (B-ranked) occurrence of Richardson's alumroot (*Heuchera richardsonii*) a globally-secure (G5) species that is critically imperiled (S1) in Colorado. Additionally, two-flowered dwarf dandelion (*Krigia biflora*), a globally secure (G5) species that is critically imperiled (S1) in the state, and plains frostweed (*Crocanthemum bicknellii*), also a globally secure (G5) species that is imperiled (S2) in the state have been documented from this PCA (T. Kelso, Colorado College, pers. comm.).

Table 38. Natural Heritage element occurrences at the Pineries at Black Forest PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Heuchera richardsonii	Richardson's alumroot	G5	S1				B	2000-10-21
Plant Communities								
Pinus ponderosa-Schizachyrium scoparium woodland	Ponderosa pine / little bluestem woodland	G3G4	S1				C	2000-10-21
Pinus ponderosa / Carex inops spp. *heliophila* woodland	Ponderosa pine / sun sedge woodland	G3G4	S2				C	2000-10-21

Boundary Justification: The PCA boundary encompasses the locations for the Richardson’s alumroot and a relatively intact portion of the ponderosa pine communities. The boundary provides a buffer around the elements without encompassing an excessive amount of the adjacent developed lands. Additional areas of the ponderosa pine woodlands contiguous to the occurrences and PCA likely contain these same elements, but were excluded based on the presence of semi-developed land use and division of land ownership in those areas. The majority of this PCA is centered on a large tract of land owned by a few conservation minded owners.

Protection Rank Comments: This PCA is entirely privately owned. Residential development is progressing rapidly in the surrounding area. This PCA represents a relatively large tract of intact land owned by a few property owners. Portions of the property could be expected to develop into subdivisions. Conservation strategies, including the purchase of conservation easements, could maintain this island of significant plants and plant communities.

Management Rank Comments: The landowners have invested considerable effort in controlling invasive weedy species during the last 15 years. Continued control efforts will likely be necessary to prevent further invasion of weedy species and degradation of the quality of the occurrences.

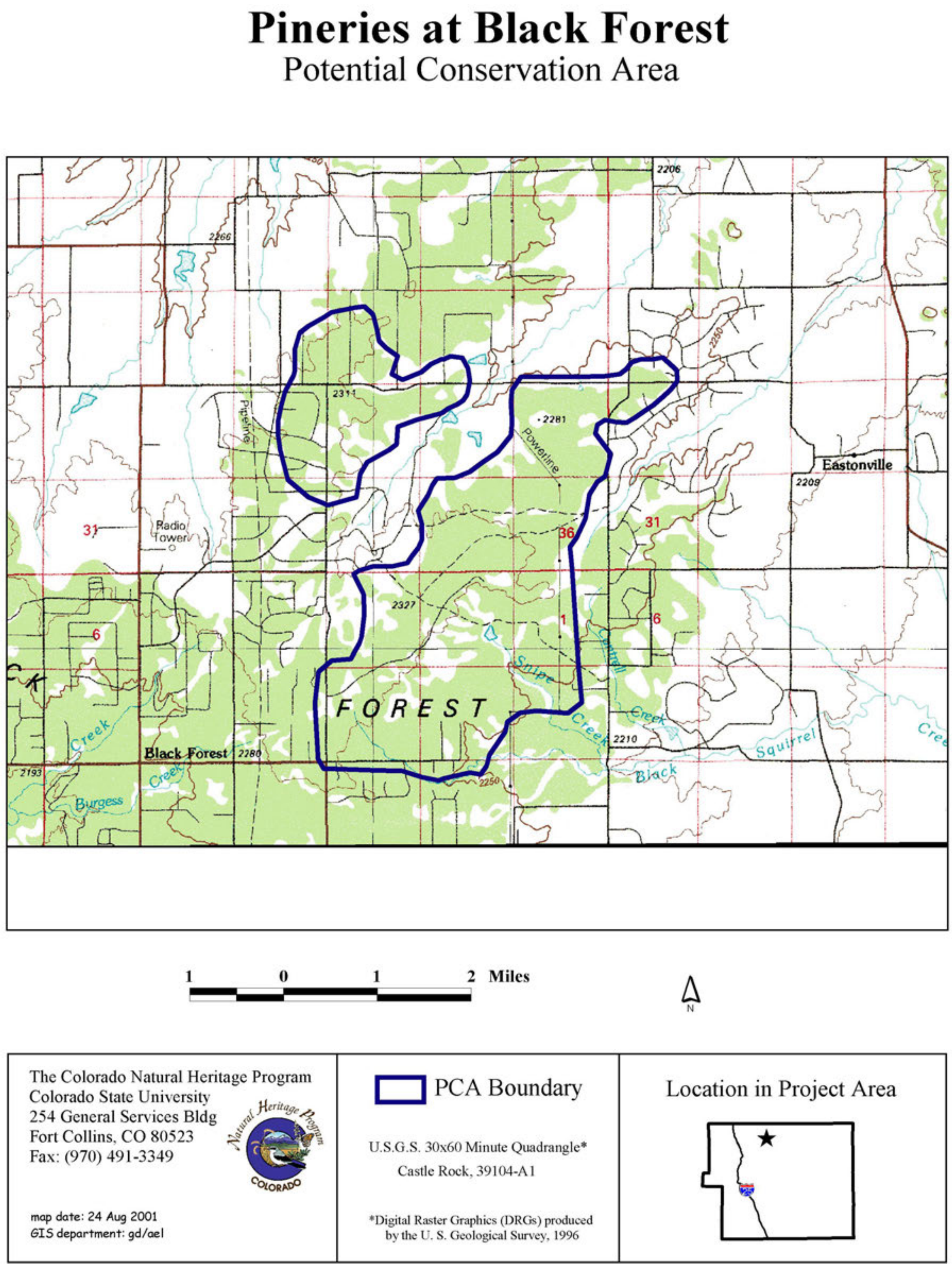


Fig. 39. Pineries at Black Forest Potential Conservation Area Map

Rasner Ranch Playas

Biodiversity Rank: B4 (Moderate significance)
This PCA contains a fair (C-ranked) example of a globally-vulnerable (G3 S3) plant species, Plains ambrosia (*Ambrosia linearis*).

Protection Urgency Rank: P3 (Moderate urgency)
Most of the PCA occurs within leased State Land Board property.

Management Urgency Rank: M3 (Moderate urgency)
One management concern is use of herbicides and its effect on the rare plant.

Location: The extreme southwest corner of El Paso County, northwest of the "four corners" area of Pueblo, Crowley, Lincoln, and El Paso counties on the Rasner Ranch.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Truckton SE
T17S R60W Sections 25, 35, and 36

Size: 435 ac (176 ha).

Elevation: 5,220 to 5,280 ft (1,591 to 1,609 m).

General Description: This PCA and the surrounding landscape consist of predominantly flat to somewhat rolling shortgrass prairie. Much of the area has been converted to agricultural fields for alfalfa. At least three playas or playa like depressions are also present within the PCA. One of these was visited on July 19, 2000 and found to contain a fair (C-ranked) occurrence of plains ambrosia. This playa, in the southwestern portion of the PCA, is somewhat large and has not been excavated for watering cattle, unlike many playas in the county. One small portion of the playa contained standing water when visited. Most of the plains ambrosia individuals were found around the margin of this playa, with a few scattered plants on the floor of the playa. One hundred ninety-eight plants were counted in 1/2 hour of searching at this location. Associated species included many common playa species such as buffalograss (*Buchloe dactyloides*), prairie coneflower (*Ratibida tagetes*), frog-fruit (*Phyla cuneifolia*), and the non-native verbena (*Verbena bracteata*). Upland species in the surrounding area include three awn (*Aristida purpurea*), old plainsman (*Hymenopappus tenuifolius*), and yellow-spined thistle (*Cirsium ochrocentrum*). This PCA also contains habitat that appears suitable for the Mountain Plover (*Charadrius montanus*). The plains ambrosia was also observed on the roadside of the access road running southeast from the ranch compound.

Biodiversity Rank Justification: This PCA contains a fair (C-ranked) occurrence of the globally-vulnerable (G3 S3) plains ambrosia. It also includes suitable habitat for Mountain Plover, although this does not affect the biodiversity rank of this PCA.

Table 39. Natural Heritage element occurrences at Rasner Ranch Playas PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plants								
Ambrosia linearis	Plains ambrosia	G3	S3			FS	C	2000-07-19
Plant Communities								
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Playa grassland	G3	S3				C	2000-07-19

Boundary Justification: The boundary of this PCA is drawn to include the known population of plains ambrosia, as well as additional suitable habitat for this species. These areas also appear suitable for the Mountain Plover.

Protection Rank Comments: Section 36, in which most of the PCA resides, is state land leased for cattle ranching. As such it is currently protected from residential development that has impacted may other playa areas in El Paso County. The surrounding sections are privately owned.

Management Rank Comments: It is uncertain how plains ambrosia responds to the use of herbicides intended to improve forage quality for cattle grazing. Until research has demonstrated that herbicides do not harm plains ambrosia, it is presumed that aerial spraying may have a negative impact on this species. Avoiding the use of these substances in and around playas may help ensure the persistence of plains ambrosia in this PCA.

Annual weeds, particularly kochia (*Bassia sieversiana*), yellow sweet clover (*Melilotus officinale*) and Russian thistle (*Salsola iberica*) are common in the PCA, but do not appear to threaten the occurrence of plains ambrosia in this PCA at this time. Grazing intensity in the PCA is moderate to heavy.

Rasner Ranch Playas
Potential Conservation Area

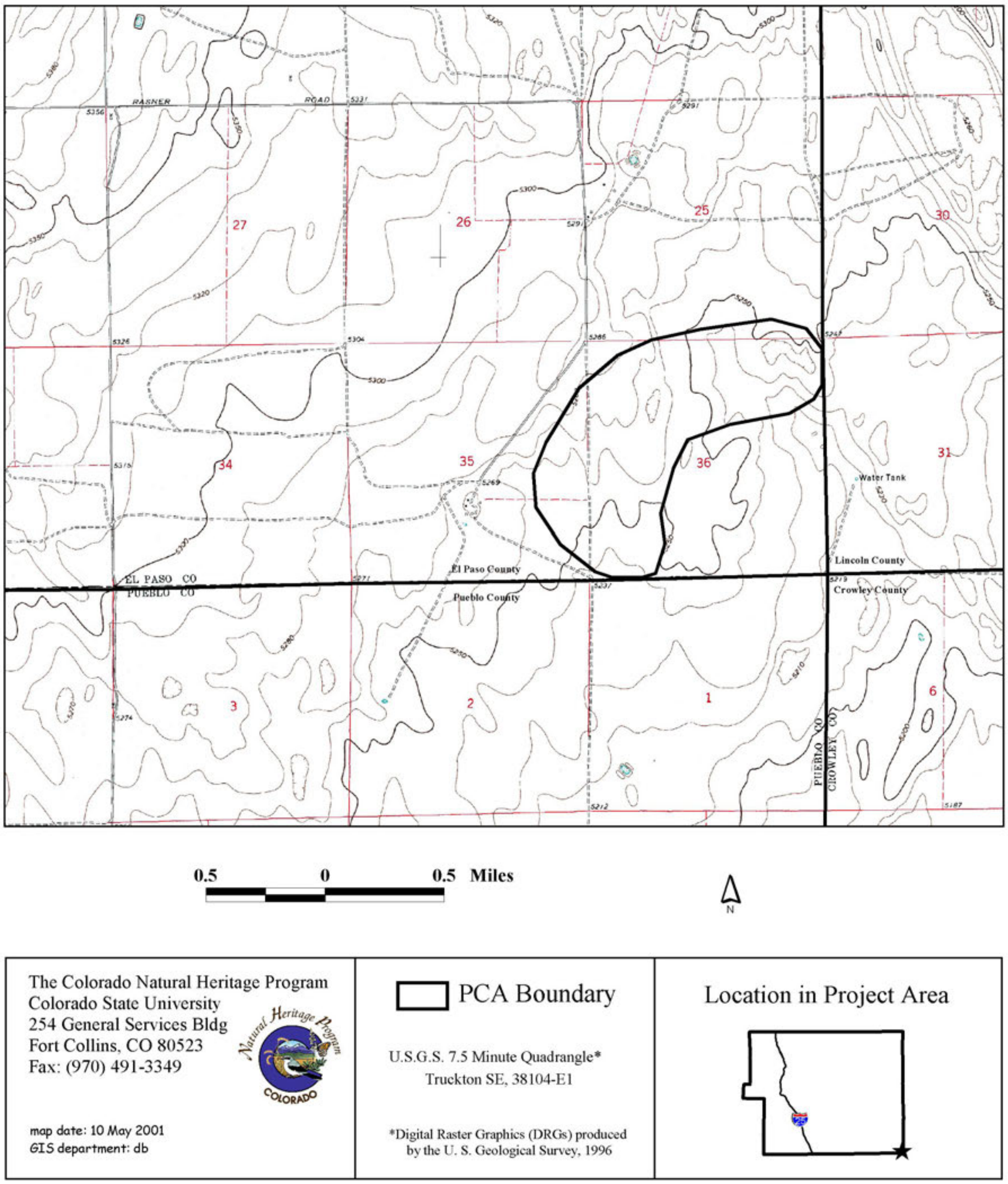


Fig. 40. Rasner Ranch Playas Potential Conservation Area Map

Sand Creek Ridge

Biodiversity Rank: B4 (Moderate significance)
This PCA contains a good (B-ranked) example of a globally-secure (G5 S2S3) mixed-grass prairie community, needle and thread-blue grama grass prairie (*Stipa comata – Bouteloua gracilis*).

Protection Urgency Rank: P2 (High urgency)
The towns of Colorado Springs, Falcon, and Elsmere are growing rapidly and have the potential to encroach on the grasslands of the PCA within the near future. The lands within the PCA are largely privately owned, although a small portion at the southern end of the site is owned by the city of Colorado Springs. Without active conservation effort, the private lands will likely be converted to urban development.

Management Urgency Rank: M4 (Low urgency)
Current management appears adequate for maintenance of the element occurrences. Given the proximity to major highways and urban areas, weed infestation may become a greater problem. A weed management plan will address this issue.

Location: The Sand Creek Ridge PCA is located in El Paso County on both sides of U.S. Highway 24 starting just north of Colorado Highway 94 and extending north to just south of the town of Falcon. It occupies the broad northeast trending ridge that separates upper Jimmy Camp Creek from the East Fork Sand Creek.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Elsmere, Falcon, Falcon NW
T13S R65W Sections 18 and 19
T13S R65W Sections 13, 14, 23-27, and 33-35
T14S R65W Sections 2-5, 8-10, 16 and 17

Size: 4,167 ac (1,686 ha).

Elevation: 6,600 ft (2,011 m).

General Description: The Sand Creek Ridge PCA consists of a gently rolling ridgeline that separates the Upper Jimmy Camp Creek drainage from the East Fork Sand Creek drainage. The east side of the ridge descends through moderately steep hillsides of ponderosa pine woods into the Upper Jimmy Camp Creek drainage. The west side of the ridge descends gradually through open needle and thread (*Stipa comata*) prairies down to the East Fork of the Sand Creek. U.S. Highway 24 traverses the ridge on the west side.

Biodiversity Comments: This site contains a good (B-ranked) occurrence of a globally-secure (G5 S2S3) needle and thread–blue grama (*Stipa comata–Bouteloua gracilis*) prairie community. While the size and quality of this site are good, the proximity of the site to urban areas and its location along Highway 24 reduce its landscape context value.

The site is located directly between the tallgrass prairie areas around the Colorado Springs Airport and the tall- and mixed-grass prairies of the Judge Orr Road site.

Table 40. Natural Heritage element occurrences at the Sand Creek Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Plant Communities								
Hesperostipa comata-Bouteloua gracilis	Needle and thread – Blue grama mixed-grass prairie	G5	S2S3				B	2000-10-23

Boundary Justification: The boundary encompasses the mixed-grass prairie element occurrence. It extends from just north of Colorado Highway 94 and continues northeast along the ridge to south of the town of Falcon. On the east it is bordered by the ponderosa pine woodlands, and on the west by the transition into a more diverse mixture of short- and midgrass species.

Protection Rank Comments: Most of the land is privately owned in a single large parcel, whereas the remainder of the site is publicly owned by the City of Colorado Springs. Currently there is intensive development pressure in this area. The towns of Falcon and Colorado Springs are encroaching on the site. Development is likely to occur here within five years.

Management Rank Comments: The current management appears appropriate for maintaining the element occurrences. Development of a weed management plan would reduce the possibility of weed infestations in the future.

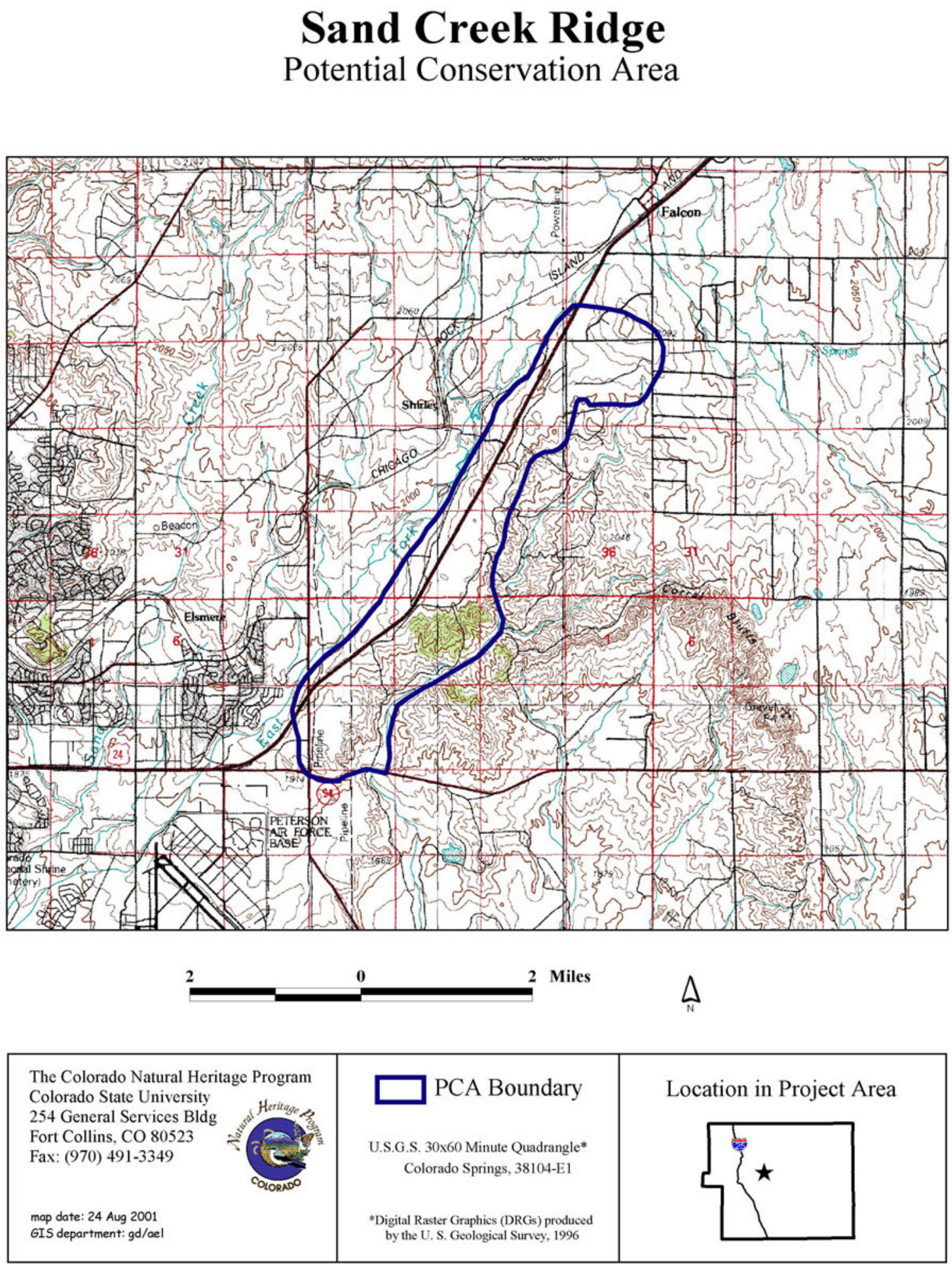


Fig. 41. Sand Creek Ridge Potential Conservation Area Map

Big Johnson Reservoir

Biodiversity Rank: B5 (General significance)
The Big Johnson Reservoir site supports three fair (C-ranked) occurrences of the apparently globally-secure (G4) but locally restricted or vulnerable wintering (S1B S3N) Bald Eagle (*Haliaeetus leucocephalus*). The Bald Eagle is classified as a threatened species by both the federal government and the state of Colorado.

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years. It is estimated that within five years, stresses may reduce the viability of the population of Bald Eagles wintering at the Big Johnson Reservoir site.

Management Urgency Rank: M3 (Moderate urgency)
New management actions may be needed within five years to maintain the current quality of the Bald Eagle occurrence at the Big Johnson Reservoir site.

Location: This site consists of three discrete areas. The first area encompasses Big Johnson Reservoir and a strip of land (0.25 miles in width) surrounding the reservoir. The second area includes a 1.3-mile-long stretch of Fountain Creek located to the west of the city of Widefield, Colorado. The third area lies along an approximately 3.5-mile-long stretch of Jimmy Camp Creek and is located to the east and south of the intersection of Marksheffel Road and Link Road.

Legal Description:

A. Big Johnson Reservoir area
U.S.G.S. 7.5-minute quadrangles: Elsmere, Fountain
T15S R65W Sections 7, 8, 9, 16, 17, 18.

B. Fountain Creek area
U.S.G.S. 7.5-minute quadrangle: Fountain
T15S R66W Sections 13, 14, 23, 24.

C. Jimmy Camp Creek area
U.S.G.S. 7.5-minute quadrangle: Fountain
T15S R65W Sections 26, 27, 28, 33, 34.

Size: 2,395 ac (969 ha).

A. Big Johnson Reservoir area:	1,008 ac	(408 ha);
B. Fountain Creek area:	435 ac	(176 ha);
C. Jimmy Camp Creek area:	952 ac	(385 ha).

Elevation: 5,590 to 5,900 ft (1,704 to 1,798 m).

A. Big Johnson Reservoir area: 5,720 to 5,900 ft (1,743 to 1,798 m);
B. Fountain Creek area: 5,640 to 5,800 ft (1,719 to 1,768 m);
C. Jimmy Camp Creek area: 5,590 to 5,720 ft (1,704 to 1,743 m).

General Description: The Big Johnson Reservoir site includes three discrete areas that are used by wintering Bald Eagles for roosting and feeding. The first area consists of Big Johnson Reservoir and a 0.25-mile-wide strip of shoreline (buffer zone) surrounding the reservoir. The reservoir is situated in a large, open expanse of shortgrass prairie that supports scattered yucca (*Yucca glauca*). A stand of large cottonwood (*Populus deltoides* ssp. *monilifera*) trees and several clusters of medium-sized cottonwood trees are located at the western edge of the reservoir. Bald Eagles use these trees for roosting and for hunting perches from which they swoop down on fishes at the water's surface. The Big Johnson Reservoir area is used by a variety of avian species including wintering Lapland Longspurs (*Calcarius lapponicus*) (R. Bunn, Fort Carson, pers. comm.). The area also serves as a stopover point for numerous migratory birds of many species (R. Bunn, pers. comm.).

The second portion of the Big Johnson Reservoir site includes a 1.3-mile-long stretch of Fountain Creek, located to the west of the city of Widefield. This area lies immediately to the south of the sewage treatment ponds and to the north of the gauging station at Fountain Creek. Riparian vegetation, including mature cottonwood trees, grows along the creek. Bald Eagles use the cottonwood trees for roosting and for hunting perches from which they attack black-tailed prairie dogs and other prey.

A 3.5-mile-long stretch of Jimmy Camp Creek constitutes the third portion of the Big Johnson Reservoir site. Riparian vegetation growing along Jimmy Camp Creek includes mature cottonwood trees that are used by Bald Eagles. Jimmy Camp Creek flows intermittently.

Arkansas darters (*Etheostoma cragini*) (globally-vulnerable (G3), imperiled in Colorado (S2), and a candidate for listing as a federally threatened/endangered species, inhabit portions of Jimmy Camp Creek. (See the Fountain and Jimmy Camp Creeks Potential Conservation Area for a description of the Arkansas darter occurrence.) In addition, black-tailed prairie dogs (G4 S4) occur on or near each of the three discrete portions of the site.

Biodiversity Rank Justification: At least three fair (C-ranked) occurrences of the apparently globally-secure (G4) but locally restricted or vulnerable (S1B S3N) wintering Bald Eagle are known within the Big Johnson Reservoir site.

Table 41. Natural Heritage element occurrences at the Big Johnson Reservoir PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Haliaeetus leucocephalus	Bald Eagle	G4	S1B, S3N	LT*	T		C	2000-03
Haliaeetus leucocephalus	Bald Eagle	G4	S1B, S3N	LT*	T		C	2000-03
Haliaeetus leucocephalus	Bald Eagle	G4	S1B, S3N	LT*	T		C	2000-03

* proposed for removal from the Federal List of Endangered and Threatened Wildlife, Federal Register 50CFR Part 17, Vol. 64 No. 128, July 6, 1999.

Boundary Justification: The boundaries encompass the three known Bald Eagle wintering sites and include a 0.25-mile-wide buffer strip surrounding each wintering site. Such buffer strips are recommended as a means of restricting human activity within a 0.25-mile radius of winter roosts between November 15 and March 15 each year (Craig 1997). In cases where there is a direct line of vision from the roost to the location of the human activities, restrictions on some activities are recommended within 0.5 miles of Bald Eagle winter roosting sites (Craig 1997). Bald Eagles often forage over vast areas many miles from their roosts (see the Bald Eagle species profiles in Chapter 6).

Protection Rank Comments: The City of Colorado Springs recently purchased 650 acres of land surrounding Big Johnson Reservoir, which will be preserved as open space (C. Leiber, City of Colorado Springs, pers. comm.). The segment of Jimmy Camp Creek that lies within the site is privately owned and is bordered by residential subdivisions to the north and the south. Additional land development is currently underway in the vicinity.

Management Rank Comments: Future management actions that may be needed to maintain the current quality of the Bald Eagle occurrences include the restriction of human access to the areas near eagle roosting and feeding sites (*via* the delineation of appropriate buffer zones). Another potential management action is the local protection of black-tailed prairie dogs, fishes, and other prey upon which the eagles depend.

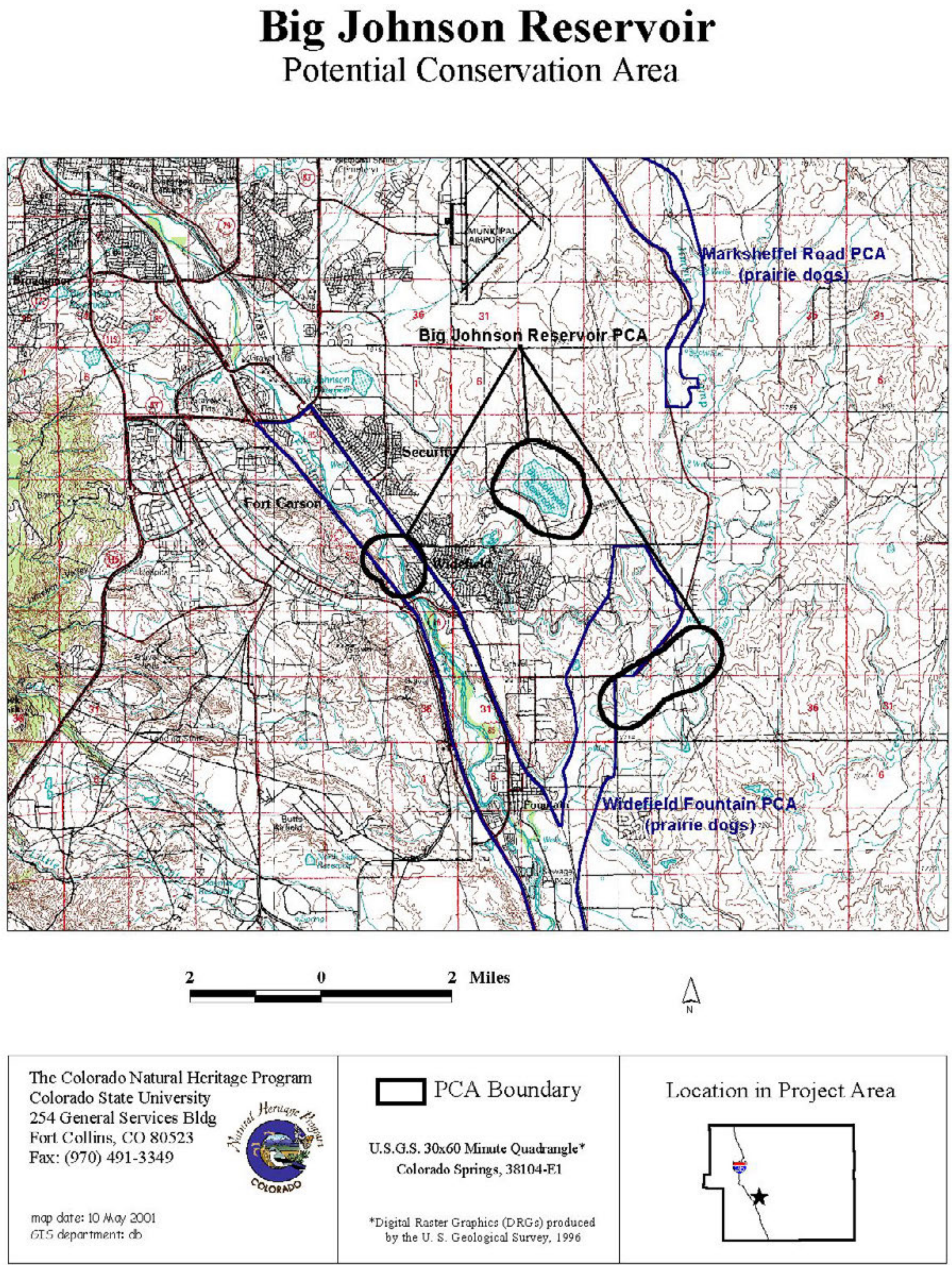


Fig. 42. Big Johnson Reservoir Potential Conservation Area Map

Cave of the Winds

Biodiversity Rank: B5 (General significance)
The Cave of the Winds site supports an unranked occurrence of the apparently globally-secure (G4T4) but sensitive (BLM) and state-imperiled (S2) Townsend's big-eared bat (*Corynorhinus townsendii pallescens*).

Protection Urgency Rank: P3 (Moderate urgency)
Protection actions may be needed, but probably not within the next five years. Much of the land within the site is privately owned, and anticipated stresses may reduce the viability of the bat occurrence if protective action is not taken.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements within the Cave of the Winds site, but changes in management actions may be necessary in the future to maintain the current quality of the bat occurrence.

Location: This site is located less than 0.5 mile to the northwest of the city of Manitou Springs, Colorado. Fountain Creek, Williams Canyon, and Cavern Gulch cross the site. The Cave of the Winds tourist area also lies within the site.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Manitou Springs
T13S R67W Sections 31, 32
T14S R67W Sections 5, 6

Size: 611 ac (247 ha).

Elevation: 6,320 to 7,210 ft (1,579 to 1,780 m).

General Description: At least two caves within the PCA are used as maternity roosts by Townsend's big-eared bats. It is not clear whether the bats in these two roosts represent one or two distinct bat colonies (K. Navo, CDOW, pers. comm.). Caves occupied by Townsend's big-eared bats are located in precipitous, rocky terrain that is characterized by the presence of pinyon-juniper woodland with scattered, brushy oak. Stands of mixed conifers also occur on the site. In addition, a vast network of subterranean caves, including the Cave of the Winds tourist destination, lies within the site. Although guided tours at Cave of the Winds do not visit the specific caves that are used as maternity roosts by Townsend's big- eared bats, the bat occupied caves lie within the extensive cave network that is visited by tourists.

Boundary Justification: This site includes the location of the caves in which bats were observed plus a 0.5-mile radius buffer zone around that location.

Biodiversity Rank Justification*:* An unranked occurrence of the apparently globally-secure (G4T4) but sensitive (BLM) and state-imperiled (S2) Townsend's big-eared bat is known within the Cave of the Winds site.

Table 42. Natural Heritage element occurrences at the Cave of the Winds PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Corynorhinus townsendii pallescens	Townsend's big-eared bat	G4T4	S2			BLM	E	1997-03-24

Protection Rank Comments: The land on which the maternity roost caves are located is privately owned. Nearby caves in the same network of underground caverns are open to the public as part of a well established tourist exhibit that is visited by thousands of tourists each year. Additional development of the cave system at Cave of the Winds could impact the maternity roosts and reduce the viability of the Townsend's big-eared bat occurrence.

Management Rank Comments: The maternity roosts of Townsend's big-eared bats at Cave of the Winds are located in portions of the cave system that are not currently visited by public tours. Because bat maternity roosts are highly sensitive to disturbance by human activities, it is critically important to keep people away from roosting areas. The establishment of a program of regular monitoring of the caves used by bats would help detect changes in environmental conditions that might negatively affect the viability of the bats. Such a monitoring program also would provide wildlife managers with improved information on habitat use and on selection of microclimatic conditions by bats in the caves.

Cave of the Winds

Potential Conservation Area

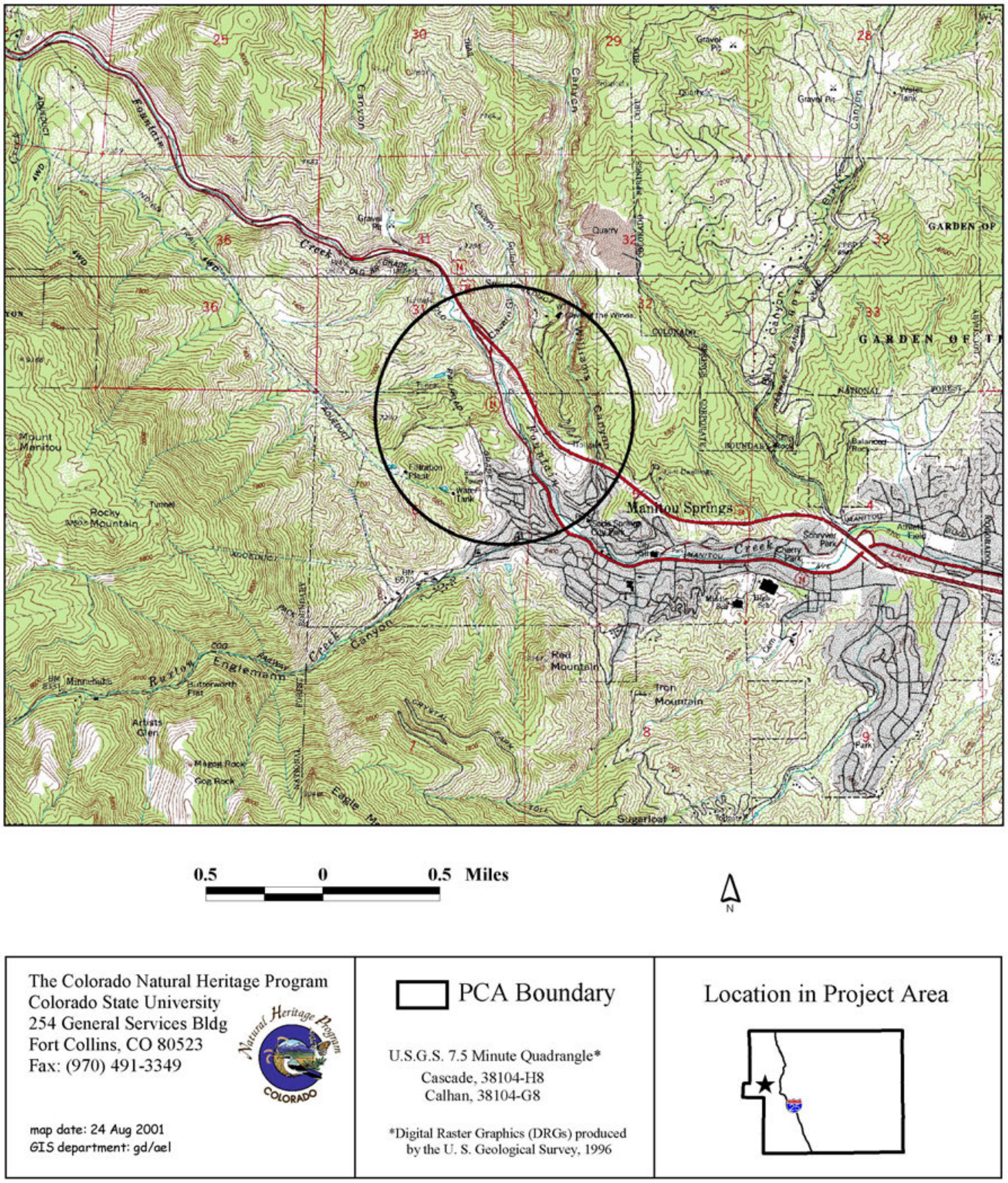


Fig. 43. Cave of the Winds Potential Conservation Area Map

Edison Road

Biodiversity Rank: B5 (General significance)
The Edison Road site supports at least eight (two excellent, five fair, and one poor) occurrences of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*). It also supports at least five (two excellent and three fair) occurrences of the apparently secure (G4 S4B) but sensitive (Forest Service) and threatened (State of Colorado) Burrowing Owl (*Athene cunicularia*).

Protection Urgency Rank: P3 (Moderate urgency)
Most of the land is privately owned and several portions of this site are threatened by residential development.

Management Urgency Rank: M5 (No urgency)
No management needs are known or anticipated on this site.

Location: This site includes much of the land that lies to the south of Neely Road, to the north of North County Line Road (at the El Paso County/Pueblo County border), to the east of Boone Road, and to the west of Whittemore Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Truckton, Edison School, Truckton SE
T16S R60W Sections 30, 31
T16S R61W Sections 25, 35, 36
T17S R60W Sections 4-10, 15-23, 26-31.
T17S R61W Sections 1, 2, 11-14, 23-27, 34-36.
T18S R61W Sections 2, 3.

Size: 18,274 ac (7,395 ha).

Elevation: 5,390 to 5,700 ft (1,643 to 1,737 m).

General Description: The Edison Road site includes much of the land that lies to the south of Neely Road, to the north of North County Line Road (at the El Paso County/Pueblo County border), to the east of Boone Road, and to the west of Whittemore Road. The site is irregularly shaped and it extends beyond each of these four roads, at least in some locations. No major drainages lie within or cross the site.

The Edison Road site is characterized by a mixture of open, flat areas and gently rolling terrain and it is covered by a mosaic of soil types (Larsen 1981). All but one of the observed prairie dog towns, however, occurred on a single soil type: Olney sandy loam. This deep, well-drained soil is characterized by moderate permeability, moderate available water capacity, and slow surface runoff. The hazards of erosion and soil blowing generally are moderate, and the effective rooting depth for plants is 60 inches (150 centimeters) or more (Larsen 1981).

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although large patches of this vegetation remain, portions of the site were converted to agricultural croplands during the past 100 years. The cultivation of some of these fields was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Other fields within the site remain under cultivation. Grazing of domestic livestock occurred historically throughout the site, and today grazing continues on most of the site.

The imperiled (G2 S2B, SZN) and sensitive (Forest Service, BLM) Mountain Plover (*Charadrius montanus*), a species of special concern in the state of Colorado and a candidate for listing as a federally-threatened species, also has been documented on the Edison Road site. (See the Truckton Edison Potential Conservation Area for information on the occurrence of Mountain Plovers in this general vicinity.) In addition, Ferruginous Hawks (*Buteo regalis*), which are apparently secure globally (G4) but also are seasonally, locally vulnerable (S3B) and are classified as sensitive (BLM, Forest Service) and as a species of special concern (State of Colorado), are known to have nested within the site. Finally, massasaugas (*Sistrurus catenatus*), which are imperiled in Colorado (S2) and are classified as sensitive (BLM) and as a species of special concern (State of Colorado) also have been observed on the Edison Road site.

Biodiversity Rank Justification: At least eight occurrences (colonies or towns) of the apparently secure (G4 S4) black-tailed prairie dog are known within the Edison Road site (two excellent, five fair, and one poor occurrence). In addition, five (two excellent and three fair) occurrences of the apparently secure (G4 S4B) but sensitive (Forest Service) and threatened (State of Colorado) Burrowing Owl are known on the site.

Table 43. Natural Heritage element occurrences at the Edison Road PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2000-07-17
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2001-04-09
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-07-17
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-08-25
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-07-17
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-08-22
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-08-22
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				D	2000-08-22
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	A	2000-07-17

Table 43. Natural Heritage element occurrences at the Edison Road PCA (cont.).

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	A	2000
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	C	2000-08-25
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	C	2000-07-11
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	C	2000-07-17

Boundary Justification: The boundary encompasses the eight known prairie dog colonies and the (mostly) unoccupied space among these colonies. Scattered within the unoccupied areas are several small clusters of occupied prairie dog mounds.

Protection Rank Comments: Most of the land on this site is privately owned. Low density residential development of land has already occurred within the site, but it is very limited. A school, an abandoned church, and widely scattered ranches and other residences are present within the Edison Road site. Residential development pressures appear to be increasing.

Management Rank Comments: No management needs are known or anticipated. Most of the land is grazed by domestic livestock. Continuation of current land management practices is unlikely to preclude continued occupancy of the site by prairie dogs.

Edison Road

Potential Conservation Area

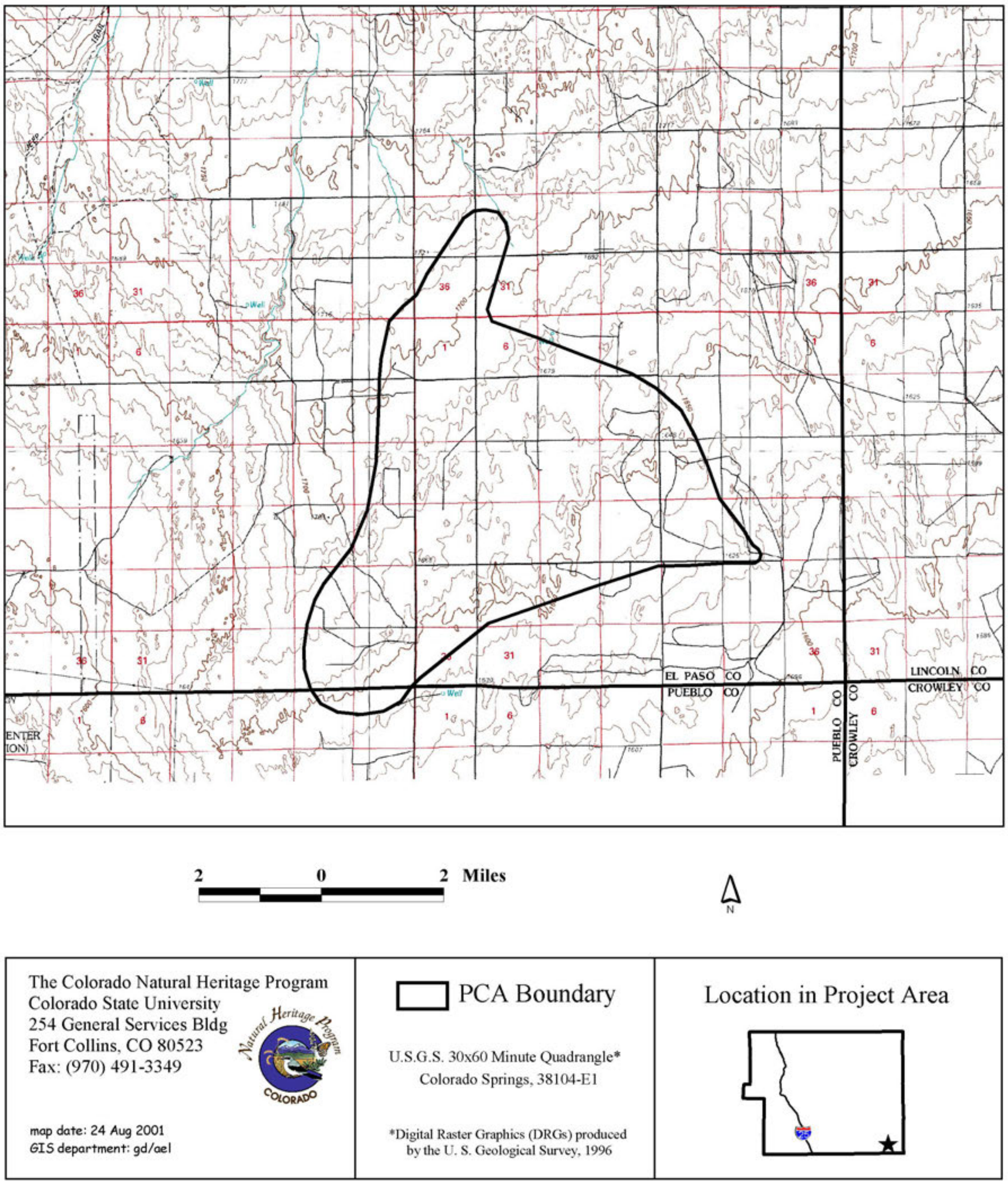


Fig. 44. Edison Road Potential Conservation Area Map

Hanover Road

Biodiversity Rank: B5 (General significance)
The Hanover Road site supports at least five (one excellent, two good and two fair) occurrences of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*).

Protection Urgency Rank: P3 (Moderate urgency)
The land is privately owned. Residential development pressures are increasing.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements on this site, but new management actions may be needed in the future to maintain the current quality of these occurrences.

Location: This site straddles Hanover Road from about 0.4 miles west of Milne Road eastward to about 0.1 mile east of the Peyton Highway. From this segment of Hanover Road, the site extends northward nearly three miles and southwestward nearly three miles.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Fountain SE, Hanover
T16S R63W Sections 31-33
T17S R63W Sections 4-9, 16-20
T17S R64W Sections 13, 14, 23, 24

Size: 4,702 ac (1,903 ha).

Elevation: 5,160 to 5,390 ft (1,573 to 1,643 m).

General Description: The Hanover Road site straddles Hanover Road from about 0.4 miles west of Milne Road eastward to about 0.1 mile east of the Peyton Highway. From this stretch of Hanover Road, the site, which is about 1.5 miles wide, extends northward nearly three miles and southwestward nearly three miles. Chico Creek, an intermittent stream, flows southeastward just inside the southwestern boundary of the site.

The Hanover Road site is characterized by a mixture of open, flat areas and gently rolling terrain and it is covered by a mosaic of soil types (Larsen 1981). Although each of the five observed prairie dog towns occurred on a different soil type, all five soil types were loams, and four of the five were sandy loams (Bijou sandy loam, Fort Collins loam, two Olney sandy loams, and Stoneham sandy loam). These deep, well-drained soils are characterized by moderate to rapid permeability, moderate to high available water capacity, slow to medium surface runoff, moderate hazards of erosion and soil blowing, and an effective rooting depth for plants of 60 inches (150 centimeters) or more (Larsen 1981).

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although large patches of this vegetation remain, portions of the site were converted to agricultural croplands during the past 100 years. The cultivation of some of these fields was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Other fields within the site remain under cultivation. Cholla (*Opuntia imbricata*) occurs on three of the prairie dog towns and elsewhere on the site. Grazing of domestic livestock occurred historically on most or all of the site, and today grazing continues on most of the site. Some locations are very intensively grazed.

Biodiversity Rank Justification: At least five occurrences (colonies or towns) of the apparently secure (G4 S4) black-tailed prairie dog are present within the Hanover Road site (one excellent, two good, and two fair occurrences).

Table 44. Natural Heritage element occurrences at the Hanover Road PCA.

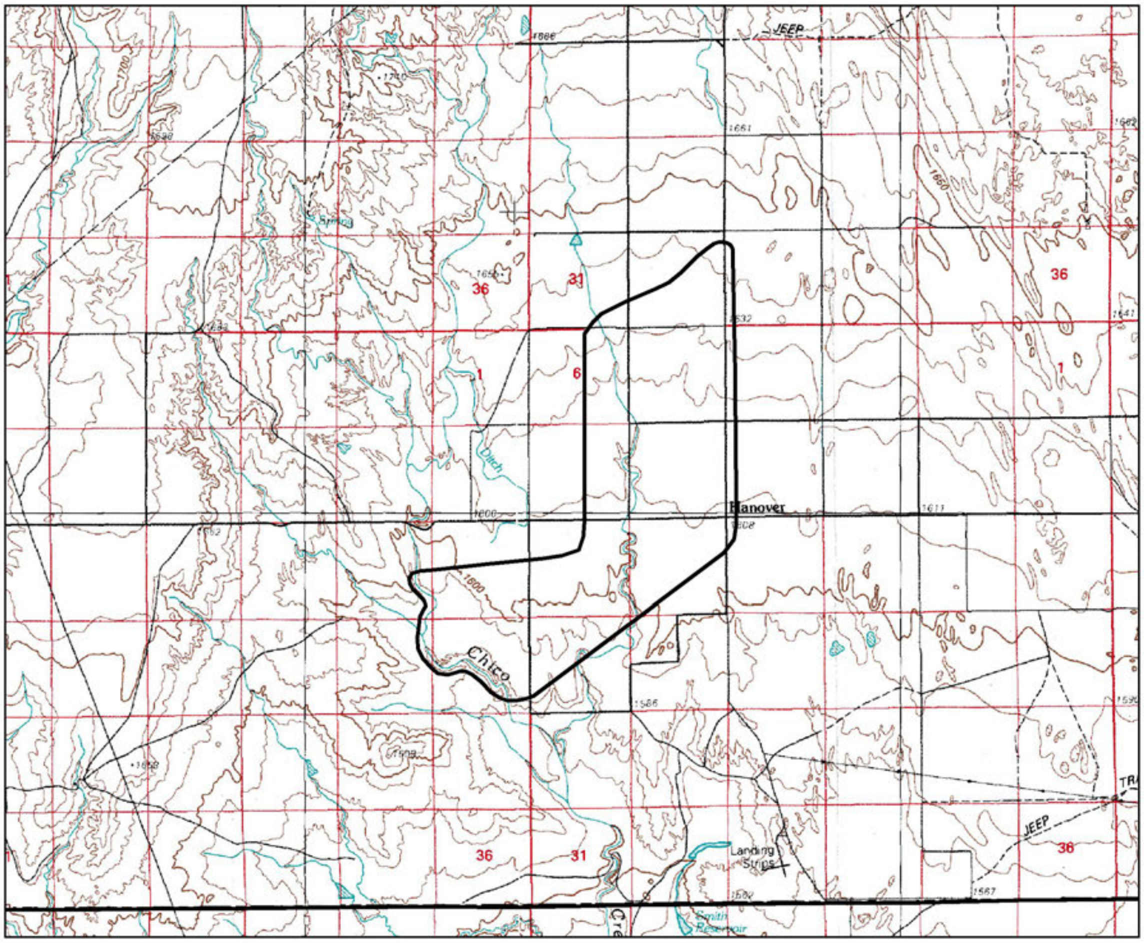
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2000-09-26
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-05
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-05
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2000-07-15
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-05

Boundary Justification: The site encompasses the five known prairie dog colonies and the unoccupied space among these colonies. Active agricultural fields form the western boundary of much of the site, and Chico Creek (buffered) forms the southwestern boundary.

Protection Rank Comments: Although most of the land on this site is privately owned, no protection actions are thought to be necessary in the foreseeable future. The site includes a church, a public school, low density residential areas, and scattered ranches and homes.

Management Rank Comments: Current management seems to favor the persistence of prairie dogs at this site. Changes in management may be needed in the future, however, to maintain the current quality of the prairie dog colonies. Grazing intensity varies considerably across the site, and therefore the effects of grazing on prairie dog habitat vary within the site. In the future, changes in the timing and intensity of livestock grazing may be useful as a means of improving habitat for prairie dogs.

Hanover Road
Potential Conservation Area



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

map date: 24 Aug 2001
GIS department: gd/ael

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle*
Colorado Springs, 38104-E1

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

Location in Project Area

Fig. 45. Hanover Road Potential Conservation Area Map

Marksheffel Road

Biodiversity Rank: B5 (General significance)
The Marksheffel Road site supports three (one excellent, two fair) occurrences of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*). The site also supports an excellent (A-ranked) occurrence of the apparently secure (G4 SB4) but threatened (State of Colorado) and sensitive (U.S. Forest Service) Burrowing Owl (*Athene cunicularia*).

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years. The southern portion of this site is threatened by residential development. A large residential subdivision already has been built immediately adjacent to this area, which supports the only excellent (A-ranked) occurrence of the black-tailed prairie dog at the Marksheffel Road site. The land is privately owned.

Management Urgency Rank: M4 (Low urgency)
New management actions may be needed in the future to maintain the current quality of the prairie dog occurrences at the site, especially on the southern portion of the site.

Location: This site lies along the east side of Marksheffel Road, where it extends southward from an area approximately one mile south of Colorado Highway 94 to a location about 0.4 miles north of Bradley Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Elsmere
T14S R65W Sections 16, 21, 22, 27, 28, 34.
T15S R65W Section 3

Size: 1,449 ac (586 ha).

Elevation: 5,800 to 6,250 ft (1,768 to 1,905 m).

General Description: The Marksheffel Road site is characterized by a mixture of open, flat areas and gently rolling terrain. Jimmy Camp Creek, an intermittent stream that lies in a broad, shallow basin, flows southward inside the eastern boundary of the site. The Marksheffel Road site is located to the east of Marksheffel Road, where it extends southward from an area about one mile south of Colorado Highway 94 to a location about 0.4 miles north of Bradley Road. The site is covered by a mosaic of soil types (Larsen 1981). The location of the largest prairie dog colony at the Marksheffel Road site (at the south end of the site) is characterized by Ascalon sandy loam, a deep, well drained soil with a surface layer that is medium in organic content and a substratum that is calcareous. Ascalon sandy loam is moderate in permeability and available water capacity, and it has slow surface runoff. Hazards of erosion and soil blowing are therefore moderate. The effective rooting depth of plants on this soil exceeds 60 inches (150 centimeters) (Larsen 1981). Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Large areas of this vegetation remain, especially on the northern 80 percent of the site. Other areas, especially on the southern 20 percent of the site, were converted to agricultural croplands during the past 100 years. The cultivation of some of these fields was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Grazing of domestic livestock occurred historically on most or all of the site and today it continues on most portions.

Biodiversity Rank Justification: At least three occurrences (colonies or towns) of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*) are present within the Marksheffel Road site (one excellent and two fair occurrences). Burrowing owls (*Athene cunicularia*), which are apparently secure (G4 SB4) but are designated as threatened (State of Colorado) and sensitive (U.S. Forest Service), are present on at least one of these prairie dog towns.

Table 45. Natural Heritage element occurrences at the Marksheffel Road PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-18
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	A	2000-09-21

Boundary Justification: The boundary encompasses the three known prairie dog colonies and the (mostly) unoccupied space among these colonies. Scattered within the unoccupied areas are several small clusters of occupied prairie dog mounds. The site is bounded on the west by Marksheffel Road. Although the road does not constitute a physical barrier to the dispersal of prairie dogs, it lies along a ridge that may discourage or reduce movements of prairie dogs. Land immediately adjacent to Marksheffel Road (at least along much of the northern portion of the road that lies within this site) is unsuitable for use by prairie dogs because it is too steeply sloped. The northern boundary of the Marksheffel Road site was determined by the location of the northernmost known prairie dog colony in the area. To the north of Drennan Road, the site's eastern boundary follows and lies to the east of the bottom of the Jimmy Camp Creek drainage. To the south of Drennan Road, the site's eastern and southern boundaries are based mainly on the presence of residential development that precludes occupation by prairie dogs. Another factor used in determining the site's eastern boundary near Drennan Road was the presence of active agricultural fields, mature stands of (planted) farmyard trees, and farm buildings.

Protection Rank Comments: All or most of the land on this site is privately owned. Residential development of land has already occurred adjacent to the southern portion of the site. Because of its proximity to major roads (Marksheffel Road and Bradley Road) and because of the recent development of nearby land parcels, the southern portion of the site is likely to be developed within several years.

Management Rank Comments: New management for this site may be needed within five years to maintain the current quality of the prairie dog colonies. The impacts of existing residential and commercial land uses adjacent to the site are unknown. Human activities and the presence of free ranging dogs have the potential to exert deleterious effects on the viability of black-tailed prairie dogs at the Marksheffel Road site. Depending upon the extent of anthropogenic impacts, new management actions may be needed to reduce or limit disturbances to prairie dogs. In addition, efforts to "environmentally educate" the residents of the subdivision that lies adjacent to the southernmost prairie dog colony may reduce the incidence and magnitude of conflicts between people and prairie dogs.

Marksheffel Road
Potential Conservation Area

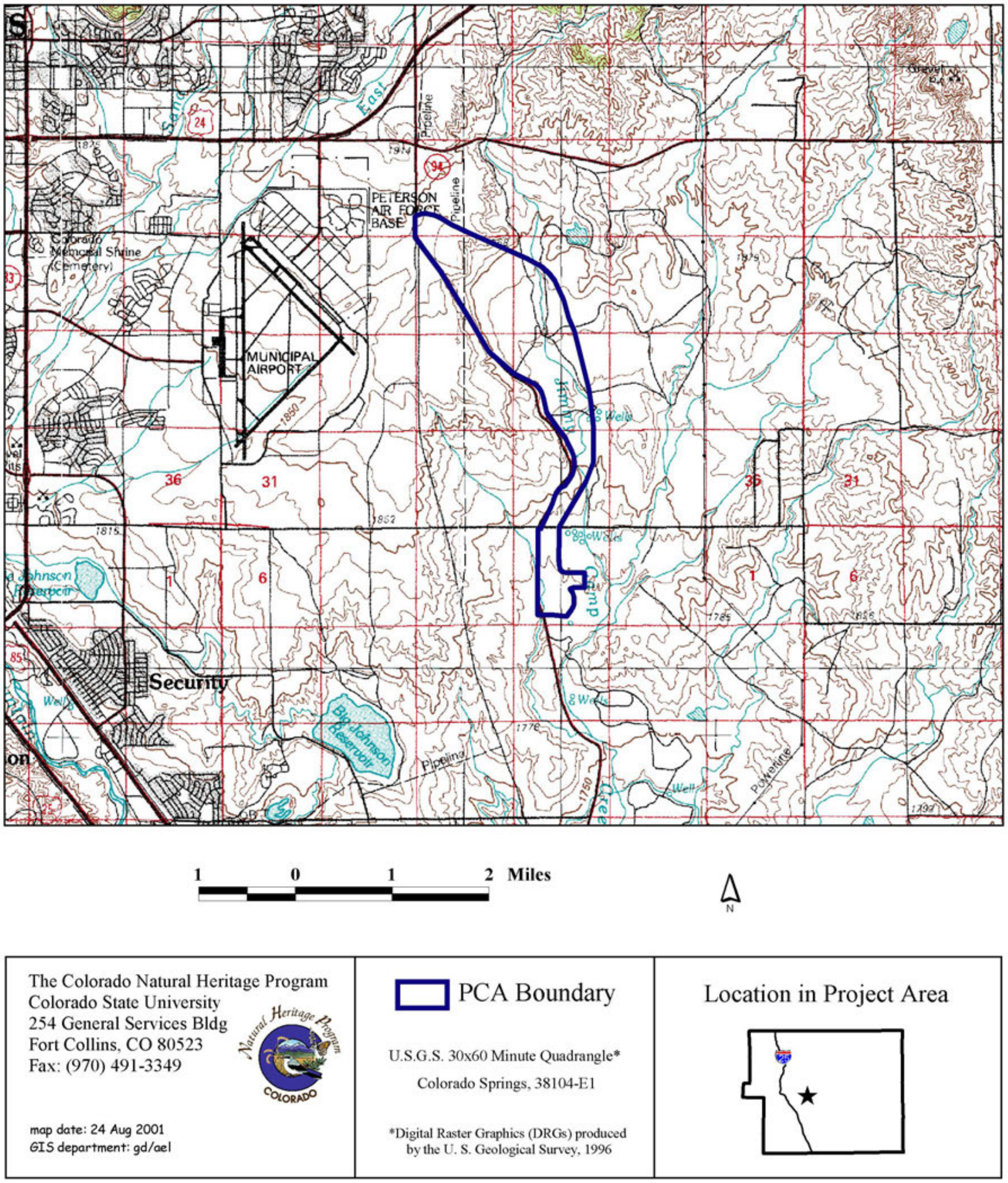


Fig. 46. Marksheffel Road Potential Conservation Area Map

Monument Southeast

Biodiversity Rank: B5 (General significance)
The Monument Southeast site supports four (two excellent, one good, and one fair) occurrences of the demonstrably secure (G5 S5) Gunnison's prairie dog (*Cynomys gunnisoni*).

Protection Urgency Rank: P1 (Very high urgency)
Protection actions are needed immediately. Several portions of this site are threatened by imminent residential and commercial development. Development is underway along U.S. Highway 105, along Struthers Road, and along the Old Denver Highway. Most of the site is privately owned, but there are public (El Paso County Parks Department) recreational/open space lands (the "New Santa Fe Trail") between Interstate Highway 25 and the Old Denver Highway.

Management Urgency Rank: M2 (High urgency)
New management actions may be needed within five years to prevent the loss of one or more prairie dog colonies from this site. The impacts of residential and commercial development within and adjacent to the site may be substantial. Human activities and the presence of free ranging domestic dogs have the potential to exert deleterious effects on the viability of Gunnison's prairie dogs at the Monument Southeast site.

Location: Approximately one-quarter mile to the southeast of Monument, Colorado, along a 3-mile stretch of Interstate Highway 25.

Legal Description:
U.S.G.S. 7.5-minute quadrangle: Monument
T11S R67W Sections 13, 14, 22-26, 35, 36

Size: 1,307 ac (529 ha).

Elevation: 6,770 to 7,200 ft (2,063 to 2,195 m).

General Description: The Monument Southeast site is located to the south and east of the city of Monument, Colorado, where it straddles Interstate 25 from approximately Walker Road (Colorado Highway 105) southward to an area about 0.4 miles south of Baptist Assembly Road. Portions of four creeks lie within or adjacent to the site. Monument Creek, a major perennial stream, lies outside the western boundary of the Monument Southeast site. Dirty Woman Creek, an intermittent stream, flows along Walker Road and lies just outside the northern boundary of the site. Jackson Creek, an intermittent stream, lies outside the southern and southeastern edges of the site. Teachout Creek, a relatively small, intermittent stream that lies to the south of Higby Road, traverses the central portion of the site.

The Monument Southeast site is characterized by a mixture of flat areas and gently rolling terrain, but it also includes several hilly areas associated with creek systems. Two major soil types occur on the site (Larsen 1981). To the north of Teachout Creek the predominant soils are deep, well-drained Tomah-Crowfoot loamy sands. The permeability of these soils is moderate to moderately rapid, their available water capacity is moderate, and their surface runoff is slow. These factors cause the hazard of erosion of these soils to be slight to moderate. The effective rooting depth of plants in Tomah-Crowfoot loamy sands exceeds 60 inches (150 centimeters). To the south of Teachout Creek, where elevations are slightly lower than those to the north of the creek, the primary soil type is Pring coarse sandy loam. This deep, noncalcareous, well-drained soil is characterized by rapid permeability, moderate available water capacity, and medium surface runoff, which result in a moderate hazard of erosion (Larsen 1981).

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although scattered remnants of this vegetation remain, many local areas within the site were converted to agricultural uses during the past 150 years. The cultivation of some of these agricultural fields was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Other formerly cultivated fields on the site were later planted with non-native grasses. Also included within the Monument Southeast site are patches of shrub dominated land and strips of riparian vegetation along creeks. Grazing of domestic livestock occurred historically on most or all of the site, and today it continues on some portions (i.e., the northeastern lobe).

Biodiversity Rank Justification: At least four occurrences (colonies or towns) of the demonstrably secure (G5 S5) Gunnison's prairie dog (*Cynomys gunnisoni*) are present within the Monument Southeast site (two excellent, one good, and one fair occurrence). These occurrences are ecologically significant because they are located at the eastern edge (and are very near the northeastern limit) of the global distribution of Gunnison's prairie dogs (Fitzgerald *et al*. 1994).

Table 46. Natural Heritage element occurrences at the Monument Southeast PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys gunnisoni	Gunnison's prairie dog	G5	S5				A	2001-04-18
Cynomys gunnisoni	Gunnison's prairie dog	G5	S5				A	2001-04-18
Cynomys gunnisoni	Gunnison's prairie dog	G5	S5				B	2001-04-18
Cynomys gunnisoni	Gunnison's prairie dog	G5	S5				D	2001-04-18

Boundary Justification: The boundary encompasses the four known prairie dog colonies and the (mostly) unoccupied space among these colonies. Scattered within the unoccupied areas are several small clusters of occupied prairie dog mounds. The site is bounded on the north, west, and south sides by land that is unsuitable for use by prairie dogs because it is much too hilly. The site's eastern boundary is based on the presence of residential and other development that precludes occupation by prairie dogs. Another factor used in determining the site's eastern (and other) boundaries was the distribution of soils. Most of the site is covered by large patches of Tomah-Crowfoot loamy sands and Pring coarse sandy loam. Many of the soils that lie outside the boundaries of the Monument Southeast site are structurally much less suitable for burrow construction by prairie dogs.

Protection Rank Comments: Most of the land on this site is privately owned. Residential and commercial development of land has already occurred on and near several portions of the site. Additional, similar development is underway throughout the northeastern portion of the site and along the Old Denver Highway to the west of Interstate Highway 25. At some locations, development has occurred on active prairie dog towns, causing physical displacement of the animals. Because of its proximity to Colorado Springs, land on and near this site is highly likely to be developed in the near future.

Management Rank Comments: New management for this site may be needed within five years to prevent the loss of one or more of the prairie dog colonies. Management activities that would likely benefit the prairie dogs include prohibition of the presence of free ranging domestic dogs and minimization of human disturbances and activities in and near the colonies. Efforts to "environmentally educate" the residents of subdivisions that lie near the prairie dog colonies may reduce the incidence and magnitude of conflicts between people and prairie dogs.

Monument Southeast
Potential Conservation Area

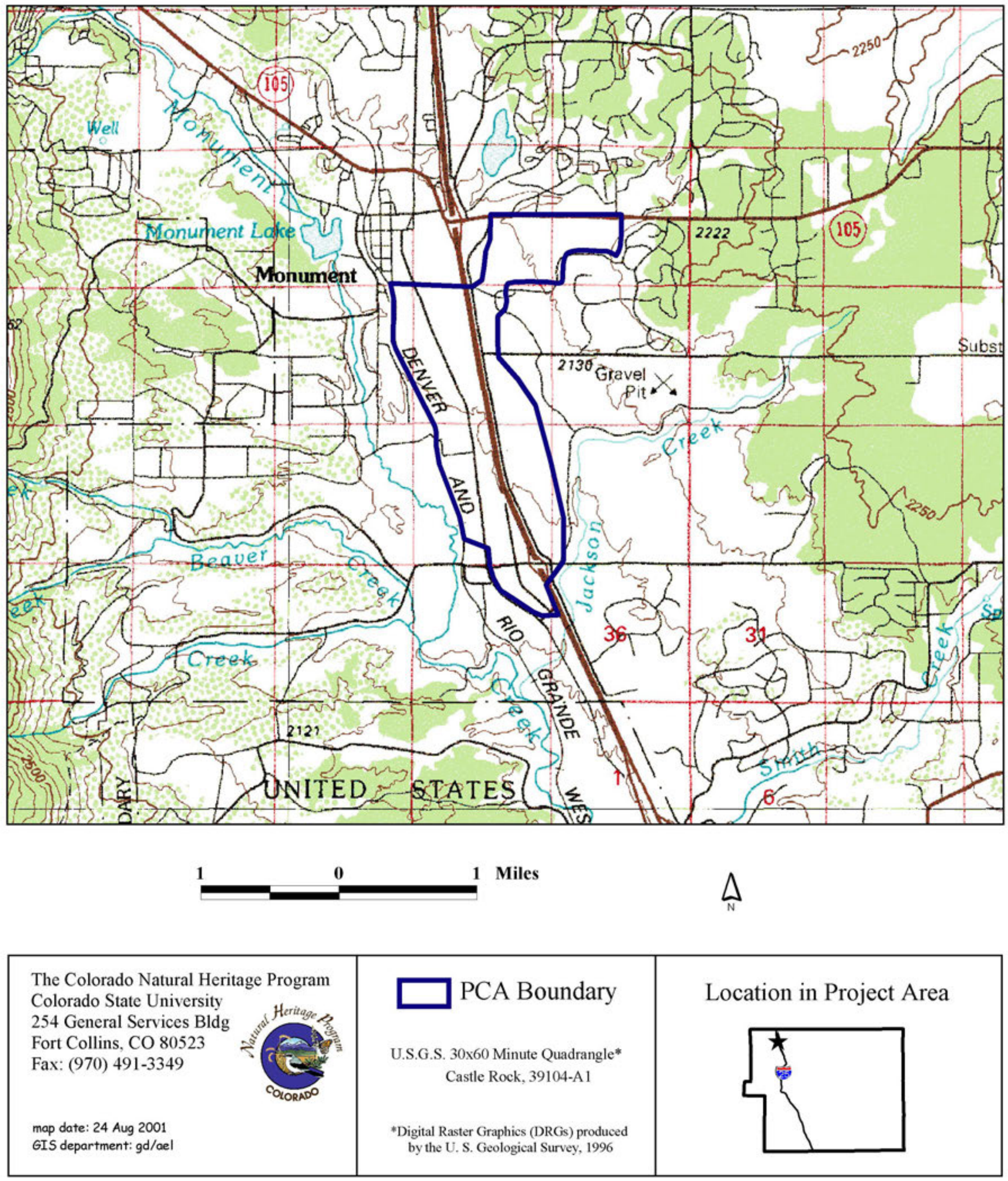


Fig. 47. Monument Southeast Potential Conservation Area Map

Squirrel Creek Road

Biodiversity Rank: B5 (General significance)
The Squirrel Creek Road site supports at least three (one excellent, two good and one fair) occurrences of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*). It also supports at least two good (B-ranked) occurrences of the apparently secure (G4 S4B) but sensitive (Forest Service) and threatened (State of Colorado) Burrowing Owl (*Athene cunicularia*).

Protection Urgency Rank: P2 (High urgency)
The land is privately owned and several portions of this site are threatened by residential development.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements on this site, but new management actions may be needed in the future to maintain the current quality of these occurrences.

Location*:* This site straddles Squirrel Creek Road from the Ellicott Highway southeastward to Dearing Road. It also extends northward about 1.4 miles from the intersection of Squirrel Creek Road and the Ellicott Highway.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Hanover NW, Hanover NE, Hanover SE
T15S R62W Sections 30, 31, 32
T15S R63W Sections 25, 26
T16S R62W Sections 5-9, 16-22, 27-30, 32-34
T16S R63W Sections 1, 12
T17S R62W Sections 4, 5

Size: 8,377 ac (3,390 ha)

Elevation: 5,340 to 5,740 ft (1,628 to 1,750 m)

General Description: The Squirrel Creek Road site straddles Squirrel Creek Road and Black Squirrel Creek from the intersection of Squirrel Creek Road and the Ellicott Highway southeastward to the intersection of Squirrel Creek Road and Dearing Road. The site also extends northward for about 1.4 miles from the intersection of Squirrel Creek Road and the Ellicott Highway. Black Squirrel Creek flows southeastward through the site, about 0.2-0.3 miles inside the western site boundary.

The Squirrel Creek Road site is characterized by a mixture of open, flat areas and gently rolling terrain and it is covered by a mosaic of soil types (Larsen 1981). All of the observed prairie dog towns, Burrowing Owls, and Mountain Plovers, however, occurred on a single soil type: Bijou sandy loam. This deep, well-drained soil is characterized by rapid permeability, moderate available water capacity, low organic matter in its surface layer, and slow surface runoff. The hazards of erosion and soil blowing are moderate, and the effective rooting depth for plants is 60 inches (150 centimeters) or more (Larsen 1981).

Historically, much of the site was covered with vegetation typical of the native shortgrass prairie. Although large patches of this vegetation remain, portions of the site were converted to agricultural croplands during the past 100 years. The cultivation of some of these fields was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Other fields within the site remain under cultivation. Grazing of domestic livestock occurred historically on most or all of the site, and today grazing continues on most of the site. Herbaceous riparian vegetation lines the banks of Black Squirrel Creek.

An occurrence of the imperiled (G2 S2B, SZN) and sensitive (Forest Service, BLM) Mountain Plover, a species of special concern in the state of Colorado and a candidate for listing as a federally threatened species, also has been documented on the Squirrel Creek Road site. (See the Squirrel Creek School Potential Conservation Area for a description of the Mountain Plover occurrence in this vicinity).

Biodiversity Rank Justification: At least three occurrences (colonies or towns) of the apparently secure (G4 S4) black-tailed prairie dog are present within the Squirrel Creek Road site (one excellent, one good, and one fair occurrence). In addition, two good (B-ranked) occurrences of the apparently secure (G4 S4B, SZN) but sensitive (Forest Service) and threatened (State of Colorado) Burrowing Owl are known on the site.

Table 47. Natural Heritage element occurrences at the Squirrel Creek Road PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2001-04-10
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-10
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-10
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	B	2000-06-21
Athene cunicularia	Burrowing Owl	G4	S4B		T	FS	B	2000-07-11

Boundary Justification: The site encompasses the three known prairie dog colonies and the (mostly) unoccupied space among these colonies. Scattered within the unoccupied areas are several small clusters of occupied prairie dog mounds. The site is bounded on the north by hilly terrain that rises to the north and is associated with the sandstone formation at Crows Roost. The eastern, southern, and western boundaries of the site are marked by vast expanses of very loose, sandy soil ("Valent sand") that is unsuitable for burrow construction and therefore is unoccupied by prairie dogs (and Burrowing Owls).

The southern portion of the western boundary also is characterized by land that is too severely sloped to be used by prairie dogs or Burrowing Owls.

Protection Rank Comments: All or most of the land on this site is privately owned. Limited residential development has already occurred near the site. Construction of a new residential subdivision consisting of modular homes placed on small lots is underway, however, along the west side of the Ellicott Highway just to the north of the Squirrel Creek Road site.

Management Rank Comments: Current management seems to favor the persistence of prairie dogs and Burrowing Owls at this site. Changes in management may be needed in the future, however, to maintain the current quality of the prairie dog colonies (and Burrowing Owl habitat). Grazing intensity varies considerably across the site, and therefore the effects of grazing on prairie dog habitat vary within the site. In the future, changes in the timing and intensity of livestock grazing may be useful as a means of improving habitat for prairie dogs and Burrowing Owls.

Squirrel Creek Road
Potential Conservation Area

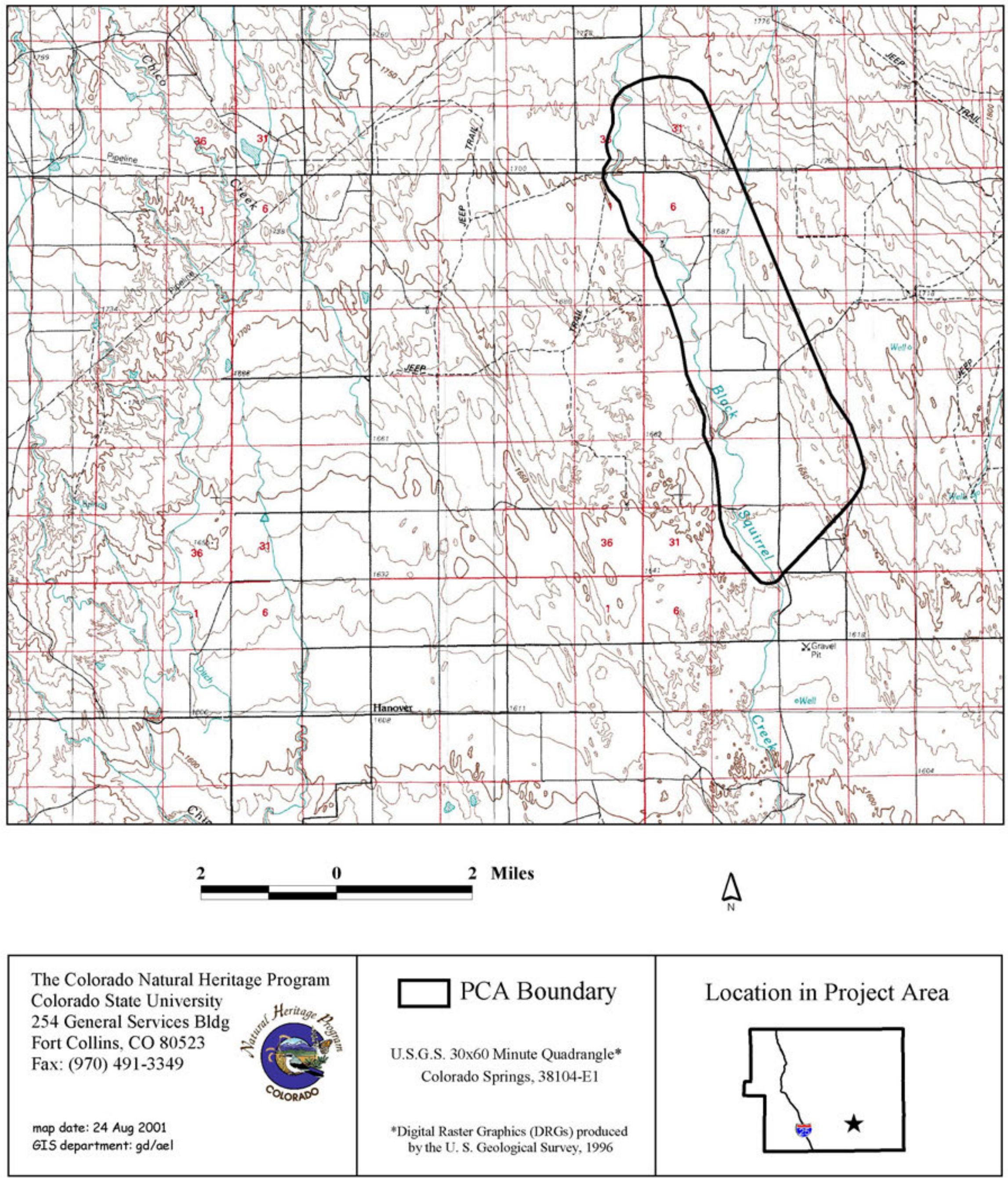


Fig. 48. Squirrel Creek Road Potential Conservation Area Map

Widefield Fountain

Biodiversity Rank: B5 (General significance)
The Widefield Fountain site supports at least nine (three excellent, five good, and one fair) occurrences of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*). It also supports four Great Blue Heron (*Ardea herodias*) rookeries (colonial breeding sites).

Protection Urgency Rank: P2 (High urgency)
Protection actions may be needed within five years. Several portions of this site are threatened by residential and other development. Several large residential subdivisions already have been built immediately adjacent to this site. The land is privately owned.

Management Urgency Rank: M4 (Low urgency)
Current management seems to favor the persistence of the zoological elements within the Widefield Fountain site, but changes in management actions may be needed in the future to maintain the current quality of the occurrences.

Location: This Y-shaped site includes a strip of land along Fountain Creek from Academy Boulevard southward to Wigwam Road. Bounded on the west by Interstate Highway 25, the portion of the site that lies along Fountain Creek varies in width from about 0.7 to about 2.3 miles. Among the larger tributaries that join Fountain Creek within the site are Jimmy Camp Creek, Little Fountain Creek, and Williams Creek. The eastern portion of the site (the eastern branch of the "Y") lies to the east of the cities of Widefield and Fountain, Colorado and it is crossed by Jimmy Camp Creek. It extends southward from Fontaine Boulevard to the intersection of Link Road and Old Pueblo Road, and it is bounded on the east by Marksheffel Road and Link Road.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Colorado Springs, Elsmere, Cheyenne Mountain, Fountain, Buttes, Fountain SE
T15S R65W Sections 19, 21, 22, 27, 28, 30-33
T15S R66W Sections 3, 10, 11, 13-15, 23-36.
T16S R65W Sections 4-9, 16-18, 20, 21, 28, 29, 32, 33
T16S R66W Section 1
T17S R65W Sections 2-5, 9-15, 22-27, 35, 36

Size*:* 13,809 ac (5,588 ha).

Elevation: 5,180 to 5,840 ft (1,579 to 1,780 m).

General Description: The Widefield Fountain site includes a relatively flat, low lying strip of land along Fountain Creek that extends southward from Academy Boulevard (Colorado Highway 83) to Wigwam Road. Bounded on the west by Interstate Highway 25, this portion of the site (that lies along Fountain Creek) varies in width (measured east-west) from about 0.7 to about 2.3 miles. Among the larger tributaries that join Fountain

Creek within the site are Jimmy Camp Creek, Little Fountain Creek, and Williams Creek. The eastern portion of the Widefield Fountain site is located to the south of Fontaine Boulevard, where it extends southward from an area between Powers Boulevard and Marksheffel Road to the northeastern corner of the intersection of Link Road and Old Pueblo Road. Jimmy Camp Creek, an intermittent stream, crosses the site between C and S Road and Squirrel Creek Road as it flows southwestward toward Fountain Creek.

The western portion of the Widefield Fountain site (along Fountain Creek) consists mainly of the open, flat, floodplain along Fountain Creek and several of its tributaries. At the southern end of this area the site extends eastward onto a large expanse of cholla (*Opuntia imbricata*) within shortgrass prairie along Hanover Road. The western portion of the site is covered by a mosaic of soil types (Larsen 1981). The complex distribution of soil types, especially within the floodplain of Fountain Creek, precludes the identification of clearly discernible patterns of preferential use of soils by the prairie dogs.

The eastern portion of the Widefield Fountain East site (the eastern branch of the "Y"-shaped site) also is covered by a mosaic of soil types (Larsen 1981). Each of the five known prairie dog colonies in this area, however, is located on a patch of soil of a single type. Two prairie dog colonies are located on Nunn clay loam, two are located on Ascalon sandy loam, and one is located on Stoneham sandy loam. All of these soils are deep and well-drained, with moderately slow to moderate permeability, moderate to high available water capacity, slow to medium surface runoff, and a slight to moderate hazard of erosion or soil blowing. The effective rooting depth for plants in these soils is 60 inches (150 centimeters) or more (Larsen 1981).   Riparian vegetation lines the banks of Jimmy Camp Creek, which crosses the site between C and S Road and Squirrel Creek Road and then runs southward along the western boundary of the eastern portion of the site.

Historically, much of the Widefield Fountain site was covered with floodplain, riparian, and native shortgrass prairie vegetation. Although patches of these vegetation types remain, large portions of the site (especially the flat, relatively rich soiled floodplain along Fountain Creek) were converted to agricultural croplands during the past 100 years. The cultivation of many of these areas was subsequently abandoned, producing "old field" (weedy, early successional) habitats. Vegetative cover on these fields now varies greatly: some areas are characterized by high proportions of bare soil, whereas other areas support dense stands of invasive, early successional perennial and annual species. Other agricultural fields within the site remain under cultivation. Horse pastures planted with mixed-grasses are common near the towns of Widefield and Fountain. Grazing of domestic livestock occurred historically on much of the site, and today grazing continues on many areas, especially to the north of Kane Road.

At least four rookeries (colonial breeding sites) of the Great Blue Heron are known along Fountain Creek within this site. The Widefield Fountain site also provides essential wetland habitats and resources for many species of migratory birds (Cafaro 2000). Isolated locations along both Fountain Creek and Jimmy Camp Creek support the

Arkansas darter (*Etheostoma cragini*), a globally-vulnerable and state-imperiled species of fish that is classified as sensitive (Forest Service) and threatened (State of Colorado), and that is a candidate for listing as a federally threatened/endangered species. (See the Fountain and Jimmy Camp Creeks Potential Conservation Area for a description of the Arkansas darter occurrence in this general vicinity.)

Biodiversity Rank Justification: At least nine occurrences (colonies or towns) of the apparently secure (G4 S4) black-tailed prairie dog (*Cynomys ludovicianus*) are present within the Widefield Fountain East site (three excellent, five good, and one fair occurrence).

Table 48. Natural Heritage element occurrences at the Widefield Fountain PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
Animals								
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2000-06
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				A	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2000-09-26
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				B	2001-04-18
Cynomys ludovicianus	Black-tailed prairie dog	G4	S4				C	2001-04-18

Boundary Justification: The boundary encompasses the nine known prairie dog colonies and the (mostly) unoccupied space among these colonies. Scattered within the unoccupied areas are several small clusters of occupied prairie dog mounds. Interstate Highway 25 forms the western boundary for the Fountain Creek portion of the site (although at one location a prairie dog town extends westward to include a small tract of land on the west side of the highway). The northern boundary of this portion of the site consists of Academy Boulevard (Colorado Highway 83) and associated areas of high density land uses. Railroad (Denver and Rio Grande) tracks provide the eastern boundary for this area. At the southern end of the Fountain Creek portion of the site, the eastern boundary follows natural topographic, edaphic (soil related), and vegetative features.

The eastern portion of the site is bounded on the north by Fontaine Boulevard. Although the road does not constitute a physical barrier to the dispersal of prairie dogs, the land to the north of Fontaine Boulevard has not been colonized by prairie dogs. A ditch full of water (2-3 m wide) lies immediately to the north of the road. This ditch runs parallel to

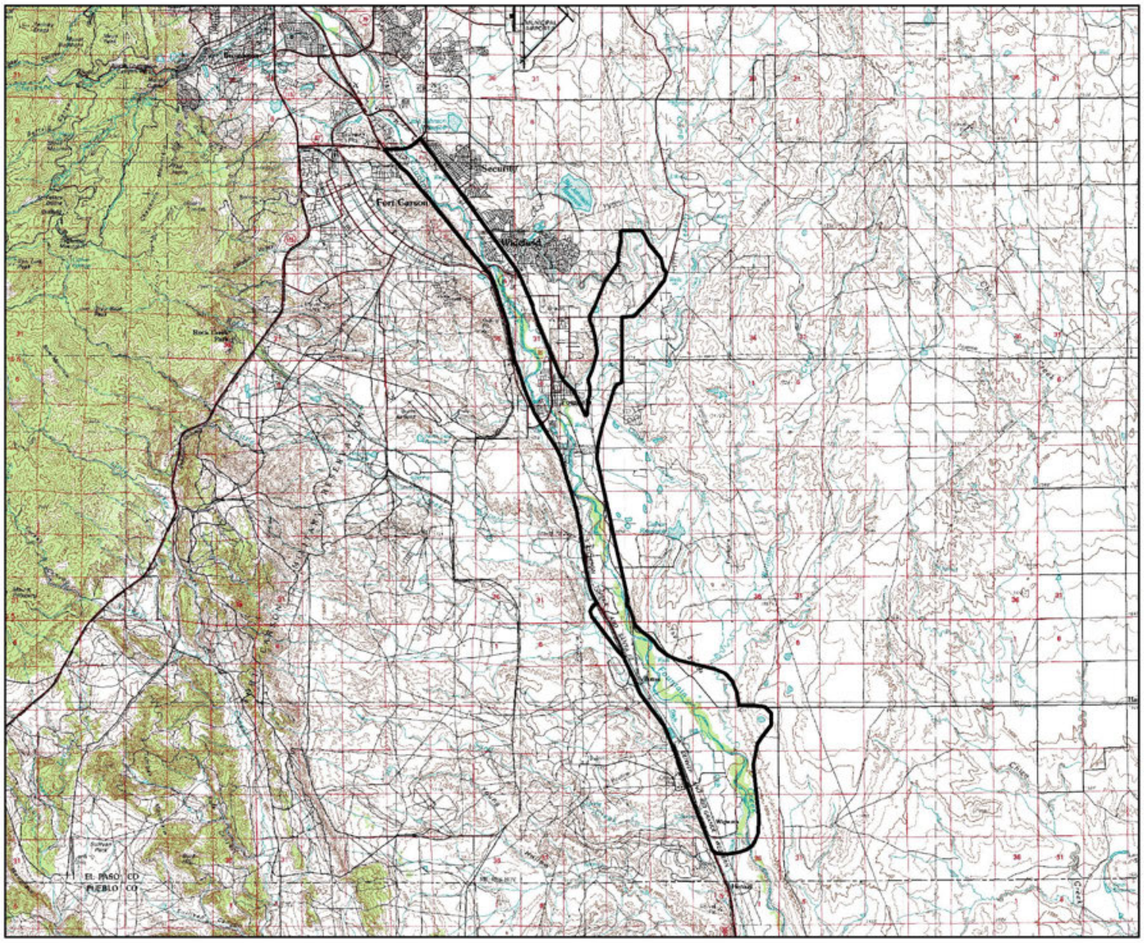
Fontaine Boulevard and then swings southward and crosses Fontaine Boulevard; it then extends southeastward, forming the northeastern boundary of the site. To the east of this boundary lie a residential subdivision and active agricultural fields. Farther to the south, the site's eastern boundary becomes coincident with Marksheffel Road, then C and S Road, and then Link Road. At the intersection of Link Road and Kane Road, the eastern boundary of the site jogs to the southwest and extends southwestward to a point along Link Road that lies just to the east of the Denver and Rio Grande Railroad crossing. From that point the site boundary runs westward to the intersection of Link Road and Old Pueblo Road. The western boundary of the eastern portion of the Widefield Fountain site runs northeastward from this intersection to Fontaine Boulevard. Outside this western boundary are several types of habitat that are unsuitable for occupation by prairie dogs: active agricultural fields, riparian woodland (along Jimmy Camp Creek), hilly terrain that rises to a bluff, and residential subdivisions.

Protection Rank Comments: Most of the land on the Fountain Creek portion of this site lies adjacent to Interstate Highway 25 and is privately owned. Many areas within this area already have been developed and now support residential, business, and commercial land uses. At least part of one of the large prairie dog colonies lies within the Clear Spring Ranch area, a joint project of Colorado Springs Utilities and El Paso County Parks. A 25-year lease between these entities was signed in 2001.

All or most of the land on the eastern portion of this site also is privately owned. Residential development of land has already occurred on and adjacent to this area. Because of the proximity to major roads (Fontaine Boulevard, Marksheffel Road, C and S Road, Link Road, Old Pueblo Road) and because of the recent development of numerous nearby land parcels, parts of the eastern portion of the site are likely to be developed within several years.

Management Rank Comments: Current management seems to favor the persistence of the prairie dog colonies, but changes in management practices may be needed in the future to maintain the current quality of the colonies. Factors that might prompt the need for new management actions would include the effects of grazing and agricultural practices, additional land development, and the impacts of human activities and disturbances within the site. The impacts of existing residential and commercial land uses adjacent to the site are unknown. Human activities and the presence of free ranging domestic dogs have the potential to exert deleterious effects on the viability of black-tailed prairie dogs at the Widefield Fountain site. Depending upon the extent of anthropogenic impacts, new management actions may be needed to reduce or limit disturbances to prairie dogs. In addition, efforts to "environmentally educate" the residents of the subdivisions that lie adjacent to the prairie dog colonies may reduce the incidence and magnitude of conflicts between people and prairie dogs.

Widefield Fountain
Potential Conservation Area



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

Natural Heritage Program COLORADO

map date: 24 Aug 2001
GIS department: gd/ael

PCA Boundary

U.S.G.S. 30x60 Minute Quadrangle*
Colorado Springs, 38104-E1

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

Location in Project Area

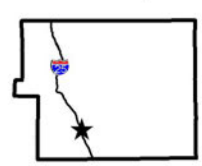


Fig. 49. Widefield Fountain Potential Conservation Area Map

West Bijou Creek

Biodiversity Rank: B4 (Moderate significance)
This network of conservation areas (NCA) contains one potential conservation area (PCA) of moderate biodiversity significance (B4) and one PCA of general biodiversity significance (B5). The PCAs contain a good (B-ranked) example of a coyote willow riparian shrubland (*Salix exigua/*mesic graminoid) (G5 S5) and fair (C-ranked) examples of plains cottonwood/coyote willow riparian forest communities (*Populus deltoides-(Salix amygdaloides)/Salix exigua*) (G4? S3).

Protection Urgency Rank: P3 (Moderate urgency)
The land within the network of conservation areas is privately owned with occasional sections owned by the State Land Board. The occurrences are threatened by groundwater extraction to supply the Denver metropolitan area and subsequent drawdown of the water table.

Management Urgency Rank: M3 (Moderate urgency)
Some areas within the network of conservation areas are under excellent management, others are in need of improved management to restore the floodplain vegetation. Control non-native vegetation within the floodplain.

Location: El Paso, Elbert, and Arapahoe counties. The NCA begins at the headwaters of Bijou Creek at the extreme north end of El Paso County, continues through Elbert County, and ends in Arapahoe County, about two miles south of the Adams County line.

Legal Description:
U.S.G.S. 7.5-minute quadrangles: Peyton, Bijou Basin, Fondis, Big Gulch, Kiowa NE, Strasburg SE, Byers
T4S R61W, T5S R61W, T5S R62W, T6S R62W, T7S R61W, T7S R62W, T8S R61W, T8S R62W, T9S R62W, T10S R62W, T10S R63W, T11S R63W

Size: 24,190 ac (9,790 ha).

Elevation: 5,200 to 7,060 ft (1,585 to 2,152 m).

General Description: West Bijou Creek is an ephemeral stream on the Great Plains of eastern Colorado. The stream drains from the Black Forest region of Elbert and El Paso counties. The floodplain and channel are relatively wide. The substrate is sandy and the stream is often dry in the late summer. The northern end of the network of conservation area is surrounded mostly by agricultural land (center pivot irrigation), but the southern end is surrounded by rangeland. The floodplain, banks, and terraces of the stream are dominated by large or good quality patches of plains cottonwood (*Populus deltoides*) with scattered peach-leaf willow (*Salix amygdaloides*). Coyote willow (*Salix exigua*) is present within the floodplain in varying quantities, generally dense near the channel, but less so on higher surfaces above the channel. The understory is highly variable. Both native and exotic weeds are common. Other riparian plant associations found along the stream are coyote willow/bare soil, cattail (*Typha latifolia*) and threesquare bulrush (*Scirpus pungens*) wetlands. The creek has a strong gradient of near perennial surface runoff at the upper end, to becoming an intermittent wash at the downstream end. Along the upper reaches, the bedrock is not far from the surface, keeping the stream flow near the surface. About mid-NCA the bedrock is no longer constricting flow, and the stream water flows into a much deeper sandy alluvium. As a consequence, the upper reaches of the stream are a diverse mosaic of riparian and wetland plant associations, whereas downstream reaches can support only the cottonwood dominated plant association.

Biodiversity Rank Justification: This NCA contains two potential conservation areas encompassing the riparian vegetation along West Bijou Creek. The PCAs encompass fair examples of the plains cottonwood/coyote willow riparian forest (*Populus deltoides-(Salix amygdaloides)/Salix exigua*) that is apparently secure on a global basis (G4? S3) and a good example (B-ranked) of a demonstrably secure (G5 S5) coyote willow/mixed-grass riparian shrubland (*Salix exigua*/mesic graminoid).

Table 49. Natural Heritage PCAs and element occurrences within the West Bijou Creek NCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO Rank	Last Observed
West Bijou Creek at 86 PCA (Elbert County) Biodiversity rank: B4 (Moderate significance)								
Populus deltoides ssp. *monilifera-(Salix amygdaloides)/Salix exigua*	Plains cottonwood riparian woodland	G4?	S3				C	1995-06-28
Salix exigua /mesic graminoid	Coyote willow/ mesic graminoid	G5	S5				B	1995-07-03
West Bijou Creek at Byers PCA (Arapahoe County) Biodiversity rank: B5 (General significance)								
Populus deltoides ssp. *monilifera-(Salix amygdaloides)/Salix exigua*	Plains cottonwood riparian woodland	G4?	S3				C	1994-08-09

Boundary Justification: Boundaries that protect the elements from direct impacts such as weed invasions and physical alterations of the vegetation structure should be considered a minimum. Boundaries should incorporate the major ecological processes that allow the element to survive. These may include, but are not limited to, channel migration, flooding and sedimentation, fire, and herbivory. Inclusion of the entire floodplain into the site boundaries will allow for natural migration of the channel, allowing the creation of sites for cottonwood regeneration and other vegetation types.

Protection Rank Comments: The entire watershed needs to be monitored. The natural hydrologic flow of the stream and groundwater must be maintained for long term survival of this riparian ecosystem.

Management Rank Comments: Some areas within the NCA boundaries are under excellent management, with the floodplain showing signs of recovery and an increase in the abundance of native woody species. Other areas, however, have very poor examples of the riparian plant associations, or none at all, and require improved management techniques to restore the floodplain vegetation. Control weeds, allow for continued natural hydrologic regime, and avoid groundwater table depletion. Current intensive short duration grazing (holistic) and reintroduction of beavers appear to be improving the element vigor, reproduction and viability.

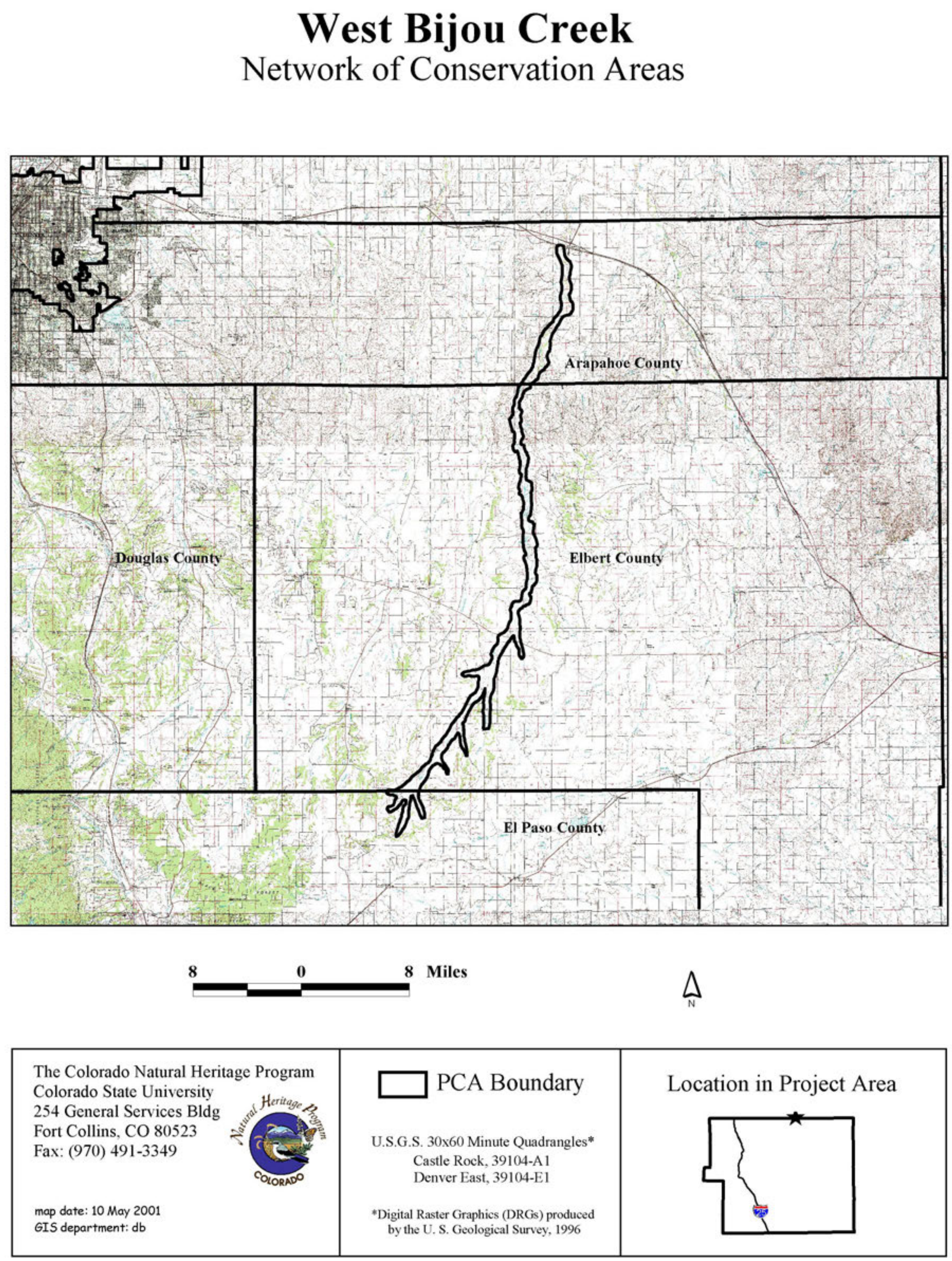


Fig. 50. West Bijou Creek Network of Conservation Areas Map

Chapter 5. El Paso County Conservation Plan and Implementation Strategies

Introduction

The recommendations summarized in Chapter 2 of this report provide guidance for on-the-ground action that can be taken to help ensure that the species and natural communities detailed in this report are conserved for the long term. The purpose of this chapter is three-fold:

1. to document the process by which a broad brush community based conservation plan was developed and to place the results of the inventory process within the context of community set conservation goals;

2. to explore options for ongoing activities related to the inventory effort; and

3. to identify strategies that might be used by the El Paso County community to achieve conservation success.

Together these two chapters lay out potential planning pathways that can be used to guide conservation action in the El Paso County region.

Conservation Planning

The primary purpose of planning is to make informed decisions about the use of resources. The rational or traditional planning process is familiar to most people and is noted for its adaptability but is sometimes criticized for its top-down approach to problem solving (Fig. 51). Other more recent additions to planning theory include community based or collaborative planning models which assume a bottom-up approach, striving to engage local communities as the foundation of the planning process.

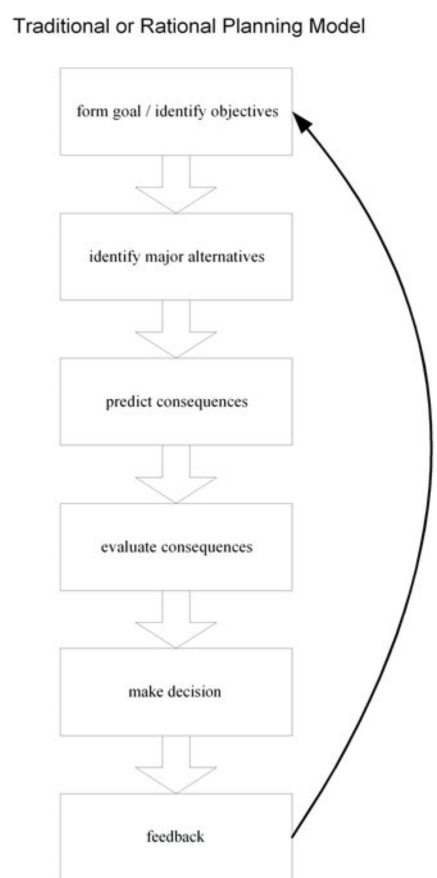


Fig. 51. Traditional or Rational Planning Model

Conservation Planning is a more specialized discipline that focuses specifically on biological systems and diversity and adapts the traditional model to better address issues of rarity, imperilment, and habitat conservation. Conservation planning addresses both landscape and local level scales and integrates information about land use activities, potential stresses, and other systems into the planning process. This allows for locally based conservation action and a better understanding of the ecological context of the species and natural communities that comprise our local environment.

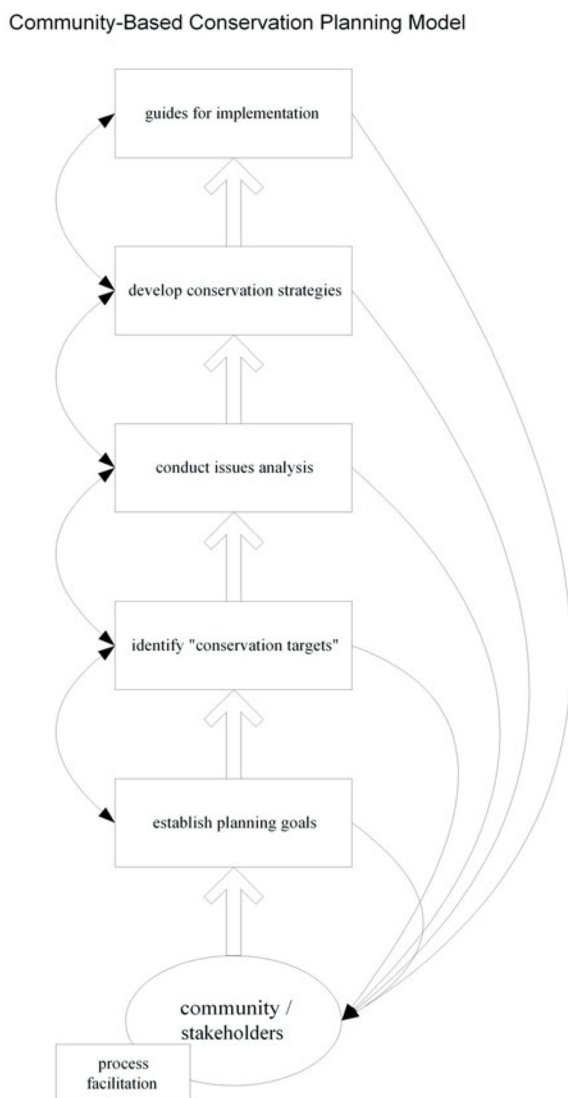


Fig. 52. Community-Based Conservation Planning Model

Project Planning Process

The planning process used in this project was based on the community based or collaborative planning model and includes elements of conservation planning. The community based planning approach suggests that long term, sustainable planning outcomes are derived from a bottom-up, community-based approach that places emphasis on the needs and goals of the local community. It is thought that by involving the community from the outset, resulting conservation strategies have a higher likelihood of implementation and eventual success because they are based upon local desires and goals and reflect familiar issues and constraints. Planning goals are traditionally the driving force behind planning and community set goals are appealing because community members have a stake in the outcome.

The planning process utilized in this project combined aspects of traditional planning (goal setting and feedback loops, for example) and conservation planning (identification of conservation targets, identification of stresses and so on) to better reflect the stated needs of the El Paso County stakeholder group. This process is outlined in Fig. 52. Three planning meetings were held in late 2000 and early 2001, and invitees included local landowners, members of local non-profit organizations, university faculty and educators, and municipal, county, state, and federal land and resource managers. The intent was to involve a multi-jurisdictional planning team comprised of regional experts with varying levels and types of experience. This group also played an important role within the inventory process itself, assisting CNHP biologists with landowner contacts, with the identification of target areas, and with the location of biologically significant species populations and natural communities.

Planning Goals
The stakeholder group developed three main planning goals to facilitate implementation and use of conservation information gathered during the inventory effort and to ensure broad based use of the information in the region:

1. Develop method for conservation prioritization;
2. Foster opportunities for capacity building and outreach; and
3. Build foundation for on-going community based conservation efforts.

Planning Process Results
Natural Heritage information is used for a wide variety of purposes, from assisting planners and land managers in the avoidance of and mitigation of impacts to species with regulatory protections, to helping students or local residents obtain a better understanding of their local natural resources, to helping non-profit organizations and local governments prioritize the acquisition of open space, ensuring the “biggest bang for the buck,” among other uses.

The stakeholder group/planning team developed a list of possible uses of inventory information in the El Paso County area:

To assist better site planning and mitigation strategies for infrastructure development (future utility expansion and maintenance);

1. To assist better site planning and mitigation strategies for infrastructure development (future utility expansion and maintenance);
2. To assist with open space prioritization;
3. To develop proactive approaches to conflict avoidance in land use decision-making;
4. To facilitate choices;
5. To provide supporting information for grants and Conservation Reserve Program (CRP) programs for landowners;
6. To provide information to help guide growth into more appropriate areas through education and communication;
7. To assist in the identification of “receiving” areas for mitigation projects;
8. To validate current land use;
9. To develop opportunities for county/city collaboration (multi-jurisdictional planning);
10. To provide a basis for coordination with the state regarding regional land holdings;
11. To provide input into policy decisions;
12. To provide an outreach and education tool;
13. To inform recapitalization or land use change; and
14. To support additional research and planning efforts.

What is clear from this list is that Natural Heritage information can be used to make better informed decisions about actions that affect land use. By informing our planning processes and evaluating potential outcomes, alternatives can be devised to reduce the stress on biologically significant species and systems.

Planning Issues and Opportunities

The El Paso County planning context is particularly complex. El Paso County's human population growth, environmental, and social trends within the county, and fast paced change of land use result in a scenario that is difficult to effectively plan for. The identification of planning issues helps to define boundaries for the conservation effort, to paint a more realistic portrayal of the planning context, and to begin identifying ways to minimize stresses to significant biological resources.

Many planning issues or potential impacts are also planning opportunities. This distinction is important as it implies a slightly different way of thinking about planning and about conservation. For example, fire is a planning issue: it has the potential of causing catastrophic damage to resources and property, affecting habitat, impacting stream drainages, increasing air and water pollution, and it needs to be considered when addressing conservation; however, fire is also a natural system and many of habitats, such as grasslands and forests, are well adapted to an environment in which fire is a part. Some of these species are dependent upon fire and others are tolerant of it. As a planning issue and opportunity, fire is complex as it can place great stress on biological systems but at the same time, it can be an important way to ensure conservation related goals are met and that our natural systems are sustainable over the long term.

The identification of planning issues and opportunities is likely to be an ongoing task as they are ever changing. A better understanding of the planning context invariably leads to better and more realistic planning action. Evaluating the information summarized in this report with the following issues in mind might help guide how the information might be used and possibly refine or better apply the recommendations made in Chapter 2 of this report.

Knowledge of these issues might be used as a reference for refining conservation priorities, ensuring timeliness of effort, efficiency of action, and economy of resources. The following list of planning issues and opportunities was developed by the planning team to capture a wide ranging and complex planning context in which conservation in the El Paso County region occurs. Using the following list as a foundation, citizens, conservationists, and planners can consider the following questions: what other planning issues and opportunities exist in the El Paso County area? How might these issues affect, facilitate, or impede a community's ability to set and reach conservation goals? What kind of stresses might these issues place on biologically significant species and places?

The main planning issue categories identified by the stakeholder group/planning team include:

- growth/development (major themes: density, high and low, and loss of habitat)
- transportation (major theme: addressing cumulative impacts)
- recreation (major themes: access, facilities, and increasing demand)

- mineral development, including sand, gravel, and possibly oil (major themes: location, cumulative impacts, habitat loss, reclamation)
- economics (major theme: effect of increased land values on ability to achieve conservation action)
- land use (major theme: uncertain future of state lands in county)
- plans and other planning efforts in the county

Within some of these issue groups are specific, on-the-ground issues that may be relevant to species or natural communities at specific locations of or to Potential Conservation Areas. This level of detail might be important for refining a prioritization plan but also might be used with caution as these issues are changing quickly.

Growth/Development

El Paso County is one of the fastest growing counties in Colorado, surpassing 500,000 inhabitants in 2000. With increased human population comes a myriad of issues. In fact, many of the issues identified by the planning team can be traced in some way back to effects of rapid human population growth. It is important to understand the nature of the change and how this change manifests itself in stresses to the biological character of the region.

Stresses associated with growth and specifically development include:

- density (high and low)
- flooding and downstream impacts
- change in wildlife composition (for example, in areas of light development, an increase in red fox and coyote populations and a decrease in ground nesting bird populations)
- changes in wildlife movement patterns and an increase in "unwanted contact"
- changes to vegetation from fire suppression (oak has been removed as fire hazard) but many forested areas remain dense
- additional infrastructure (power, oil, gas pipelines) needs: increased costs, increased numbers of facilities (towers, pipelines, etc.)
- groundwater contamination and depletion
- soil loss from increased density, relationship to hard surface development and roads
- impacts to wetlands and wildlife from development including fragmentation of habitat and migration corridors
- light pollution, causing "sky glow"
- decline in water and air quality
- increased number of pets and their potential stress to wildlife, habitat
- blowing trash
- introduction and proliferation of noxious weeds
- livestock density (five-acre lots in particular): forage is not usually local

Opportunities:

- reintroduction of fire as an essential ecological process into natural systems
- increased awareness of growth, educational options
- education and research potential

Specific planning issues include:

- Black Squirrel (and other drainage) flows impacted by upstream land use
- Denver, Dawson and Widefield aquifers are effectively being "mined" by 230-500-foot domestic wells at five acre densities
- flooding on Monument and Fountain Creeks, leading to bank failure, sedimentation and catastrophic damage
- land use changes affect ability to mitigate/use fire: winter burn ban (through February)
- increased density in some areas (northeast county, Black Forest: Bennet and Meridian); Upper Monument Creek Basin; east of Fountain
- low density development in other areas: 35 acre development in southeast county; five acre development in southern part of county near Hanover Rd.

Transportation

Due to population growth in the area and aging infrastructure, the transportation system in El Paso County is undergoing rapid change and development. Within this scenario is the potential for impact or stress to biologically significant species and natural communities through habitat change, fragmentation and road related mortality.

Stresses include:

- habitat alteration
- direct mortality from development or maintenance
- additional vectors for the spread of noxious weeds
- fragmentation of habitat or severing of established movement corridors and home ranges
- vehicle/species contact
- noise and pollution from vehicles
- chemical runoff
- impacts to hydrologic regimes (increased runoff from roads and parking lots, barriers, etc.)

Specific planning issues include:

- I-25 redevelopment project (~10 year effort)
    - designed to leave room for additional capacity
    - extends from Academy Blvd. to Monument
    - bridge, overpass and interchange work
- Woodmen Rd;→ US 24, east/west corridor project

- Drennan Rd; airport → I-25 southeast corridor project
- Powers Blvd., North Gate → past airport → State Highway 16 → power plant/race track
- US 24 corridor: Judge Orr and Curtis Roads
- Black Forest: Meridian Rd.
- airport expansion
- private toll-road: Pueblo to Fort Collins, ~20 mi east of I-25

Recreation
Also related to increased human population is the demand for outdoor recreational activities. Recreation can place varying levels of stress on natural systems while also providing opportunities to reach community set conservation goals.

Stresses include:

- open space (this can be an opportunity, although unmitigated access may cause stress)
- increased use of existing recreational trails and roads
- new construction of roads, trails
- off-road vehicle use (stress on habitats, may cause increased levels of erosion, noise, pollution)
- potential lack of impact mitigation
- active vectors for spread of noxious weeds
- pets (wildlife impacts, wastes, etc.)
- unwanted contact with wildlife
- golf course, ball park, and other facilities development
- chemical runoff and use of herbicides and pesticides

Opportunities include:

- open space (although improperly managed access may cause stress on natural systems)
- education (through interpretation and access, capacity to understand natural systems might be enhanced)
- elements of parks system can provide habitat, corridors, buffers, and refuge opportunities

Mineral Development
Mining related activities can place special stresses upon natural systems due to disturbance, infrastructure development, transportation, length of land use, and proximity to specialized habitat. Mining related activities in El Paso County include sand, gravel, rock, and limited oil development.

Stresses include:

- habitat disturbance

- changes to hydrologic regime from sedimentation, flow restriction, or alteration
- chemical runoff
- spills or transportation hazards
- road and access development
- introduction of non-native plant species, possibly introduced as seed contaminants, or from heavy equipment used in excavation purposes

Economics
The specific effects of economics on species and natural communities of concern may be difficult to measure, but economics still plays an important role in the types of stresses present in natural systems and influences the options available to achieve conservation goals.

Specific stresses related to economics include:

- the effect land value increases have on land use and potential for conservation (in some cases reducing incentives for conservation)
- the strain strong economies may place on existing infrastructure, exacerbating issues associated with growth (increase demand for recreational opportunities and sustained growth pressures).

Opportunities:

- the additional resources for conservation provided by strong economies

Land Use Change
How land is used places specific stresses on species, natural communities, and their habitats. Examples of these stresses and the accompanying opportunities are addressed to a large extent in the sections on growth, transportation, mining, etc. Central to the issue of land use is the nature of change and humans' role as agents of change within the landscape.

Associated stresses include:

- uncertain future of state lands in county
- conversion of rangeland to residential/commercial developments
- inconsistent landscape patterns contribute to fragmentation, habitat disturbance, isolation of movement corridors, lack of buffers and separators, and changes to other natural systems: hydrology, soils, vegetation, etc.

Potential opportunities:

- incentives to land owners to maintain critical habitat for existing or potential populations of significant species
- State Land Board Stewardship Trust nomination process

Conservation Implementation Strategies

Implementation strategies are possible outcomes of using Natural Heritage information to reach community set goals and to achieve conservation action. These strategies help place the information in this report within the context of the larger county region and suggest ways that long term, multi-faceted approaches to conservation may be developed involving a broad cross section of the El Paso County community.

Using goals established by the planning team (see the goal setting section of the planning model and the description of the goals in this chapter) as a foundation, a set of objectives and strategies, or ways to achieve these goals were developed providing suggested and voluntary ways to address conservation across landscape level scales. They are designed to be based in an environment of collaboration and multi-jurisdictional cooperation and may serve as a foundation for related activities in the county and therefore are not simply meant to address the use of Natural Heritage information.

Planning issues identified by the stakeholder group/planning team and the proposed uses of this planning information were used to refine the conservation strategies that follow.

Unlike traditional plans, the following goals, objectives, and strategies are developed outside of a set time frame. This allows for greater flexibility and potentially creates opportunity to adapt suggested strategies that better meet the needs of the local community. Eventually, time frames may be set to allow for better measurements of success or to ensure that long term planning goals are reached and that the process stays on track.

It will be apparent that many of the following strategies overlap and many help achieve other goals. Rather than being redundant, these overlaps might be useful as some strategies may be used to reach several goals and to achieve more than one objective. It might be possible to use certain strategies to leverage efforts and use limited resources more efficiently.

<u>Goal 1: Conservation Prioritization</u>

The methodology used to capture, catalog, synthesize, and interpret Natural Heritage information is designed to assist in the prioritization of conservation action. By utilizing information assembled in this report, the first cut at prioritization can be made by using data the community already possesses. For more information on Heritage Ranking Methodology, see Chapter 1. The strategies for reaching this goal also consider ways of refining the prioritization process to reflect other issues, stresses, opportunities, and on-the-ground realities that may be present in El Paso County.

Objective 1A: Develop map or GIS database that depicts prioritization based upon biological significance (see also objective 3A regarding GIS skill development).

> Strategy 1Ai: Use Biological Significance Ranks (B-Ranks) assigned by CNHP to depict prioritization of Potential Conservation Areas (B1 – B3 = highest priority) (see Chapter 4).

> Strategy 1Aii: Utilize Colorado Division of Wildlife composite mapping and Wildlife Resource Information System data to further refine regions of biological significance.

> Strategy 1Aiii: Assign (or use) regulatory designations (federal and state threatened or endangered status, Forest Service sensitive, etc.) to identify species or areas with regulatory protection.

Objective 1B: Use other data to refine GIS prioritization model.

> Strategy 1Bi: Assemble information from county, cities, federal agencies that depicts development patterns, transportation projects, areas of local and cultural significance, land values, areas of agricultural significance, "opportunity mapping" (where is conservation possible?), etc.

> Strategy 1Bii: Use community-based decision-making processes to derive potential "stress values" and corresponding numerical ranks for relevant planning issues or opportunities to facilitate proactive and realistic conservation.

> Strategy 1Biii: Map planning issues and rank with temporal relevance to ensure potential projects can be developed in a time sensitive fashion.

Objective 1C: Identify partners and funding sources to implement prioritization plan.

> Strategy 1Ci: Identify potential partners and collaborators missing from planning process and engage them in community-led conservation goals, including: local government, land trusts, agricultural and ranching associations, etc.

> Strategy 1Cii: Based upon outcome of prioritization analysis, target funding sources to achieve conservation goals: open space, education, additional inventory, easement acquisition or donation, etc.

> Strategy 1Ciii: Using results of prioritization analysis developed in strategies 1Bi – 1Biii to identify top priorities and implement.

Goal 2: Capacity Building and Outreach

Objective 2A: Develop approach for wide distribution of inventory report.

Strategy 2Ai: Assemble contact list of elected officials, advisory groups, planning boards, city and town councils, resource agencies, planners and managers (see also strategy 3Di).

Strategy 2Aii: Using easily and cheaply replicable formats (i.e., electronic) to distribute report and introductory information to contact list *via* compact disk or website download.

Strategy 2Aiii: Develop mechanism for follow-up with members of contact list and expectations for follow-through.

Strategy 2Aiv: Develop and maintain community conservation website to serve as information clearinghouse for partner organizations, landowners, local governments, and elected officials (see also 3B).

Objective 2B: Identify opportunities to attend related workshops, conferences, and symposia.

Strategy 2Bi: Prepare storyboards of local success stories, plans, and biological overview for display at local events.

Strategy 2Bii: Consider alternative opportunities to build capacity and publicize conservation goals and successes including local malls, downtown venues, fairs, etc.

Objective 2C: Create approach to work directly with local schools and educators.

Strategy 2Ci: Volunteer as guest lecturer or lead a field trip.

Strategy 2Cii: Develop conservation0related curricula with local focus and application.

Strategy 2Ciii: Utilize student effort for development and implementation of monitoring component (on-going) and post to website (see also objective 3B). Prepare data for community GIS (see also objective 3A) to better understand the nature of change over time and to track the status of species or biologically significant areas.

Objective 2D: Work with local media to develop countywide awareness.

Strategy 2Di: Develop articles or outreach materials to submit to local news media for publication to promote awareness and build coalitions and partnerships.

Objective 2E: Develop landowner awareness workshops.

Strategy 2Ei: Using more ‘relational’ approaches to goal setting, facilitate workshops through which landowners can better understand the biologically significant resources in their area and how conservation can help them reach personal goals.

Strategy 2Eii: Working with local landowners, identify potential incentive programs to encourage private sector conservation and to help sustain local economic bases (ranching, agriculture, etc.).

Objective 2F: Integrate Natural Heritage information into other regional planning efforts.

Strategy 2Fi: Facilitate inclusion of prioritization model (or use of B-Ranks) into open space planning for reference and prioritization purposes (see also objectives 1A and 1B).

Strategy 2Fii: Identify opportunities to use inventory results to enhance interpretive options at existing or future trails and recreational facilities.

Goal 3: On-going, Community-based Conservation Effort

Objective 3A: Build and maintain community GIS database.

Strategy 3Ai: Coordinate GIS-skills acquisition workshop using spatial data from this inventory as a case study or an example.

Strategy 3Aii: Identify and establish community access points (community centers, schools, organizations, agencies, etc.) where community members, landowners, local organizations, and local government can use the GIS database.

Strategy 3Aiii: Assemble base data layers and identify data manager to ensure data are up-to-date, compatible, and that future needs are assessed.

Objective 3B: Develop community conservation website clearinghouse.

Strategy 3Bi: Develop prototype structure for website and identify permanent host, webmasters/mistresses, and collaborating organizations, landowners, and other partners.

Strategy 3Bii: Launch site and advertise widely, encouraging linkages with other regional sites to facilitate collaboration and partnership building.

Objective 3C: Organize countywide watershed councils.

Strategy 3Ci: From existing contact list, assign membership to watershed, identify gaps in representation and develop contacts in adjacent watersheds.

Strategy 3Cii: Formulate methods for developing "watershed consciousness" or increased awareness of the ecological context and relationships in the region including: posted signs, interpretative materials, and "membership" program.

Objective 3D: Assemble resource list from CNHP inventory planning meetings.

Strategy 3Di: Using the list of planning team/advisory committee participants as a foundation, compile resource list of community and agency contacts, non-profit organizations, local government and elected officials; post to website (see also objective 3B).

Objective 3E: Establish data flow between local inventory work and CNHP (and vice versa).

Strategy 3Ei: Compile list of local consulting firms/consultants or those that work in the El Paso County region.

Strategy 3Eii: Using field forms supplied by CNHP, ensure information gathered from NEPA related efforts is forwarded to CNHP for inclusion into data system keeping regional dataset up-to-date and further refining content.

Strategy 3Eiii: To complete the data flow loop, encourage the use of CNHP information in local planning efforts and decision-making processes.

Objective 3F: Integration or collaboration with existing conservation network.

Strategy 3Fi: Identify potential partners and major players working to achieve conservation in El Paso County, encouraging diversity in approach and scope.

Strategy 3Fii: Engage in strategic and collaborative partnerships to share resources, knowledge and technology to reach common goals.

Objective 3G: Broaden network of private landowners and engage them in landscape-level conservation.

Strategy 3Gi: Investigate options for incentives for landowners providing land-based resources essential for biologically significant species (see also objective 2E).

Strategy 3Gii: Using existing communication networks or building new ones (see objective 3C) facilitate ecologically based conservation across property and jurisdictional boundaries.

Chapter 6. Selected Species Profiles and the Associated PCAs

Plants

Ambrosia linearis (Plains ambrosia)

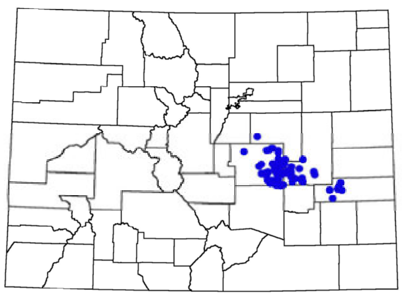
Taxonomy
Class: Dicotyledoneae
Order: Asterales
Family: Asteraceae
Genus: *Ambrosia*

Photograph copyright © CNHP

Taxonomic Comments: None.

CNHP Ranking: G3 S3

State/Federal Status: Forest Service Sensitive



Colorado Distribution

Phenology: The inconspicuous flowers appear in June and continue through early August; fruiting continues through September (Spackman *et al*. 1997).

Habitat Comments: Known primarily from clayey soils, but also from sandy soils in seasonally moist habitats in prairies. Frequently encountered in association with intermittent streams and around the margins of intermittent ponds and playas. It is also found along roadsides and ditches. Elevation ranges from 4,300 to 6,700 ft (1,326 to 2,066 m).

Global Range: The plains ambrosia is a restricted in range to the shortgrass prairie of east central Colorado.

State Range: It is known from Elbert, Lincoln, Cheyenne, Kiowa, Crowley, El Paso, and Pueblo counties.

Distribution/Abundance: In natural occurrences, which are limited to playa and dry creek margin habitats, there are an estimated 50,000 to 100,000 individuals at this time. As this species is common on roadsides within its range, additional hundreds of thousands of individuals are presumed to exist.

Known Threats and Management Issues: Development of land for housing and agriculture poses the greatest threat to this species. Playas and creek banks have been subject to significant disturbance and alteration throughout the range of this species, and further reduction of these habitats is ongoing. Many occurrences are eminently threatened by the rapid subdivision of southeastern El Paso County. Rapidly increasing density of humans, livestock, and infrastructure in east central Colorado is resulting in overall reduced quality of habitat for this species.

Potential Conservation Areas which support *Ambrosia linearis*:

Bohart Playas	on page 104
Buffalograss Playas	on page 45
East Chico Basin Ranch	on page 119
Rasner Ranch Playas	on page 159
Riser at Calhan	on page 132
Signal Rock Sandhills	on page 79

Aquilegia chrysantha var. *rydbergii* (Golden columbine)

Taxonomy
Class: Dicotyledoneae
Order: Ranunculales
Family: Helleboraceae
Genus: *Aquilegia*

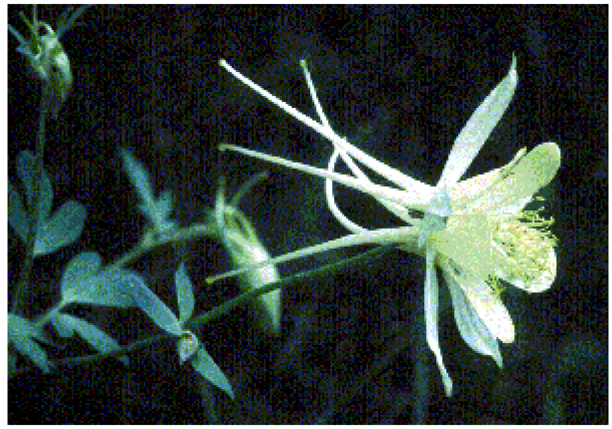
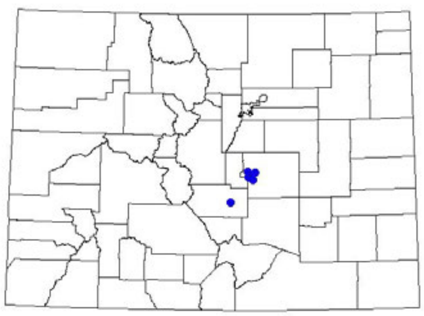


Photo copyright © 1999 by B. Jennings

Taxonomic Comments: The Flora of North America Association (1997) questions the distinctiveness of the variety *rydbergii*, saying that material seen displays traits which fall within the normal variation for the species.

CNHP Ranking: G4T1Q S1

State/Federal Status: BLM Sensitive



Colorado Distribution

Phenology: Flowers in June.

Habitat Comments: In mountains especially along streams or in rocky ravines. Elevation range is 5,500 to 6,000 ft (1,696 to 1,850 m).

Global Range: This variety of *A. chrysantha* is known only from Colorado, with eight documented occurrences.

State Range: The type locality for this variety is Canon City, Fremont County. The only other records are from the Colorado Springs area, El Paso County. Recently discovered in Long Canyon near Boulder, however, it is thought to be introduced at this location.

Distribution/Abundance: Of the eight locations documented for this species, only four have been recently revisited and are known to be extant. It has not been seen in Fremont County since 1873. Population estimates at the known occurrences range from 100 to 500 individuals. The known population of this species does not exceed 1,000 plants.

Known Threats and Management Issues: Two occurrences are located on the Pike-San Isabel National Forest. Development, trampling from hikers, erosion, and flower picking threaten the known occurrences.

Potential Conservation Areas which support *Aquilegia chrysantha* var. *rydbergii*:

Cheyenne Canyon on page 52
Cheyenne Mountain on page 146

Aquilegia saximontana (Rocky Mountain columbine)

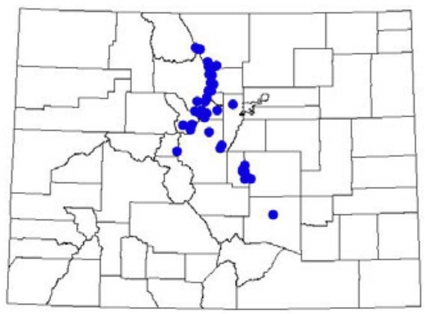
Taxonomy
Class: Dicotyledoneae
Order: Ranunculales
Family: Helleboraceae
Genus: *Aquilegia*

Photo copyright © 1999 by B. Jennings

Taxonomic Comments: None.

CNHP Ranking: G3 S3

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers and fruits in July and August.

Habitat Comments: Cliffs and rocky slopes, subalpine and alpine. Elevation range: 9,000 to 12,300 ft (2,775 to 3,793 m).

Global Range: Known only from central and north-central Colorado (Boulder, Clear Creek, El Paso, Gilpin, Jackson, Jefferson, Larimer, Park, Summit and Teller counties).

State Range: See above.

Distribution/Abundance: There are 44 recorded occurrences of this species in Colorado with seven of the records in El Paso County. One occurrence on Pikes Peak supports a large population of hundreds while the remainder of the occurrences in El Paso are small, ranging from 5-25 individuals.

Known Threats and Management Issues: This species is reportedly threatened by collectors who want it for their rock gardens. Because many records in El Paso County and throughout the state are historical and have not been visited in over 20 years, the impacts of recreational uses haven't recently been assessed for the species.

Potential Conservation Areas which support *Aquilegia saximontana:*

Cheyenne Canyon	on page 52
Pikes Peak	on page 36

Botrychium lineare (Narrowleaf grapefern)

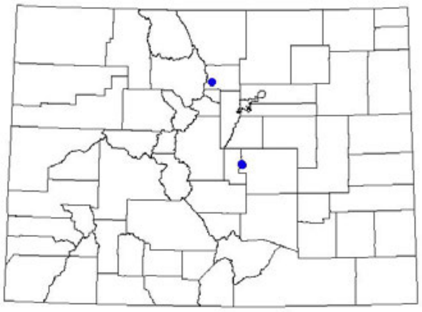
Photo copyright © 1999 by J. Sellers

Taxonomy
Class: Ophioglossopsida
Order: Ophioglossales
Family: Ophioglossaceae
Genus: *Botrychium*

Taxonomic Comments: None.

CNHP Ranking: G1 S1

State/Federal Status: Forest Service Sensitive



Colorado Distribution

Phenology: Sporophores (the spore bearing structure in moonworts) are produced in June.

Habitat Comments: Grassy slopes, among medium-height grasses, along edges of streamside forests, between 7,900 and 9,500 ft (2,436 to 2,930 m) in Colorado.

Global Range: Found in seven widely scattered locations throughout North America (New Brunswick, Quebec, Idaho, Montana, Oregon, California, and Colorado).

State Range: Previously documented in Boulder County, but the only known extant occurrence is in El Paso County.

Distribution/Abundance: The occurrence in El Paso County, Colorado is the second largest known occurrence globally, where 45 individuals have been seen previously.

Known Threats and Management Issues: According to the U.S. Fish and Wildlife Service, threats to this species throughout its range include habitat succession as a result of fire suppression, livestock grazing, exotic species, development, timber harvest, road maintenance activities, and recreational impacts such as trampling and campfires. The occurrence in El Paso County is threatened by some of these issues, including invasion of yellow toadflax (*Linaria vulgaris)* and trampling by hikers.

Potential Conservation Areas which support *Botrychium lineare:*

Cascade Creek on page 33

Chenopodium cycloides (Sandhill goosefoot)

Taxonomy
Class: Dicotyledoneae
Order: Caryophyllales
Family: Chenopodiaceae
Genus: *Chenopodium*

Photo copyright © 1999 by C. Freeman

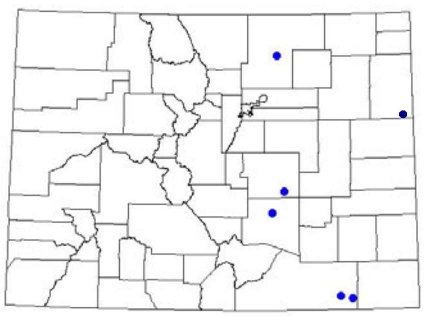
Taxonomic Comments: None.

CNHP Ranking: G3G4 S1

State/Federal Status: Forest Service Sensitive

Phenology: Annual; flowers and fruits in late summer and early fall, bearing reddish-purple fruits in September.

Habitat Comments: Sandy soil on dunes and stabilized sand in blowouts. The plant can be found on grasslands in sandy soils on dunes and stabilized sand in blowouts. Elevation: 4,000 to 5,500 ft (1,234 to 1,696 m).



Colorado Distribution

Global Range: Southwest Kansas south through west Texas, west to southern New Mexico and Colorado.

State Range: In Las Animas, Pueblo, El Paso, Bent, and recently found in Weld County. Likely in Baca County, and perhaps in other counties throughout the plains where sandy soil is found.

Distribution/Abundance: This plant is inconspicuous and undercollected, and very little is known about it in Colorado. It may be found to be more abundant as more inventory work is completed. Currently it is known in Colorado from five occurrences.

Known Threats and Management Issues: Residential development and agricultural use of land represent tangible threats to this species. Currently, no known occurrences are imminently threatened.

Potential Conservation Areas which support *Chenopodium cycloides*:
Signal Rock Sandhills on page 79

Cypripedium calceolus ssp. *parviflorum* (Yellow lady's-slipper)

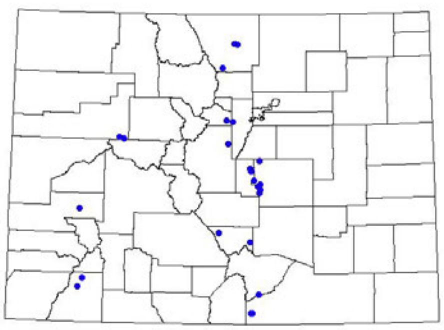
Taxonomy
Class: Monocotyledoneae
Order: Orchidales
Family: Cypripediaceae
Genus: *Cypripedium*

Photo copyright © 1999 by B. Jennings

Taxonomic Comments: The yellow lady's slippers are often considered to be three distinct species, *Cypripedium calceolus* being strictly Eurasian and the American plants being assigned to either *C. parviflorum* or *C. calceolus* ssp. *parviflorum* (sometimes treated as varieties of *C. calceolus*). Kartesz (1999) treats the North American plants in this group as three varieties of broadly viewed species called *C. parviflorum* (vars. *makasin*, *parviflorum*, and *pubescens*).

CNHP Ranking: G5 S2

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers June through July.

Habitat Comments: Aspen groves and ponderosa pine/Douglas fir forests. Elevation 7,400 to 8,500 ft (2,282 to 2,621m).

Global Range: Yukon east to Newfoundland, south to Louisiana, Arizona, and New Mexico.

State Range: In Colorado, this species occurs in Clear Creek, Custer, Douglas, El Paso, Huerfano, Jefferson, La Plata, Larimer, Las Animas, Montrose, Park and Pueblo counties.

Distribution/Abundance: There are 26 occurrences of this species recorded in Colorado with six present in El Paso County. Four are historical records and have not been visited in over 20 years. Most populations are small with only a handful in the state numbering over 100 individuals.

Known Threats and Management Issues: Since *C. calceolus* ssp. *parviflorum* is a showy flower, it is often threatened by recreationists who pick the flowers or trample the habitat area. Invasive weeds have been noted in many sites.

Potential Conservation Areas that support *Cypripedium calceolus* ssp. *parviflorum*:

Blue Mountain	on page 96
Cheyenne Canyon	on page 52

Heuchera richardsonii (Richardson's alumroot)

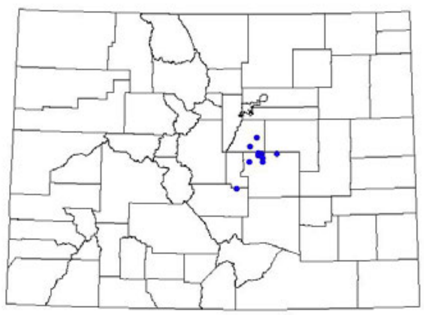
Taxonomy
Class: Dicotyledoneae
Order: Rosales
Family: Saxifragaceae
Genus: *Heuchera*

No Picture Available

Taxonomic Comments: None.

CNHP Ranking: G5 S1

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers June through July.

Habitat Comments: In Colorado, occurs in low elevation Ponderosa pine woods in the Front Range foothills at elevations of 6,000 to 7,500 ft (1,850 to 2,313 m).

Global Range: The plant is present in a wide range through the United States (IL, IN, IA, KS, MI, MN, MO, MT, NE, ND, OK, SD, WI, WY) and Canada.

State Range: Douglas, El Paso, Teller, and Fremont counties.

Distribution/Abundance: There are 10 sites of *H. richardsonii* recorded in the state with six of the sites occurring in El Paso County. Many sites are historical records and may have been extirpated by development.

Known Threats and Management Issues: At many of the occurrences, weeds are present with yellow toadflax, (*Linaria vulgaris*) as the most invasive. Also, residential encroachment is a threat at many of the sites.

Potential Conservation Areas which support *Heuchera richardsonii*:

Black Forest	on page 142
Fremont Fort	on page 125
Pineries at Black Forest	on page 155
Table Rock	on page 135

Juncus brachycephalus (Small-headed rush)

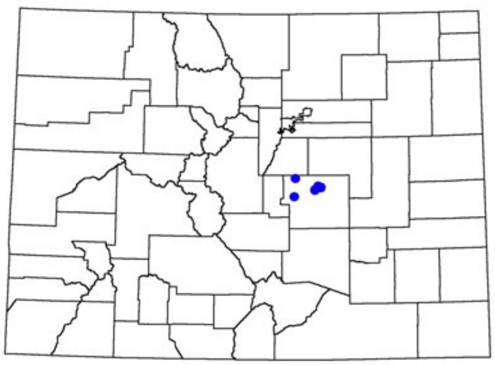
Taxonomy
Class: Monocotyledoneae
Order: Juncales
Family: Juncaceae
Genus: *Juncus*

Taxonomic Comments: None.

CNHP Ranking: G5 S1

State/Federal Status: None

Photo copyright © USDA, NRCS, 1997 - Northeastern Wetlands Flora USDA Plants



Colorado Distribution

Phenology: The flowers appear in July through early August (Great Plains Flora Association 1986).

Habitat Comments: Known primarily from lake and stream marshes (Great Plains Flora Association 1986).

Global Range: The small-headed rush is known to occur throughout the midwest and east (CT, GA, IL, IN, LA, MA, MD, ME, MI, MN, ND, NH, NJ, NY, OH, PA, TN, VA, VT, WI) and eastern Canada (LB, NB, NS, NU, ON, QC) (Nature Serve 2001). In Colorado it is an eastern relict with only five occurrences; three of which are historic occurrences.

State Range: It is known only from El Paso County.

Distribution/Abundance: There are limited data for the small-headed rush in Colorado. One occurrence reported individuals as not common. The three remaining occurrences did not contain population data.

Known Threats and Management Issues: Development of land for housing and agriculture poses the greatest threat to this species. Lake and creek banks have been subject to significant disturbance and alteration throughout the range of this species, and further reduction of these habitats is ongoing. Many occurrences are eminently threatened by the rapid subdivision of El Paso County. Rapidly increasing density of humans, livestock, and infrastructure in east central Colorado is resulting in overall reduced quality of habitat for this species.

Potential Conservation Areas that support *Juncus brachycephalus*:
Judge Orr Road on page 61

Mertensia alpina (Alpine bluebells)

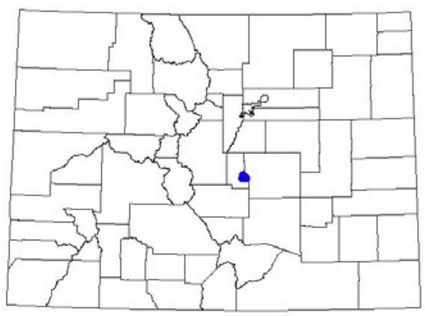
Taxonomy
Class: Dicotyledoneae
Order: Lamiales
Family: Boraginaceae
Genus: *Mertensia*

No Picture Available

Taxonomic Comments: None.

CNHP Ranking: G4? S1

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers from late June through early August.

Habitat Comments: Occurs in alpine meadows, rock crevices, and rocky areas from 11,000 to 14,000 ft (3,392 to 4,318 m) (Kelso *et al.* 1999). Occurs on Pikes Peak and Windy Point granite gravel.

Global Range: Found in alpine areas in Idaho, Montana, New Mexico, Wyoming, and Colorado.

State Range: El Paso and Teller counties.

Distribution/Abundance: On Pikes Peak, tens to hundreds of thousands of individuals are present, irregularly dispersed on alpine tundra and fellfields.

Known Threats and Management Issues: Although all occurrences are protected from residential development, this species is being impacted by the Pikes Peak Highway in some areas. Severe erosion has occurred in many areas as a result of disturbance from the road. Erosion has washed away or degraded habitat for this species. Trampling is also having limited impacts on this species in areas of high visitation.

Potential Conservation Areas which support *Mertensia alpina*:
Pikes Peak on page 36

Oreoxis humilis (Pikes Peak spring parsley)

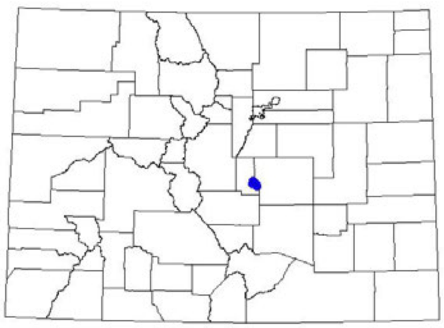
Taxonomy
Class: Dicotyledoneae
Order: Apiales
Family: Apiaceae
Genus: *Oreoxis*

Photo copyright © 1999 by R. Hartman

Taxonomic Comments: Harrington (1954) notes that this may not be distinct from *O. alpina.*

CNHP Ranking: G1 S1

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers in June through August, bearing a cluster of small yellow flowers. Fruits appear in August.

Habitat Comments: Found on granitic substrates above timberline, at elevations between 12,000 and 13,000 ft (3,701 to 4,009 m) (Spackman *et al*. 1997). Soils are often sparsely vegetated and easily eroded.

Global Range: The range for this species is restricted to Colorado, known only from Pikes Peak, Colorado.

State Range: El Paso County.

Distribution/Abundance: Tens of thousands of individuals are documented in five occurrences on Pikes Peak.

Known Threats and Management Issues: Although all occurrences are protected from residential development, some occurrences are being impacted by the Pikes Peak Highway. Severe erosion has occurred in many areas as a result of disturbance from the road. Erosion has washed away or degraded habitat for this species. Trampling is also having limited impacts on this species in areas of high visitation.

Potential Conservation Areas which support *Oreoxis humilis*:
Pikes Peak on page 36

Ptilagrostis porteri (Porter's feathergrass)

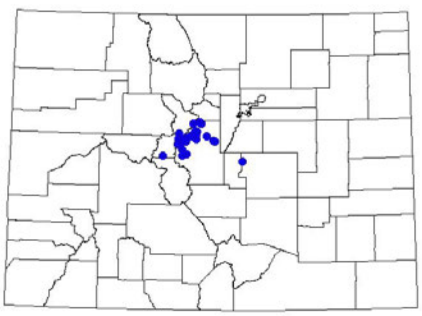
Taxonomy
Class: Monocotyledoneae
Order: Cyperales
Family: Poaceae
Genus: *Ptilagrostis*

Photo copyright © CNHP

Taxonomic Comments: This taxon is still considered by W.A. Weber (University of Colorado) to be a distinct species (*Ptilagrostis porteri*), but is classified by Kartesz (1994 checklist), following Barkworth (1983), as the subspecies *Ptilagrostis mongholica* ssp. *porteri*. *Ptilagrostis mongholica* is otherwise an Asiatic species.

CNHP Ranking: G2 S2

State/Federal Status: Forest Service and BLM Sensitive.



Colorado Distribution

Phenology: Fruit maturing from mid-August to early September.

Habitat Comments:
Hummocks in fens and willow carrs, at elevations between 9,200 and 12,000 ft (2,776 to 3,701 m)

Global Range: Known only from central Colorado (El Paso, Lake, Park, and Summit counties).

State Range: See above.

Distribution/Abundance: Twenty-seven occurrences have been documented in Colorado for this species, but many of these have likely been extirpated.

Known Threats and Management Issues: Peat mining, wetland ditching, and other hydrological alterations to its habitat pose the greatest threat to this species.

Potential Conservation Areas which support *Ptilagrostis porteri*:
Farish Recreation Area on page 122

Telesonix jamesii (James' false saxifrage)

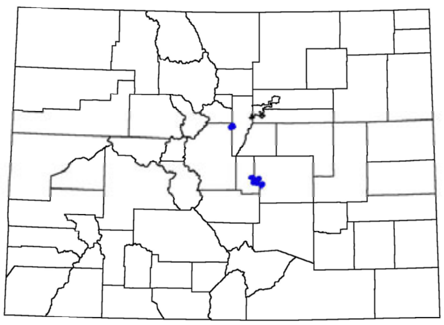
Photograph copyright © CNHP

Taxonomy
Class: Dicotyledoneae
Order: Rosales
Family: Saxifragaceae
Genus: *Telesonix*

Taxonomic Comments: Treated as *Boykinia jamesii* in Kartesz (1994) and *Telesonix jamesii* in Kartesz (1999), where *T. heucheriformis* is also recognized. In the Intermountain Flora, Cronquist *et al.* (1997) treat the more widespread taxon as *T. jamesii* var. *heucheriformis*.

CNHP Ranking: G2G3 S2?

State/Federal Status: None.



Colorado Distribution

Phenology: Flowers in late July and early August. Fruits appear in August and September.

Habitat Comments: On rocky granite outcroppings and deep boulder pockets. This species has a large elevation range from 8,000 to 13,600 ft (2,467 to 4,194 m).

Global Range: *Telesonix jamesii* (in the narrow sense, without taxonomic varieties) is considered to be only in Colorado and New Mexico. In Colorado (at about 9,000 to 12,000 ft; 2,775 to 3,700 m), it is scattered sporadically on granite tors of the easternmost mountains (in the north-central to central region). In northern New Mexico, it has been reported from one mountain area.

State Range: Restricted to granite outcrops between Rocky Mountain National Park to Pikes Peak in Jefferson, Park, Teller and El Paso counties.

Distribution/Abundance: There are 16 sites of this species documented in Colorado with the largest recorded occurrence of tens of thousands of plants occurring in El Paso County on Pikes Peak.

Known Threats and Management Issues: In El Paso County, the Pikes Peak Highway is impacting this species in some areas. Severe erosion has occurred in many areas as a result of disturbance from the road. Recreational uses, especially rock climbing, also threaten the sites. Noxious weeds have been recorded at some of the occurrences.

Potential Conservation Areas that support *Telesonix jamesii*:

Cheyenne Canyon on page 52
Pikes Peak on page 36

Unamia alba (Prairie Goldenrod)

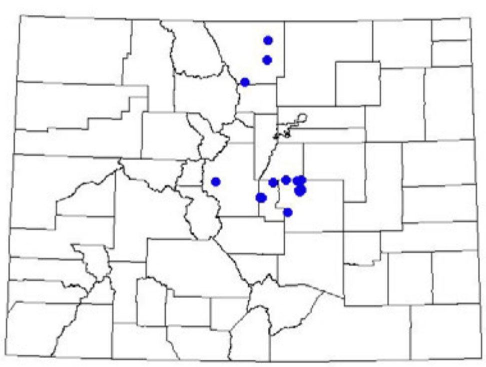
Photo copyright © 1999 by L. Barzee

Taxonomy
Class: Dicotyledoneae
Order: Asterales
Family: Asteraceae
Genus: *Unamia*

Taxonomic Comments: Formerly *Solidago ptarmicoides.*

CNHP Ranking: G5 S2S3

State/Federal Status: None.



Colorado Distribution

Phenology: The inflorescences with creamy white flowers bloom in July and continue through August; fruiting continues through September (Spackman *et al*. 1997).

Habitat Comments: Dry, open prairies or montane meadows; often on limestone bluffs in sandy or gravelly soil (Spackman *et al.* 1997). In El Paso County, this species is found on Alfisols, primarily on Elbeth and Kettle soil types (J. Von Ahlefeldt, Botanist, pers. comm.). In Colorado, it ranges from 7,500 to 9,300 ft (2,313 to 2,868) in elevation.

Global Range: Saskatchewan east to New England, south to Colorado.

State Range: Found in El Paso, Larimer, Park, and Teller counties.

Distribution/Abundance: This species is common in other parts of its range, but very little is known about the abundance of this species in Colorado. No reports cite more than 50 individuals in one location.

Known Threats and Management Issues: Residential development is the greatest threat to this species in Colorado. Appropriate habitat for this species is being rapidly converted to subdivisions throughout the Front Range. This species has probably declined significantly in recent years as a result of the widespread transformation of its habitat. Eight of the 16 occurrences known from Colorado have not been seen in over 20 years, and some may have disappeared.

Potential Conservation Areas that support *Unamia alba*:

Black Forest	on page 142
Table Rock	on page 135

Insects

Polites origenes rhena (Cross-line Skipper)

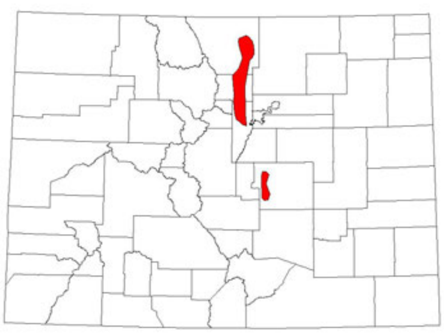
Taxonomy:
Class: Insecta
Order: Lepidoptera
Family: Hesperiidae
Genus: *Polites*

Photo copyright © by Paul Opler.

Taxonomic Comments: Two subspecies occur in North America: *origenes* and *rhena*. *Polites origenes rhena* occurs in Colorado (Ferris and Brown 1981) and is larger and more tawny than eastern subspecies *origenes* (Ferris and Brown 1981). Resembles *P. themistocles*, but is slightly larger and darker; the mail stigma is straight, females usually (and males often) have faint hindwing spots, and females nearly lack an orange upper-forewing streak.

CNHP Ranking: G5 S3

State/Federal Status: None.



Statewide distribution of *Polites origenes.* Source: Stanford and Opler 1993

Distribution: Global range: This species occurs in the eastern United States and southern Canada, with disjunct populations in tallgrass meadows adjoining the Rocky Mountain foothills, and similar habitats in the Black Hills of South Dakota (Ferris and Brown 1981). State range: Colorado Front Range lower foothill canyons where they open onto the plains (Ferris and Brown 1981, Brown 1957). Known from 13 counties in Colorado (Stanford and Opler 1993): Adams, Arapahoe, Boulder, Custer, Douglas, El Paso, Elbert, Fremont, Gilpin, Jefferson, Larimer, Las Animas, Pueblo.

Habitat Comments: Elevational range: Ranges from 5,400 to 7,600 ft (1,645 to 2,316 m) in Colorado. Grasslands, serpentine or sandy barrens, canyon openings near plains typify its preferred habitat landscape (Pyle 1981). May be encountered in swales and grassy meadows adjoining the Rocky Mountain foothills (Ferris and Brown 1981).

Phenology: One brood emerging in mid-June through July in Colorado (Ferris and Brown 1981, Pyle 1981). Males perch all day in grassy swales and valley bottoms to await females (Scott 1986).

Larval Hostplant: In Colorado, the hostplant is suspected to be big bluestem (*Andropogon gerardii*) by habitat association (R. Stanford, Lepidopterist, pers. comm.).

Known Threats and Management Issues: Habitat, especially along the foothills of Colorado is subject to continued destruction of prairie habitat by conversion to cropland and for urban developments. Additionally, habitat loss may be attributed to increased tree density into formerly open prairie habitat.

Potential Conservation Areas supporting *Rana blairi*:
Cheyenne Mountain on page 146

Atrytonopsis hianna turneri (Dusted Skipper)

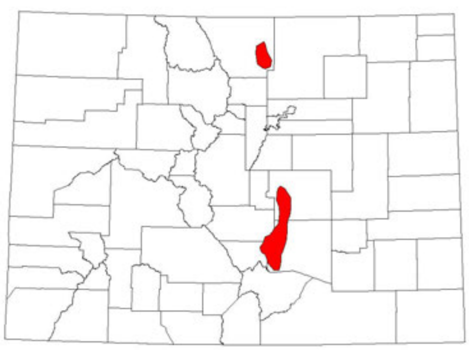
Taxonomy:
Class: Insecta
Order: Lepidoptera
Family: Hesperiidae
Genus: *Atrytonopsis*

No photo available

Taxonomic Comments: Two subspecies are recognized in North America: *turneri* and *hianna* (Miller and Brown 1981). Subspecies *turneri* occurs in Colorado (Ferris and Brown 1981). Subspecies *hianna* has few or no under-hindwing spots when compared with subspecies *turneri* (Scott 1986).

CNHP Rank: G4G5 S2

State/Federal Status: None



Statewide distribution of *Atrytonopsis hianna.* Source: Stanford and Opler 1993

Distribution: Global range: Frequents northeastern North America from Saskatchewan and New England south to Florida and the Ozark Plateau. Several disjunct western populations comprise the Rocky Mountain subspecies. New Mexico records require confirmation (Ferris and Brown 1981). State range: Found in the foothills of the Arkansas headwaters, and in Larimer County (Stanford and Opler 1993). Larimer County populations are apparently peripheral to eastern populations, while Arkansas drainage populations are believed to be disjunct (Scott 1986, Ferris and Brown 1981). Known from five Colorado counties: Custer, El Paso, Fremont, Larimer, Pueblo.

Habitat Comments: Inhabits Transition Zone open dry fields, open woodland, and prairie gulches (Scott 1986). This skipper is found in bluestem grasslands, and often on acid pine or pine-oak barrens or prairies (Pyle 1981). Inhabits relatively undisturbed canyons and open pine woodlands from 5,300 to 7,200 ft (1,615 to 2,195 m). These habitats are subject to fire, and the skipper must either survive burning or be a good colonist (Opler and Krizek 1984, Pyle 1981).

Phenology: In Colorado, it has one brood, with adults flying from May to mid-June. Males perch in flat clearings or gullies, usually on the ground to await females. Adults will nectar on beardtounge (*Penstemon*) species, and on blackberry, strawberry, and clover (Scott 1986).

Larval Hostplants: Big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium*).

Known Threats and Management Issues: Given its lower Front Range distribution, it may be threatened by increasing development. Fire suppression is changing the character of its Front Range habitat reducing the open shrublands and woodlands preferred by this species.

Potential Conservation Areas supporting *Atrytonopsis hianna*:

Aiken Canyon on page 41

Reptiles

Cnemidophorus neotesselatus (Triploid Colorado Checkered Whiptail)

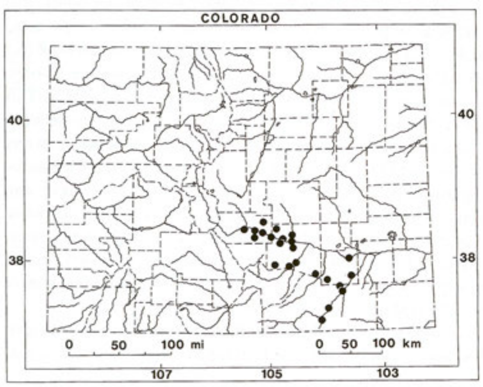
Taxonomy
Class: Reptilia
Order: Squamata
Family: Teiidae
Genus: *Cnemidophorus*

Taxonomic Comments: This species formerly was included in *Cnemidophorus tesselatus* but was recognized as a distinct species in 1997 (Walker *et al.* 1997a). *Cnemidophorus neotesselatus* sometimes hybridizes with *C. sexlineatus* (Walker *et al.* 1997b).

CNHP Ranking: G2Q S2

State/Federal Status: None.

Photo by G. Hammerson



Triploid Colorado Checkered Whiptail distribution in Colorado (from Hammerson 1999)

Habitat Comments: *Cnemidophorus neotesselatus* occupies arid grasslands, rocky canyons, rocky hillsides, shrubby areas, and open savannahs associated with the Arkansas, Huerfano, Apishapa, and Purgatoire rivers and their tributaries (Walker *et al.* 1997a,b).

Distribution: *Cnemidophorus neotesselatus* occurs only in southeastern Colorado, where it is patchily distributed in Fremont, Pueblo, Otero, and Las Animas counties (Hammerson 1999). Several sites near Higbee, Colorado (Otero County) constitute the only area where coexistence between diploid and triploid stages in any complex of parthenogenetic *Cnemidophorus* is known to occur (Walker *et al.* 1995, Walker and Cordes 1998).

Important Life History Characteristics: This species consists entirely of females and is parthenogenetic (Maslin 1966, 1971). In parthenogenetic species, reproduction is asexual, with egg cells developing without having been fertilized by male gametes; females raised in total isolation from the egg stage to sexual maturity produce eggs that develop into fertile female offspring (Uzzell 1970). The species originated through hybridization between a female *Cnemidophorus marmoratus* and a male *Cnemidophorus septemvittatus*, followed by hybridization between one of these hybrids and a male *Cnemidophorus sexlineatus* (Wright 1993, Walker *et al.* 1995, Walker *et al.* 1997a). Because members of a parthenogenetic population are genetically identical, they would be expected to tolerate and cooperate with each other to a greater extent than would be expected in a non-parthenogenetic population (Hamilton 1964a,b). Indeed, in outdoor enclosure experiments, parthenogenetic whiptails tended to share burrows much more often (and interacted aggressively much less often) than non-parthenogenetic whiptails, suggesting a greater degree of intraspecific tolerance (Leuck 1982, 1985). Similar experiments with mixed groups of parthenogenetic and non-parthenogenetic whiptails also found that levels of aggression among lizards were correlated with degree of genetic relatedness (Leuck 1993). The diet of *Cnemidophorus neotesselatus* consists of invertebrates, including grasshoppers, beetles, caterpillars, termites, spiders, and moths (Paulissen *et al.* 1993). Whiptails dig burrows in which they spend the night; these burrows are defended against conspecifics and are used night after night (Knopf 1966). *Cnemidophorus neotesselatus* enters hibernation between late August and mid-October and emerges in April (Knopf 1966). A very fast runner, this whiptail typically runs a considerable distance to a sheltered site beneath a bush when threatened (Smith 1946). In general, however, the species is relatively unwary and may be approached quite closely (Price 1992, Hammerson 1999).

Known Threats and Management Issues: Habitat loss has caused the extirpation of *Cnemidophorus neotesselatus* from several sites where it formerly occurred (Walker *et al.* 1996, Walker *et al.* 1997b) and it continues to threaten the survival of populations of this species (Walker *et al.* 1997b, Walker and Cordes 1998).

Potential Conservation Areas supporting *Cnemidophorus neotesselatus*: Although this species has been reported from El Paso County, not enough information exists about the occurrence to outline a PCA.

Sistrurus catenatus (Massasauga)

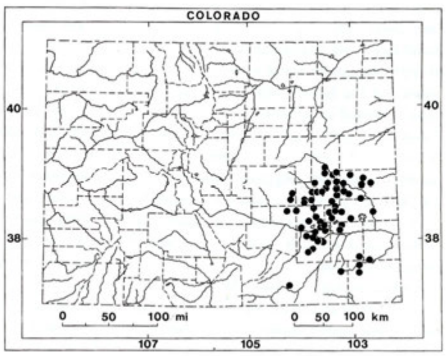
Taxonomy
Class: Reptilia
Order: Squamata
Family: Viperidae
Genus: *Sistrurus*

Photo by G. Hammerson

Taxonomic Comments: The eastern massasauga (also known as the pigmy rattlesnake) is a distinct species, *Sistrurus miliarius*.

CNHP Ranking: G3G4 S2

State/Federal Status: BLM sensitive; species of special concern (Colorado).



Massasauga distribution in Colorado (from Hammerson 1999)

Habitat Comments: Over much of its range, *Sistrurus catenatus* inhabits moist habitats such as swamps, marshes, wet meadows, bogs, and associated wetlands (Wright and Wright 1957, Ernst 1992). In the drier, southwestern portions of its range, this small rattlesnake occupies river bottoms, dry grasslands, and shortgrass prairies with sandy soil (Gloyd 1955, Degenhardt *et al.* 1996, Hobert 1997, Hammerson 1999). Use of relatively cool, moist rodent burrows for shelter enables massasaugas to exploit these arid habitats without excessive loss of moisture (Ernst 1992).

Distribution: Extirpated over most of its historical range in the United States (Mackessy 1998), the massasauga now occurs in disjunct populations that extend obliquely to the southwest from the Great Lakes region of southern Ontario and New York through the central and Great Plains states to Texas, southern New Mexico, southeastern Arizona, and Mexico (Minton 1983). Over most of its range the species occurs below 5,000 ft (1,542 m) in elevation (Minton 1983). In Colorado, the species occurs at elevations below 5,500 ft (1,696 m) in the southeastern quarter of the state (Maslin 1965, Hammerson 1999). The greatest concentration of these snakes is found in southern Lincoln County (Hobert 1997, Mackessy 1998).

Important Life History Characteristics: Massasaugas hibernate (singly) in rock crevices, rodent or crayfish burrows, hollow logs, and other protected sites ("hibernacula") from October or November through March or April (Degenhardt *et al.* 1996, Mackessy 1998). Although they can withstand a freezing body temperature for a short time, massasaugas select hibernacula below the frost line (Maple and Orr 1968, Klauber 1972). Evidence of seasonal migrations between winter and summer habitats has been found in Colorado (Hobert 1997) and in other states (Reinert and Kodrich 1982, Seigel 1986). In spring and fall the snakes are active diurnally (basking and foraging in the sunlight), but during the summer they avoid the extreme daytime heat by shifting their activities to the crepuscular and nocturnal (twilight and night) hours (Seigel 1986, Collins 1993, Hobert 1997, Hammerson 1999). Like many snakes, massasaugas are capable swimmers (Ernst 1992). Massasaugas mate between March and November (Wright 1941, Chiszar *et al.* 1976, Reinert 1981) and they are ovoviviparous (fully formed eggs are retained and hatched inside the maternal body, with the release of live offspring). Young are born from late July to late September (Ernst 1992). In some cases, sperm are stored over winter in the female's reproductive tract and fertilization occurs the next spring (Ernst 1992). Massasaugas use their heat-sensitive facial pits (one pit is located between each eye and its corresponding nostril) to locate endothermic ("warm-blooded") prey, but they also use sight and scent to detect prey (Chiszar *et al.* 1976, Chiszar *et al.* 1979, Chiszar *et al.* 1981). Young massasaugas wave their yellow-tipped tails back and forth over their heads to lure frogs, toads, and lizards that often feed on brightly-colored, moving insects (Schuett *et al.* 1984). Prey generally are consumed only after death by envenomation, but massasaugas sometimes eat carrion (including roadkills) or live prey (i.e., frogs) (Greene and Oliver 1965, Ernst 1992). Common prey include small mammals, amphibians, reptiles, and birds (Greene and Oliver 1965, Klauber 1972, Hobert 1997). Bites of massasaugas occasionally are fatal to humans (Lyon and Bishop 1936, Stebbins 1954) but usually they are not (Degenhardt *et al.* 1996, Hammerson 1999).

Known Threats and Management Issues: Over much of the species' range, habitat loss has destroyed most colonies of this species (i.e., Bushey 1985, Seigel 1986). Because of their habit of resting on warm, paved roads at night, many massasaugas are killed by motor vehicles (Lowe *et al.* 1986, Degenhardt *et al.* 1996, Mackessy 1998). Like other rattlesnakes, massasaugas are often willfully destroyed because they are venomous, and many are taken by collectors (Klauber 1972, Breisch 1984, Lowe *et al.* 1986).

Potential Conservation Areas supporting *Sistrurus catenatus*:

Edison Road — on page 172 (historical occurrences only)
Truckton Edison — on page 87 (historical occurrences only)

Amphibians

Rana blairi (Plains Leopard Frog)

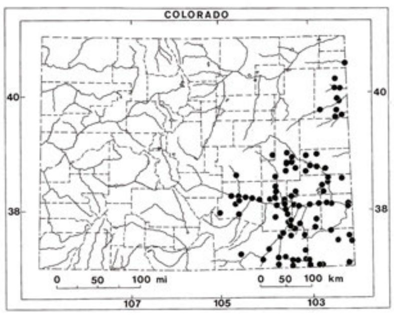
Photo by G. Hammerson

Taxonomy
Class: Amphibia
Order: Anura
Family: Ranidae
Genus: *Rana*

Taxonomic Comments: Formerly considered part of the *Rana pipiens* species complex; hybridizes with *Rana pipiens* and *Rana sphenocephala*. No subspecies are recognized.

CNHP Ranking: G5 S3

State/Federal Status: Species of special concern (Colorado).



Plains leopard frog distribution in Colorado (Hammerson 1999)

Habitat Comments: Plains leopard frogs are found in a variety of temporary and permanent aquatic habitats, including streams, rivers, ponds, lakes, ditches, and marshes (Degenhardt *et al.* 1996). They are often found great distances from water and for that reason they sometimes are known as "meadow frogs" (Wright and Wright 1949). Mass movements away from breeding ponds are sometimes undertaken by adults and young after summer rains (Fitch 1958). *Rana blairi* is better adapted to dry conditions than the closely-related *Rana pipiens* (Gillis 1975, 1979) and often uses shallow, muddy waters (Scott and Jennings 1985, Stebbins 1985).

Distribution: *Rana blairi* ranges westward from Indiana to southern South Dakota and eastern Colorado, and southward to Texas; isolated populations occur in southern Illinois, New Mexico, and Arizona (Stebbins 1985, Brown 1992, Conant and Collins 1998). In Colorado, the range of the plains leopard frog generally is complementary to that of the northern leopard frog (*Rana pipiens*) (Hammerson 1999). *Rana blairi* is found at elevations below 6,000 ft (1,850 m) in the Arkansas River drainage in southeastern Colorado and in the Republican River drainage of northeastern Colorado (Hammerson 1999).

Important Life History Characteristics: *Rana blairi* breeds from February through October (Pace 1974), with peak breeding activity occurring after heavy rains (Gillis 1975, Lynch 1985). Eggs, which hatch into tadpoles within three weeks, are laid in large clusters attached to submerged vegetation in shallow water (Degenhardt *et al.* 1996). Depending upon the timing (month) of egg deposition, the tadpoles may metamorphose into frogs or they may overwinter and then transform during the next spring (Gillis 1975, Scott and Jennings 1985). In the autumn, the adults dig into the mud and debris on the bottoms of streams and ponds to overwinter (Collins 1993). The adults feed mainly on non-aquatic insects (Hartman 1906, Hammerson 1999). To escape predators, they tend to leap away from water rather than toward it, in contrast to the responses of many other species of frogs (Degenhardt *et al.* 1996, Hammerson 1999). When captured by predators, these frogs emit characteristic, explosive distress calls (Hammerson 1999). Dispersal distances of eight km have been recorded for the species (Gillis 1975).

Known Threats and Management Issues: *Rana blairi* has become scarce or absent at some locations where non-native bullfrogs have been introduced (Hammerson 1982). *Rana blairi* eggs and young are readily eaten by bullfrog larvae (Ehrlich 1979), and large bullfrog larvae that have overwintered could greatly reduce the reproductive success of plains leopard frogs (Hammerson 1999). Moreover, adult bullfrogs consume adult plains leopard frogs (Mackessy 1998).

Potential Conservation Areas supporting *Rana blairi*:
Chico Creek on page 111

Fish

Etheostoma cragini (Arkansas Darter)

Taxonomy
Class: Osteichthyes
Order: Perciformes
Family: Percidae
Genus: *Etheostoma*

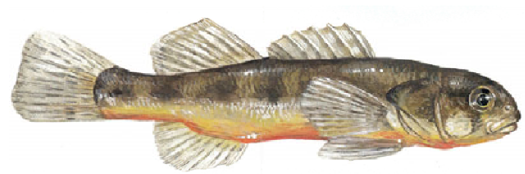


Illustration © copyright by W. D. Lewis, Colorado Division of Wildlife distributive information.

Taxonomic Comments: *Etheostoma* is the largest (most speciose = contains the most species) genus of North American fishes.

CNHP Ranking: G3 S2

State/Federal Status: Forest Service sensitive; candidate for federal listing as threatened/endangered; threatened in Colorado.

Arkansas darter distribution in Colorado (from Colorado Division of Wildlife 2001b)

Habitat Comments: Arkansas darters inhabit small, shallow, clear, slowly-flowing streams that are partially overgrown with rooted aquatic vegetation such as watercress; they often are found in pools with substrates of sand, fine gravel, or organic detritus (Miller and Robinson 1973, Cross and Collins 1975, Lee *et al.* 1980). They are able to tolerate moderately suboptimal conditions such as water turbidity (Miller 1984), high water temperature and low dissolved oxygen availability (Labbe and Fausch 1997).

Distribution: Although the historical distribution of Arkansas darters is unknown because of the paucity of historical records (i.e., three pre-1979 records exist for Colorado), it is generally agreed that the distribution and abundance of the Arkansas darter have declined substantially due to loss of riparian habitats and reductions in groundwater aquifers that support spring-fed habitats in the region (Colorado Division of Wildlife 2001a). Today, localized populations of Arkansas darters inhabit portions of the Arkansas River drainage in eastern Colorado, southern Kansas, northeastern Oklahoma, and southwestern Missouri (Lee *et al.* 1980, Colorado Division of Wildlife 2001a). In Colorado, Arkansas darters are known to occur in Elbert, El Paso, Lincoln, Pueblo, Kiowa, and Prowers counties (Woodling 1985, Colorado Division of Wildlife 2001a).

Important Life History Characteristics: Arkansas darters are small fishes (up to 2.5 inches or 10 centimeters in length) that breed in the early spring and deposit their eggs in open areas where organic ooze occurs as a thin layer over sandy substrates (Moss 1981). Young Arkansas darters tend to occupy areas that are relatively open, whereas adults use areas with more aquatic vegetation (Moss 1981, Woodling 1985). Although mayflies are the primary food for Arkansas darters, many other items also are consumed, including dragonflies, caddisflies, dipterans, fish eggs, and small leaves and seeds (Moss 1981). Like most darters, Arkansas darters often sit motionless on the substrate; the name "darter" is based on their habit of occasionally darting about on the bottoms of streams as they forage (Page and Burr 1991).

Known Threats and Management Issues: Several factors have contributed to the declines in distribution and abundance of the Arkansas darter. Since the late 1800s, extensive water diversion and impoundment for irrigating croplands, degradation of stream banks and shallow wetlands due to livestock grazing and human activities, and pollution of streams have probably substantially reduced the availability of habitat suitable for Arkansas darters (Colorado Division of Wildlife 2001a). The major obstacle to the recovery and future persistence of the Arkansas darter is the availability of adequate amounts of suitable habitat. The quality and quantity of freshwater habitats will become increasingly difficult to maintain as the demand for water for human usage (i.e., domestic, agricultural, industrial) continues to increase (Colorado Division of Wildlife 2001a).

Potential Conservation Areas supporting *Etheostoma cragini*:

Big Sandy Creek at Calhan	on page 91
Chico Creek	on page 111
Fountain and Jimmy Camp Creeks	on page 150

Oncorhynchus clarki stomias (Greenback Cutthroat Trout)

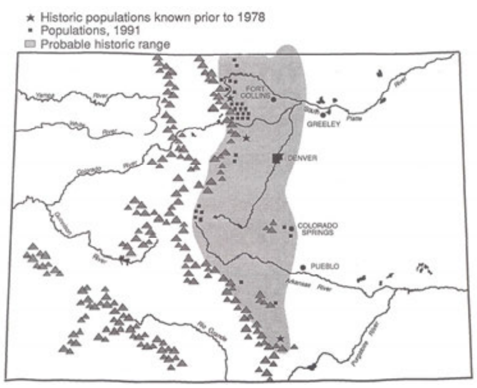
Taxonomy
Class: Osteichthyes
Order: Salmoniformes
Family: Salmonidae
Genus: *Oncorhynchus*

Photograph by J. Woodling

Taxonomic Comments: Greenback cutthroat trout are closely related to Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Greenback cutthroat trout hybridize with various species and subspecies of the genus *Oncorhynchus* and therefore local cutthroat populations can range in appearance from "pure-looking" to obvious hybrids (U.S. Fish and Wildlife Service 1998).

CNHP Ranking: G4T2T3 S2

State/Federal Status: Listed as federally threatened.



Historical and current greenback cutthroat trout distributions (from U.S. Fish and Wildlife Service 1998)

Habitat Comments: Inhabits clear, cold, well-oxygenated mountain streams with moderate gradients, rocky to gravelly substrates, and abundant riparian vegetation; also is found in ponds and lakes (Trotter 1987).

Distribution: The exact historical distribution of the greenback cutthroat trout is uncertain because the species declined so rapidly during the 1800s. The species is native to the headwaters of the South Platte and Arkansas river drainages in Colorado and to a short portion of the South Platte drainage in Wyoming (U.S. Fish and Wildlife Service 1998). By the early 1900s, greenback cutthroat trout were thought to be extinct (Greene 1937). Since then, ten native populations of greenback cutthroat trout have been discovered in the South Platte drainage (seven populations) and in the Arkansas River watershed (three populations); two of the three populations in the Arkansas River drainage are considered stable (Severy Creek in El Paso County and South Apache Creek in Huerfano County) (U.S. Fish and Wildlife Service 1998, Policky *et al.* 1999). The Colorado Division of Wildlife has reintroduced greenback cutthroat trout at many sites in the South Platte and Arkansas River drainages, and 25 areas in the Arkansas river watershed are managed for the species (Policky *et al.* 1999). Twenty (six historical and 14 reintroduced) populations of greenback cutthroat trout are currently thought to be stable and self-sustaining (U.S. Fish and Wildlife Service 1998).

Important Life History Characteristics: Greenback cutthroat trout spawn in gravel-bottomed areas in running water during the spring when water temperatures reach 5-8°C (41-46°F); the timing of spawning varies with elevation and the age of the fish (U.S. Fish and Wildlife Service 1998). Although female greenbacks in hatcheries produce eggs when two years old, females in small alpine streams in Colorado typically reach sexual maturity at three or four years of age (U.S. Fish and Wildlife Service 1998). An opportunistic feeder, the greenback cutthroat trout consumes a wide range of prey but focuses mainly on invertebrates (Trotter 1987, U.S. Fish and Wildlife Service 1998). Vertebrates such as salamanders and small fishes also are consumed (U.S. Fish and Wildlife Service 1998).

Known Threats and Management Issues: The decline in greenback cutthroat trout populations was caused by several factors related to human activities. The major factor was the introduction of non-native salmonid species (rainbow trout, brook trout, brown trout, and Yellowstone cutthroat trout) into the South Platte and Arkansas river drainages (U.S. Fish and Wildlife Service 1998). Rainbow trout and various cutthroat subspecies readily hybridize with greenback cutthroat trout (Everhart and Seaman 1971, U.S. Fish and Wildlife Service 1998). Introduced brook trout (Behnke and Zarn 1976, Behnke 1979) and brown trout (Wang 1989) tend to outcompete and ultimately displace greenback cutthroat trout. Finally, because cutthroat trout are more easily caught than other salmonid species, harvest by anglers may have played an important role in reducing greenback cutthroat populations, particularly in waters where non-native species were present with greenbacks (U.S. Fish and Wildlife Service 1998).

Other factors that contributed to the decline of greenback cutthroat trout populations also were associated with the human settlement and development of the Front Range. Exploitation of land, water, minerals, timber resources, and fisheries adversely affected greenback cutthroat trout and their habitat (U.S. Fish and Wildlife Service 1998). The diversion of streams and the removal of water for irrigation of agricultural lands had major impacts on the ecology and hydrology of waters occupied by greenback cutthroat trout.

Preliminary experiments indicated that greenback cutthroat trout were susceptible to whirling disease (caused by microscopic, water-borne parasite *Myxobolus cerebralis*) and that mortalities among infected greenbacks were higher than those among infected rainbow trout despite the fact that greenbacks showed no overt signs of infection (no skeletal deformities or tail-chasing behavior) (U.S. Fish and Wildlife Service 1998).

Potential Conservation Areas supporting *Oncorhynchus clarki stomias*:

Boehmer Creek on page 100
Severy Creek on page 76

Birds

Athene cunicularia (Burrowing Owl)

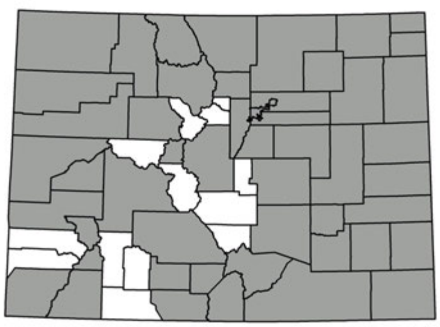
Taxonomy
Class: Aves
Order: Strigiformes
Family: Strigidae
Genus: *Athene*

Photo © by Don Baccus
dhogaza@pacifier.com

Taxonomic Comments: Formerly known as *Speotyto cunicularia.* As many as 18 subspecies are recognized.

CNHP Ranking: G4 S4B

State/Federal Status: Forest Service sensitive; listed as threatened in Colorado.



Burrowing Owl breeding distribution in Colorado (adapted from Andrews and Righter 1992)

Habitat Comments: Burrowing Owls occupy dry, open, treeless grasslands where they typically nest in burrows of prairie dogs or ground squirrels (Butts and Lewis 1982, Haug *et al.* 1993, Kingery 1998). Burrows of badgers, tortoises, and other animals also are sometimes used (Johnsgard 1979) and the owls occasionally excavate their own nesting holes in sandy soil (Ryser 1985, Millsap 1996). Burrowing Owls prefer sites with very low vegetation (as are found in prairie dog towns and heavily-grazed grasslands (Johnsgard 1979) and they abandon areas where plague or poisoning has eliminated most burrowing rodents and the vegetation has grown more than a few inches tall (MacCracken *et al.* 1985, Plumpton and Lutz 1993). In urban and suburban settings, Burrowing Owls sometimes nest in open areas such as golf courses, airports, cemeteries, street rights-of-way, and vacant lots (Haug *et al***.** 1993).

Distribution: Burrowing Owls nest in suitable habitat throughout most of western North America, in central and southern Florida, in Mexico and in much of central and South America, and on islands to the southwest and southeast of North America (Haug *et al.* 1993). Historically the species probably ranged farther eastward in North America; reductions in the numbers and distributions of prairie dogs and ground squirrels have caused range contractions and decreased abundance of Burrowing Owls throughout the Great Plains (Johnsgard 1979). Winter range includes the southern portions of the breeding range; in winter, most owls seem to vacate the northern parts of the Great Plains and Great Basin (Haug *et al.* 1993). Most Burrowing Owls in North America are migratory, but some local populations are year-round residents (Haug *et al.* 1993). In Colorado, Burrowing Owls are declining in abundance and distribution, and they have been extirpated from some areas (Andrews and Righter 1992). On the eastern plains of Colorado, the species remains a locally uncommon to fairly common summer resident and a casual winter resident; in Colorado's western valleys and mountain parks it is now rare to uncommon (Andrews and Righter 1992).

Important Life History Characteristics: Burrowing Owls often collect dried manure, shred it, and then use it to line the floor of the tunnel, the nest chamber, and the burrow entrance, presumably to reduce the likelihood of predation by masking the scent of the birds (Bent 1938, Martin 1973a, Millsap 1996). If manure is removed from the burrow entrance or the tunnel, the owls will replace it within a day (Martin 1973a). Most Burrowing Owls in non-migratory populations maintain and use the burrow throughout the year and show nest site fidelity (they breed on the same territory in successive years) (Millsap and Bear 1988, Haug *et al.* 1993). Even in migratory populations, some nest site fidelity is evident (Martin 1973a, Wedgwood 1976, Haug *et al.* 1993, Desmond *et al.* 1995). During the breeding season, both male and female Burrowing Owls defend (intrasexually) the nest burrow and the area immediately surrounding it against intrusions by other Burrowing Owls (Haug *et al.* 1993). Burrowing Owls feed primarily on nocturnal rodents such as voles and kangaroo rats as well as nocturnal insects (see refs. in Haug *et al.* 1993). Opportunistic feeders, Burrowing Owls forage mostly during crepuscular hours but also hunt during all other times of the day and night (Grant 1965, Coulombe 1971, Marti 1974). Hunting behavior includes walking, running, or hopping on the ground, flying to the ground from perches, hovering, and aerial flycatching (Grant 1965, Thomsen 1971, Marti 1974). Food is cached both inside (Agersborg 1885, Haug 1985) and outside (Grant 1965) the burrows. When disturbed in the burrow, young Burrowing Owls produce a rasp-like vocalization that mimics the rattling of a disturbed rattlesnake and probably deters predators from entering nesting burrows (Martin 1973b, Rowe *et al.* 1986). Burrowing Owls have the curious habit of following moving animals (i.e., dogs, horses), perhaps to capture small prey items flushed by the animals (Bent 1938).

Known Threats and Management Issues: Burrowing Owls in North America continue to experience mild to relatively severe population declines (Holroyd and Wellicome 1997, Sheffield 1997). Habitat fragmentation and loss (Bent 1938, Haug 1985, Sheffield 1997, Warnock and James 1997), pesticide use for insect control (James and Fox 1987, Fox *et al*. 1989), poisoning of rodent colonies (Bent 1938, Sheffield 1997, Desmond *et al*. 2000:1073), plague outbreaks in rodent colonies (Sheffield 1997), shooting (Butts 1973, Wedgwood 1978), and collisions with vehicles (Bent 1938, Haug and Oliphant 1987, Millsap and Bear 1988) have reduced North American Burrowing Owl populations. Human disturbance at nest and roost sites may significantly reduce Burrowing Owls' reproductive success (Thomsen 1971, Millsap and Bear 1988).

Potential Conservation Areas supporting *Athene cunicularia*:

Edison Road	on page 172
Marksheffel Road	on page 179
Olney Prairie	on page 129
Squirrel Creek Road	on page 187
Squirrel Creek School	on page 83
Truckton Edison	on page 87

Calcarius mccownii (McCown's Longspur)

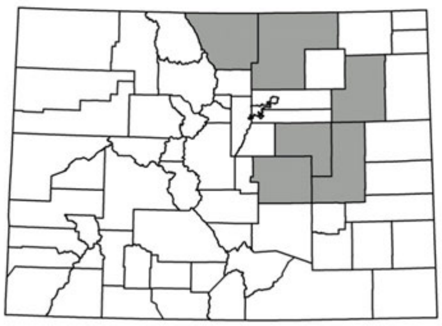
Taxonomy
Class: Aves
Order: Passeriformes
Family: Emberizidae
Genus: *Calcarius*

No photo available

Taxonomic Comments: No subspecies described.

CNHP Ranking: G5 S2B, SZN

State/Federal Status: None.



McCown's Longspur breeding distribution in Colorado (adapted from Andrews and Righter 1992, Kingery 1998, and CNHP data)

Habitat Comments: McCown's Longspurs breed on open, flat, semi-arid expanses of shortgrass prairie or structurally similar habitats such as heavily grazed or other sparsely-vegetated grasslands (Byers *et al.* 1995, With 1994). These birds tend to be more numerous on breeding grounds in dry years than in wet years (Krause 1968). Wintering grounds also tend to be sparsely-vegetated areas, including shortgrass prairie, overgrazed grasslands, plowed agricultural fields, and dry lake beds (With 1994).

Distribution: The summer breeding range for McCown's Longspurs extends southward from southern Canada to Colorado (Bailey and Niedrach 1965, Andrews and Righter 1992, With 1994, Price *et al*. 1995). Primary breeding areas are in Montana and in southern Alberta and Saskatchewan (Byers *et al*. 1995). Substantial reductions of the species' breeding range have occurred historically (Krause 1968). In Colorado, the center of breeding activity for McCown's Longspurs is located in northern Weld County but recent observations indicate that the species also breeds in areas farther to the south, including Washington, Elbert, Lincoln, and Kit Carson counties (Kingery 1998). The winter range extends southwestward from western Oklahoma through Texas, and into Mexico; it includes parts of extreme southern Arizona and New Mexico (With 1994).

Important Life History Characteristics: McCown's Longspurs forage diurnally while walking or running (not hopping) on the ground where they consume mainly weed seeds, grasshoppers, and other insects (Terres 1980, With 1994, Byers *et al.* 1995). The male establishes and maintains a discrete breeding territory that he vigorously defends against intrusions by other males of the species (With 1994). Characteristic behaviors (an aerial display and flight song) are used by the male to proclaim territorial ownership and to attract a female (Mickey 1943). The male flies upward, holding both wings outstretched and pulled back to reveal his bright, white wing linings; then he spreads his tail and floats to the ground while singing (Mickey 1943, With 1994). Another courtship display used by the male consists of walking in a tight circle around the female with one of his wings raised to display the white lining (DuBois 1937, Mickey 1943, With 1994). During the breeding season, male and female McCown's Longspurs show an unusual attachment for each other, remaining close together and usually walking side by side (Ludlow 1875, Terres 1980). The female constructs a nest of dried weed stems and grasses in a hollow scraped in the ground, often beneath a shrub or clump of grass (Terres 1980, Byers *et al.* 1995). Eggs are incubated by the female but both parents feed the young (Terres 1980). McCown's Longspurs form flocks by early August and leave the breeding grounds by September (Byers *et al.* 1995). Usually they return to breeding areas in April (Byers *et al.* 1995).

Known Threats and Management Issues: Habitat loss constitutes the greatest threat to this species. Breeding habitat is especially vulnerable to agricultural and urban development and was substantially reduced during the twentieth century (see refs. in With 1994; Byers *et al.* 1995). McCown's Longspurs are vulnerable to direct mortality from pesticides (McEwan and Ells 1975). Although some McCown's Longspurs are relatively tolerant of human disturbance (With 1994), others may abandon active nests if disturbed (Felske 1971, Strong 1971).

Potential Conservation Areas supporting *Calcarius mccownii:*

Squirrel Creek Road	on page 187
Squirrel Creek School	on page 83
Truckton Edison	on page 87

Charadrius montanus (Mountain Plover)

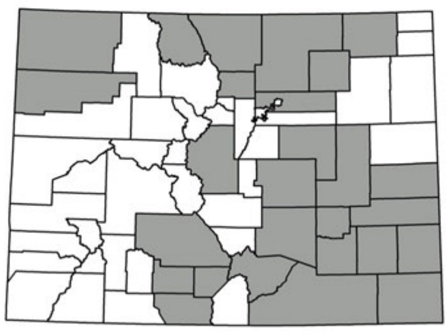
Taxonomy
Class: Aves
Order: Charadriiformes
Family: Charadriidae
Genus: *Charadrius*

Photo by M. B. Wunder

Taxonomic Comments: Formerly known as *Eupoda montana.*

CNHP Ranking: G2 S2B, SZN

State/Federal Status: Forest Service sensitive; BLM sensitive; candidate for federal listing as threatened/endangered; species of special concern (Colorado).



Mountain Plover breeding distribution in Colorado (adapted from Andrews and Righter 1992)

Habitat Comments: Breeding Mountain Plovers occupy open habitats with low-growing vegetation, especially shortgrass prairie characterized by the presence of blue grama grass and buffalo grass (Graul 1975, Graul and Webster 1976, Knopf and Miller 1994). In grasslands where vegetation grows taller than approximately three inches in height, Mountain Plovers use intensively grazed areas (Graul and Webster 1976, Knopf 1996c), prairie dog towns (Knowles *et al.* 1982; Knowles and Knowles 1984, Olson and Edge 1985, Shackford 1991), and fallow or recently plowed agricultural fields (Shackford 1991, Shackford *et al.* 1999). On their wintering grounds in California, Mountain Plovers use plowed or burned agricultural fields and heavily grazed annual grasslands (Knopf and Rupert 1995). In Texas, wintering Mountain Plovers use coastal prairies, alkaline flats, plowed fields, and Bermuda grass fields (Oberholser 1974).

Distribution: Mountain Plovers breed in parts of Montana, Wyoming, Colorado, New Mexico, and in adjacent portions of Utah, Oklahoma, and Texas (Knopf 1996a). An isolated breeding population occurs in the Davis Mountains of western Texas (Knopf 1996a). In late summer, birds form flocks and disperse widely across the western and southern Great Plains before migrating to their wintering range (Knopf 1996a). Mountain Plovers winter in California, southern Arizona, southern Texas, and Mexico (see refs. in Knopf 1996a). In Colorado, the greatest numbers of breeding Mountain Plovers occur in Weld County (Graul and Webster 1976). The breeding range of this species has undergone a dramatic long-term contraction, both in Colorado (Andrews and Righter 1992) and throughout the western Great Plains (Graul and Webster 1976).

Important Life History Characteristics: Mainly a bird of the high plains and semi-desert regions of western North America, the Mountain Plover is one of the few "shorebirds" that lives away from water in arid regions (Terres 1980). Mountain Plovers arrive on their breeding areas in Colorado in late March (Graul 1975, Knopf and Rupert 1996), when males often return to the same territories they occupied the previous year (Graul 1973). Displays of territorial males include a "falling leaf" display (the male rocks back and forth with his wings held in a sharp "V" as he drops to the ground from 15-30 feet in the air), a slow "butterfly flight" (with slow, deep wingbeats) and ritualized scraping of the ground (a courtship display in which the male presses his chest against the ground and scrapes soil with one foot at a time as he cocks his fanned tail), which produces potential nest sites throughout the territory (Graul 1973). After mating occurs and eggs are laid in a rudimentary nest located in a scrape on the ground, some females leave their mates to incubate the clutch while they begin a second clutch with a new male (Graul 1973). When this occurs, the female typically incubates the second clutch (Graul 1973, 1975, 1976). This uncommon form of polygamy, in which a female mates successively with more than one male is called successive (Krebs and Davies 1993) or sequential (Reynolds 1987) polyandry. Mountain Plover nests often are situated very close to dried cow manure piles, perhaps to provide disruptive coloration and thereby reduce the probability of nest predation, or perhaps to help the birds more easily relocate their nests (Graul 1975, Knopf and Miller 1994). An incubating Mountain Plover may fly up into the face of a cow to distract the animal and prevent trampling of the nest; this behavior apparently evolved during the long association between grazing bison and breeding Mountain Plovers (Walker 1955; Graul 1973, 1975; McCaffery *et al.* 1984). Mountain Plovers feed on the ground, consuming insects such as grasshoppers, crickets, beetles, and flies (Baldwin 1971, Knopf 1998). Most activities are restricted to the crepuscular hours to avoid the heat of the day (Graul 1975). Mountain Plovers begin to leave their breeding territories and form flocks shortly after the chicks fledge, which occurs in early July in Colorado (Knopf and Rupert 1996). They arrive on the California wintering areas in September and October (Small 1994, Knopf and Rupert 1995).

Known Threats and Management Issues: Breeding Bird Survey data indicate a decline of two-thirds in the continental population during the period 1966-1993 (Knopf 1996c). Once widely distributed in eastern Colorado (Sclater 1912, Bailey and Niedrach 1965), Mountain Plovers underwent a dramatic range reduction due to loss of habitat as native prairie was converted to cropland (see refs. in Andrews and Righter 1992). Habitat loss to agricultural activities also has severely reduced the species' breeding range outside Colorado (Samson and Knopf 1994). Mountain Plovers no longer breed in the Dakotas or in Kansas, for example, probably because of this factor (Graul and Webster 1976). Additional threats to Mountain Plovers and their habitat include gas, oil, and mineral extraction activities, livestock grazing and spring plowing (the timing and extent), collisions with motor vehicles, and recreational activities (Underwood 1994). Human disturbance at nest sites may cause nest abandonment (Graul 1975, Miller and Knopf 1993). Prior to 1900, Mountain Plovers were an important game bird for market hunters (Grinnell *et al.* 1918, Sandoz 1954).

Potential Conservation Areas supporting *Charadrius montanus*:

Big Johnson Reservoir	on page 165
Olney Prairie	on page 129
Squirrel Creek Road	on page 187
Squirrel Creek School	on page 83
Truckton Edison	on page 87

Falco peregrinus anatum (American Peregrine Falcon)

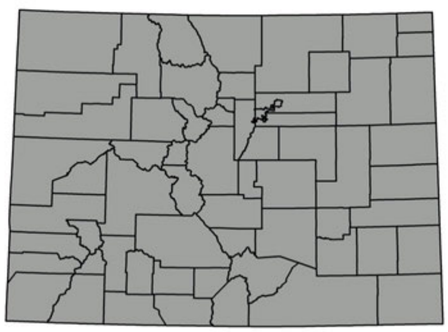
Taxonomy
Class: Aves
Order: Falconiformes
Family: Falconidae
Genus: *Falco*

Photo courtesy USFWS

Taxonomic Comments: Three of the approximately 20 recognized subspecies occur in North America (Brown and Amadon 1968); only *Falco peregrinus anatum* (the American Peregrine Falcon) occurs in Colorado (U.S. Fish and Wildlife Service 1984).

CNHP Ranking: G4T3 S3B, SZN

State/Federal Status: Colorado species of special concern; removed from federal endangered species list in August 1999.



American Peregrine Falcon distribution (all seasons) in Colorado (adapted from Andrews and Righter 1992)

Habitat Comments: In western North America, Peregrine Falcons nest on ledges of high cliffs in the foothills and mountains from 4,500 to over 9,000 ft (1,388 to 2,776 m) in elevation (U.S. Fish and Wildlife Service 1984). The steepest and most inaccessible locations on the tallest cliffs are preferred, especially those that offer flat, protected ledges at least 18 inches wide, with sheer rock above and below (Johnsgard 1979). Peregrine Falcons formerly nested at sites that were much more accessible than tall cliffs; human disturbance at these accessible sites has precluded their use by the birds (Kingery 1998). In Colorado, pinyon/juniper woodland occurs in the vicinity of about half of all Peregrine Falcon nest sites, and ponderosa pine woodland or forest is found at about one-quarter of the sites (Kingery 1998). Peregrine Falcons in the midwestern and eastern states, where high cliffs generally are unavailable, often nest on human-made structures such as buildings, bridges, and smokestacks (87 percent of midwestern pairs (Tordoff *et al*. 1998) and 33 percent of eastern pairs (Cade *et al*. 1996). Preferred habitats for hunting include agricultural lands, meadows, drainage bottoms, marshes, and lakes (U.S. Fish and Wildlife Service 1984). Migrating and wintering birds often are associated with reservoirs, rivers, and marshes, but they also use grasslands and agricultural areas (Enderson 1965, Andrews and Righter 1992).

Distribution: The Peregrine Falcon was once one of the most widely-distributed birds in the world, occurring on all continents except Antarctica, and on many islands (Hickey and Anderson 1969). Throughout its range, the species has undergone major reductions in numbers and density (Hickey 1969). From 1950 to1965, a severe decline in numbers occurred in Peregrine Falcon breeding populations in North America and in parts of Europe (Hickey 1969). In the Rocky Mountain region, only one-third of historical Peregrine nest sites were still occupied by 1965 (Enderson 1969). By 1971, the North American breeding range, which had formerly covered most of the continent, included only Canada, Alaska, and Baja, California (Cade 1971). In 1977, the Colorado population reached a low of four breeding pairs (Gray 1995). By 1995, due to an intensive program of captive breeding and reintroduction, Peregrines occupied 71 breeding sites in Colorado (Kingery 1998). Today, Peregrine Falcons breed along the foothills of Colorado's Front Range and (in higher concentrations) in the river valleys and canyons of the Western Slope (Kingery 1998). *Falco peregrinus anatum* nests across Alaska and Canada and throughout much of the western United States to central Mexico (U.S. Fish and Wildlife Service 1999). More northerly-breeding members of this subspecies migrate long distances to wintering areas in South America, whereas more southerly-breeding individuals show more variable migratory behavior (some migrate relatively short distances within western North America and others do not migrate at all) (Yates *et al.* 1988).

Important Life History Characteristics: Peregrine Falcons show very strong fidelity to nesting territories; individual birds commonly return to the same territories year after year (Tordoff and Redig 1997). Peregrine Falcons do not build their own nests, but instead they use old nests of eagles, hawks, or ravens (Hickey and Anderson 1969). A nest site may be reused by Peregrines (different individuals) for decades (Hickey 1942, Cade *et al.* 1967) or even centuries (Ferguson-Lees 1957). Mated pairs of Peregrines defend an area of about 90 m around the nest by performing a sky dance and a high, circling display (Kingery 1998). The female does most of the incubating of the eggs; the male supplies her with food and sometimes relieves her at the nest (Johnsgard 1979). The female also does most of the brooding and feeding of the young during the first two weeks after hatching; later, both parents drop prey items into the nest, where the young must compete for them (Johnsgard 1979). After the young have left the nest, they remain in the area for several weeks (mid-June to mid-July) and they are fed and protected by both adults (U.S. Fish and Wildlife Service 1984). Peregrine Falcons may travel up to 17 miles from their nesting sites to the areas where they hunt (Porter and White 1973, Enderson and Craig 1997). Mated pairs of Peregrines sometimes hunt cooperatively, with one falcon frightening potential prey (birds) into flight paths along which they are vulnerable to attack by the other falcon (Snow 1972). Prey of the Peregrine Falcon includes many types of birds, especially domestic pigeons, wild ducks and other waterfowl, and shorebirds, as well as mammals, fishes (see White and Roseneau 1970), and invertebrates (i.e., beetles, dragonflies, butterflies) (Hickey and Anderson 1969, Terres 1980). Flight speeds of 62 mph (horizontal flight, Portal 1922 [cited by Terres 1980]) and 175 mph (diving for prey, Lawson 1930 [cited by Terres 1980]) have been recorded for Peregrine Falcons.

Known Threats and Management Issues: The severe population declines experienced by Peregrine Falcons in North America were primarily due to the effects of pesticides, particularly DDT and dieldrin (Nisbet 1988, Peakall and Kiff 1988, Risebrough and Peakall 1988). Reproductive symptoms of pesticide exposure included failure to lay eggs, reduced clutch size, excessively thin eggshells, embryonic mortality, nestling mortality, and failure to re-lay after loss of the first clutch (Cade *et al.* 1988). Through captive breeding and reintroduction programs, many agencies and organizations have successfully restored Peregrine Falcon populations to portions of the species' historical range, including Colorado (Andrews and Righter 1992). Direct, human-caused mortality may result from shooting (Bond 1946, Cade 1960, Enderson 1965), poisoning (Enderson 1965, Reichel *et al.* 1974), egg collecting (Rice 1969:159) or capture-related deaths caused by falconers (Bailey and Niedrach 1965). Historically, the direct killing of Peregrines by pigeon fanciers caused serious reductions in Peregrine populations in the United States and Europe (Mebs 1960 [cited by Olsen and Olsen 1980], Mebs 1969, Herbert and Herbert 1969, Hickey and Anderson 1969). Peregrines sometimes are killed by collisions with powerlines as they dive at high speeds after prey (Herren 1969, U.S. Fish and Wildlife Service 1984), and collisions with human-made objects are the leading cause of death and injury among midwestern Peregrines (Redig and Tordoff 1994, cited by Sweeney *et al.* 1997). Human disturbance at nest sites may cause nest abandonment (Herbert and Herbert 1965, Mebs 1969, Snow 1972, Olsen and Olsen 1980, U.S. Fish and Wildlife Service 1984). The increasing popularity of recreational rock climbing in North America is becoming a serious problem for natural resource managers who are trying to protect nesting Peregrine Falcons (Ratcliffe 1969, U.S. Fish and Wildlife Service 1999).

Potential Conservation Areas that support *Falco peregrinus anatum*:

Blue Mountain on page 96
Cheyenne Canyon on page 52

Haliaeetus leucocephalus (Bald Eagle)

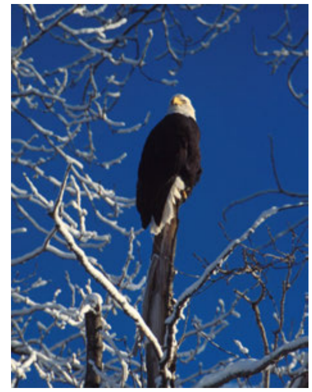


Photo copyright © M. Kiesling

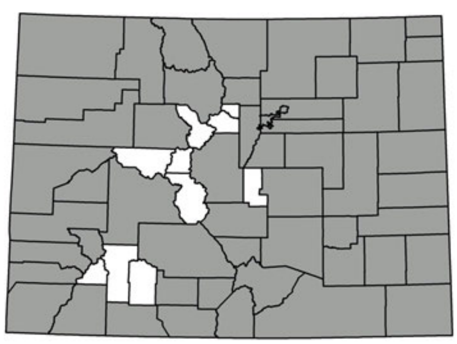
Taxonomy
Class: Aves
Order: Falconiformes
Family: Accipitridae
Genus: *Haliaeetus*

Taxonomic Comments: none.

CNHP Ranking: G4 S1B, S3N

State/Federal Status: Listed as federally threatened.

Habitat Comments: Breeding habitat for Bald Eagles consists of forested areas near large bodies of water (Andrew and Mosher 1982, Usgaard and Higgins 1995). Nests typically are placed in tops of tall trees located near suitable foraging habitat (Anthony *et al.* 1982, Anthony and Isaacs 1989, Kralovec *et al.* 1992). Factors affecting the quality of foraging habitats include the characteristics of the prey base (Livingston *et al.* 1990), the structure of the aquatic habitat (MacDonald and Austin-Smith 1989), and the extent of human development and disturbance (McGarigal *et al.* 1991). Sites used for diurnal perching tend to include tall trees located near shoreline foraging habitat (Steenhof *et al.* 1980, Chester *et al.* 1990, Buehler *et al.* 1992, Canton *et al.* 1992, Chandler *et al.* 1995). Winter habitats occur along major river systems and along eastern and western North American coasts (Millsap 1986) and are characterized by the presence of abundant food, protected roost sites, and little or no human disturbance (Steenhof *et al.* 1980, Keister *et al.* 1987). Roosting habitat consists of tall trees that offer protection from prevailing winds and are generally located near aquatic foraging areas (Steenhof *et al.* 1980, Anthony *et al.* 1982, Keister and Anthony 1983, Grubb *et al.* 1989, Chester *et al.* 1990, Buehler *et al.* 1991b). Most roosting sites for Bald Eagles in western North America are in coniferous (or sometimes in riparian) trees (Anthony *et al.* 1982, Keister and Anthony 1983, Crenshaw and McClelland 1989, Grubb *et al.* 1989).



Bald Eagle distribution (all seasons) in Colorado (adapted from Andrews and Righter 1992)

Distribution: Bald Eagles breed in suitable habitats throughout much of North America, including Alaska, Canada, all 48 contiguous states in the U.S. except Vermont and Rhode Island, and parts of Mexico (Buehler 2000). No records exist of Bald Eagles breeding outside North America (Buehler 2000). Most wintering areas for Bald Eagles are located in the lower 48 states and in coastal areas of Alaska and Canada, in aquatic habitats where open water persists for foraging (Millsap 1986). Some adult Bald Eagles migrate seasonally as necessary when food becomes unavailable (McClelland *et al.* 1982, Millsap 1986, Buehler *et al.* 1991a, Harmata and Stahlecker 1993), whereas others remain in the vicinity of their breeding territories throughout the year (Sherrod *et al.* 1976, Swenson *et al.* 1986, Garrett *et al.* 1993, Jenkins and Jackman 1993). Many of the Bald Eagles that winter in Colorado migrate to breeding areas in Saskatchewan and Manitoba in January-March (Harmata and Stahlecker 1993). Bald Eagles breed in northwestern, southwestern, and north-central Colorado (Andrews and Righter 1992).

Important Life History Characteristics: Bald Eagles are opportunistic foragers and their diet varies greatly, depending upon the location and the availability of various types of prey (Todd *et al.* 1982). In most regions Bald Eagles forage in aquatic habitats and prefer fishes (McEwan and Hirth 1980, Knight and Knight 1986, Brown 1993, Stalmaster and Kaiser 1998). Mammals and birds, however, are important components of the diet at many sites (Bent 1937, Todd *et al.* 1982, Kralovec *et al.* 1992). Bald Eagles typically hunt from perches or while soaring, but they also feed on carrion on the ground in areas where they are not disturbed by humans (Buehler 2000). At some wintering sites, ungulate carrion is a critical component of the diet (Houston 1978, Swenson *et al.* 1986). Bald Eagles often engage in kleptoparasitism or food piracy; typically they steal fishes or other prey items from other Bald Eagles or from Ospreys while in flight or on the ground (Burr 1912, Bent 1937, Todd *et al.* 1982, Knight and Knight 1983, Stalmaster and Gessaman 1984, Hansen 1986). Bald Eagles use sticks and branches to build large nests which often are reused each year (Buehler 2000). A well-known nest in Ohio was used for 34 years before the tree in which it was located blew down (Herrick 1924). Bald Eagles roost communally (or sometimes solitarily) at traditional winter roosting sites (Anthony *et al.* 1982, Keister *et al.* 1987, Crenshaw and McClelland 1989, Grubb *et al.* 1989), and, in some cases, at post-breeding-season summer roosting sites (Chester *et al.* 1990). Mated pairs of Bald Eagles defend their breeding territories against encroachments by other Bald Eagles (Gerrard *et al.* 1992b, Buehler 2000). Male and female Bald Eagles exhibit strong fidelity to their mates and to their nest sites (Gerrard *et al.* 1992a, Jenkins and Jackman 1993). A female Bald Eagle in Saskatchewan, for example, used the same territory for 13 years (Gerrard *et al.* 1992a). If one member of a mated pair dies or disappears, the surviving eagle typically continues to occupy the same territory and finds a new mate (Postupalsky and Holt 1975, Grubb *et al.* 1988, Jenkins and Jackman 1993). Many Bald Eagles also show fidelity (i.e., they return year after year) to their wintering areas (McCollough 1989, Harmata and Stahlecker 1993).

Known Threats and Management Issues: Major threats to the Bald Eagle include the loss of critical habitat components such as nest trees (Weekes 1974), perch sites, and winter roosts (Hansen *et al.* 1981) to natural or human-induced causes. Throughout the range of the Bald Eagle, loss of critical breeding and wintering habitats is a serious problem (Shapiro *et al.* 1982, Wood *et al.* 1989, Therres *et al*. 1993). Human activities and disturbance can affect populations of Bald Eagles and other birds in many important ways. These factors can alter foraging patterns, distribution, and habitat use (Stalmaster and Newman 1978, Skagen 1980, Knight and Knight 1984, Buehler *et al.* 1991b, Grubb and King 1991, Knight *et al.* 1991, McGarigal *et al.* 1991, Brown and Stevens 1997), reduce reproductive success (White and Thurow 1985) and foraging efficiency (Knight and Knight 1986, Knight *et al.* 1991, Skagen *et al.* 1991, Stalmaster and Kaiser 1998), and increase energy expenditures (Knight and Knight 1983, Stalmaster 1983) and stress (Fernandez and Azkona 1993). Additional threats to the Bald Eagle include shooting (Hamerstrom *et al.* 1975, Fraser 1983, Reichel *et al.* 1984), trapping, electrocution (Smith and Murphy 1972, Hamerstrom *et al.* 1975), and poisoning by pesticides or lead shot (Hickey and Anderson 1968, Wiemeyer *et al.* 1978, 1984, Swenson *et al.* 1986, Anthony *et al.* 1993, Kramer and Redig 1997).

Potential Conservation Areas supporting *Haliaeetus leucocephalus*:

Big Johnson Reservoir on page 165

Melanerpes lewis (Lewis' Woodpecker)

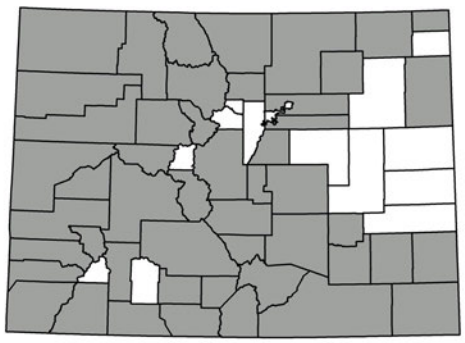
Photo from University of Iowa, uiowa.edu

Taxonomy
Class: Aves
Order: Piciformes
Family: Picidae
Genus: *Melanerpes*

Taxonomic Comments: No recognized subspecies.

CNHP Ranking: G5 S4

State/Federal Status: Forest Service sensitive.



Lewis' Woodpecker year-round distribution in Colorado (adapted from Andrews and Righter 1992)

Habitat Comments: Summer breeding habitat often consists of open ponderosa pine forest, open riparian woodland dominated by cottonwood trees, and logged or burned pine forest (see refs. in Tobalske 1997). Other habitats used for breeding include oak woodlands, pinyon-juniper woodlands, nut and fruit orchards, other types of pine and fir forests (see refs. in Tobalske 1997), and open farmland with scattered, tall cottonwood trees (Bock *et al.* 1971). Critical habitat components of Lewis' Woodpeckers' summer range include an open canopy, understory vegetation that offers ground cover, dead or downed woody material, perch sites, and an adequate insect prey base (Bock 1970). Snags (standing dead trees) selected for nesting typically are well decayed, as these birds are not anatomically specialized for cavity excavation in hard wood (Johnsgard 1979, Raphael and White 1984, Tobalske 1997). Lewis' Woodpeckers often are regarded as specialists of burned pine forests, although the suitability of burned sites varies with duration since the fire, fire intensity and size, and other factors (Bock 1970, Raphael and White 1984, Block and Brennan 1987). Winter habitats include oak woodlands and commercial orchards (Bock 1970, Vierling 1997).

Distribution: The summer range for Lewis' Woodpeckers is similar to the distribution of ponderosa pine in western North America (Diem and Zeveloff 1980). It extends from British Columbia southward to Arizona and New Mexico and from Colorado west to the Pacific coast (Winkler *et al.* 1995, Kingery 1998). In Colorado, Lewis' Woodpeckers breed in the northern parts of the state and are year-round residents in the southern parts (Andrews and Righter 1992). The southeastern plains of Colorado have been occupied by Lewis' Woodpeckers only since about 1910 (Knorr 1959, Kingery 1998); the maturation of farmland cottonwood trees and the cultivation of corn (a food source for the birds) apparently caused this range expansion (Hadow 1973). The winter range of Lewis' Woodpeckers includes the southern portions of the breeding range (as far north as southwestern Oregon, north-central Utah, and north-central Colorado) (Tobalske 1997). Weather conditions and acorn crop distribution greatly influence the winter distribution of Lewis' Woodpeckers (Winkler *et al.* 1995).

Important Life History Characteristics: Among North American woodpeckers, this species is the most highly specialized for flycatching, which may occur from perches or during extended, circling flights (Winkler *et al.* 1995). During the breeding season, Lewis' Woodpeckers feed mainly on free-living (not wood-boring) insects, many of which are caught in flight (Bock 1970). In winter the birds shift to a diet of acorns, fruits, cultivated nuts, corn, and wild seeds (Beal 1911, Bock 1970). During fall and winter, single birds (sometimes pairs) establish and defend granaries (caches of acorns, corn, or other mast) which provide a major portion of the winter diet (Bock 1970). Instead of storing whole acorns in speciallyexcavated holes (as Acorn Woodpeckers do), Lewis' Woodpeckers break open nuts and store the fragments in natural crevices in one or more trees (or utility poles!) (Brewster 1898, Bock 1970, Janos 1991). Lewis' Woodpeckers form permanent pair bonds, remain together year-round, and show strong nest fidelity (Bock 1970). Excavation of new cavities is done mostly by the male (Johnsgard 1979, Terres 1980). Nests usually are placed in dead trees at an average of 25 feet above ground; conifers and deciduous trees are used about equally (Johnsgard 1979). Several pairs may nest closely together, especially in large cottonwood trees with dead limbs (Bailey and Niedrach 1965). Both sexes develop brood patches and incubate the eggs (Terres 1980). The male incubates and broods at night; during the day, the male and female share these duties (Johnsgard 1979). Nests may be deserted if human disturbance is too great (Bock 1970, Kingery 1998). Timing of migration is irregular (Bock 1970, Hadow 1973). In flight, Lewis' Woodpeckers resemble crows more than woodpeckers because of their dark appearance, slow wingbeats, and straight-line (non-undulating) flight trajectory (Winkler *et al.* 1995).

Known Threats and Management Issues: Habitat degradation and loss are a major threat in some areas (see refs. in Tobalske 1997). Fire suppression eliminates the open canopies that are preferred by this species (Kingery 1998). Use of pesticides reduces insect prey base (Kingery 1998) and may cause secondary poisoning (Sorensen 1986). Excessive human disturbance may cause nest desertion (Bock 1970, Kingery 1998).

Potential Conservation Areas supporting *Melanerpes lewis*: Although this species has been reported from El Paso County, not enough information exists about the occurrence to outline a PCA.

Strix occidentalis lucida (Mexican Spotted Owl)

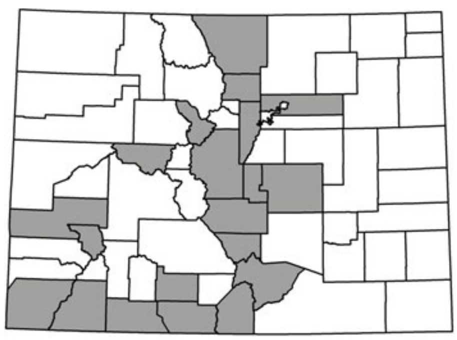
Taxonomy
Class: Aves
Order: Strigiformes
Family: Strigidae
Genus: *Strix*

Photo by F. R. Gehlbach

Taxonomic Comments: Three subspecies of Spotted Owl are recognized: the Northern Spotted Owl (*Strix occidentalis caurina*) the California Spotted Owl (*S. o. occidentalis*), and the Mexican Spotted Owl (*S. o. lucida*). Only the Mexican Spotted Owl (the smallest in body size of the three subspecies) occurs in Colorado.

CNHP Ranking: G3T3 S1B, SUN

State/Federal Status: Listed as federally threatened; listed as threatened in Colorado.



Mexican Spotted Owl distribution (all seasons) in Colorado (adapted from Andrews and Righter 1992)

Habitat Comments: Breeding habitat for the Mexican Spotted Owl consists of mixed coniferous forests dominated by Douglas fir, pine, or true fir, and pine-oak forests (Ganey and Balda 1989a, 1994, Seamans and Gutiérrez 1995, U.S. Fish and Wildlife Service 1995). Old-growth forests (Ganey and Balda 1989a, 1994, Zwank *et al.* 1994) and other closed-canopy forests (Seamans and Gutiérrez 1995, Grubb *et al.* 1997, Young *et al.* 1998) are strongly preferred. The owls also nest in steep, narrow canyons that have perennial water and (usually) coniferous or riparian trees (Kertell 1977, Wagner *et al.* 1982, Rinkevich and Gutierrez 1996). Roost sites used in summer tend to be located in cool microhabitats such as those found on north-facing slopes and/or under closed canopies (Barrows 1981). Winter habitat includes lower-elevation pinyon-juniper woodlands (Ganey *et al.* 1992, U.S. Fish and Wildlife Service 1995), open mountain-shrub habitats, and higher-elevation coniferous forests (Willey 1993).

Distribution: The Mexican Spotted Owl occurs in the forested mountain ranges and deeply-cut canyons of central Utah and Colorado, southward through Arizona, New Mexico, and western Texas into central Mexico (Ganey *et al.* 1988, McDonald *et al.* 1991, Enríquez-Rocha *et al.* 1993). Summer and winter ranges are the same, although in some areas altitudinal migration may occur as owls move to lower (or higher) elevations in winter (Ganey *et al.* 1992, U.S. Fish and Wildlife Service 1995). Although some Mexican Spotted Owls migrate up to 50 km, many individuals spend the winter in the vicinity of their breeding territories but show seasonal shifts in the use of habitats or areas (Ganey and Balda 1989b).

Important Life History Characteristics: Mexican Spotted Owls feed primarily on rodents and other small mammals (Barrows 1981, 1987). Woodrats (*Neotoma* spp.) tend to make up the largest percentage of the diet by weight, but mice (*Peromyscus* spp.), cottontail rabbits, voles, and bats also are important at certain locations and times (Kertell 1977, Ganey 1992, U.S. Fish and Wildlife Service 1995, Young *et al.* 1997). Surplus prey items are sometimes cached for later consumption (Forsman *et al.* 1984). Mexican Spotted Owls do not build their own nests, but instead they rely on the presence of a suitable structure (i.e., dwarf mistletoe brooms, broken tree tops, natural cavities caused by heart rot or broken limbs, platform nests built by other avian species, or ledges on cliffs) (Seamans and Gutierrez 1995, U.S. Fish and Wildlife Service 1995). Although territorial disputes between neighboring Spotted Owls are rare (Forsman *et al.* 1984), the species is probably highly territorial; breeding individuals defend an area around the nest against intrusions by other Spotted Owls (Gutiérrez *et al.* 1995). Long-term pair bonds generally form between mated Spotted Owls as the two birds typically share a home range throughout the year (Forsman *et al.* 1984). Spotted Owls show a strong tendency to use a traditional nest area or nest location for many years (Forsman *et al.* 1984). A traditional nest site may be occupied for many successive years by a mated pair of Spotted Owls or by different pairs (Bent 1938, Gutiérrez *et al.* 1995). If one member of a mated pair of owls dies, the survivor may remain on the same territory and find a new mate (Forsman *et al.* 1984). Only the female incubates the eggs and broods the newly-hatched chicks; the male feeds the female during this period (she gives some of the food to the young) (Gutiérrez *et al.* 1995). The young are independent by late summer and they disperse from natal areas in September or October (Hodgson and Stacey 1996, Ganey *et al.* 1998).

Known Threats and Management Issues: The primary threats to the survival of the Mexican Spotted Owl are habitat loss and habitat degradation due to forest management practices (i.e., clearcutting, even-aged stand management, mineral extraction) (Ganey and Balda 1989a,b, U.S. Fish and Wildlife Service 1993, Gutiérrez 1994, Gutiérrez *et al.* 1995). The importance of mortality factors such as direct killing by humans and accidental deaths (i.e., collisions with cars, tree limbs, etc.) is unknown.

Potential Conservation Areas supporting *Strix occidentalis lucida*:

Blue Mountain on page 96

Mammals

Corynorhinus townsendii pallescens (Townsend's Big-eared Bat)

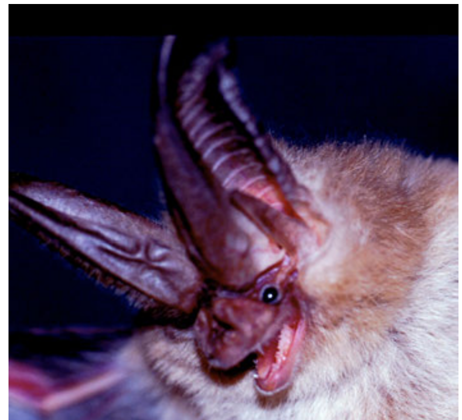


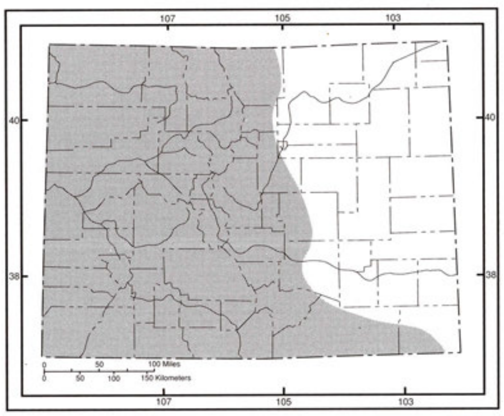
Photo by J. Siemers

Taxonomy
Class: Mammalia
Order: Chiroptera
Family: Vespertilionidae
Genus: *Corynorhinus*

Taxonomic Comments: The generic name was recently changed from *Plecotus* to *Corynorhinus*.

CNHP Ranking: G4T4 S2

State/Federal Status: BLM sensitive; USFS sensitive; state species of undetermined status (Colorado).



Colorado (from Fitzgerald et al. 1994)

Habitat Comments: Townsend's big-eared bats occur in a wide range of habitats including semi-desert shrublands, pinyon-juniper woodlands, and dry coniferous forest (Fitzgerald *et al*. 1994). Because they naturally roost (and hibernate) in caves, their presence is strongly correlated with the availability of caves or cave-like roosting sites (Pierson *et al*. 1999). Population densities are highest in areas with substantial surface exposures of cavity-forming rock (i.e., limestone, sandstone, gypsum, or volcanic) and in old mining areas (Pierson *et al*. 1999). Hibernacula generally are characterized by stable low temperatures and moderate airflow (Colorado Division of Wildlife 1984) and they are thought to be a population limiting factor for Townsend's big-eared bats (Fitzgerald *et al*. 1994).

Distribution: The two western subspecies of *C. townsendii* are widely distributed throughout western North America; in several northwestern states there are extensive zones of intergradation of the two subspecies (Pierson *et al.* 1999). *C. t. pallescens* occurs throughout Colorado except on the eastern plains, and is found in mines, caves, and human-made, cave-like structures at elevations up to 9,500 ft (2,930 m) (Colorado Division of Wildlife 1984). Only 11 maternity roosts and 30 hibernacula have been documented in Colorado (Pierson *et al.* 1999). Almost all known colonies in Colorado are very small (< 30 bats); known historical records of big-eared bats in Colorado include only about 350 individuals (Pierson *et al.* 1999). Available evidence suggests that dramatic declines in the sizes of Colorado colonies of big-eared bats may have occurred historically (Pierson *et al.* 1999).

Important Life History Characteristics: Big-eared bats emerge from their daytime roosts after dark and feed on insects (especially moths) which they capture in flight or glean from foliage (Colorado Division of Wildlife 1984, Nowak 1999). Much of their feeding occurs over water or sagebrush, or along the edges of patches of vegetation (Fitzgerald *et al.* 1994). After the young are born in May or June (only one offspring per female) the females congregate in nursery colonies where they share metabolic heat; warm nursery sites are critical for the survival of the young (Humphrey and Kunz 1976). No long-distance migrations have been reported for *C. townsendii* (Barbour and Davis 1969, Clark and Stromberg 1987, Fitzgerald *et al.* 1994). Site fidelity is high: individual bats tend to return each year to the same hibernation (Humphrey and Kunz 1976) and nursery (Pearson *et al.* 1952) roosts. Nonetheless, during hibernation there is much movement of bats within a cave and among caves as environmental conditions fluctuate and the animals seek more favorable microclimatic conditions (Bee *et al.* 1981, Schwartz and Schwartz 1981, Fitzgerald *et al.* 1994).

Known Threats and Management Issues: Townsend's big-eared bats have very specific habitat requirements with regard to temperature and humidity levels at roosting sites; relatively few sites offer conditions appropriate for roosting by these bats (see refs. cited by Pierson *et al.* 1999). Moreover, *C. townsendii* is highly vulnerable to human disturbance (Colorado Division of Wildlife 1984, Clark and Stromberg 1987, Nowak 1999). Unlike many other species of bats, Townsend's big-eared bats do not seek shelter in protected crevices when roosting, but instead they cluster in highly visible locations (i.e., cave ceilings) where they are easily disturbed (Handley 1959, Barbour and Davis 1969). In Colorado, human visitation and disturbance rates at nursery and hibernation caves are very high (Pierson *et al.* 1999). In addition to human disturbance, other factors that threaten *C. townsendii* include the closure of abandoned mines (loss of roosting habitat), the impoundment of toxic materials (direct mortality), pesticide spraying (reduction of insect prey base), vegetation conversion and livestock grazing (loss of foraging habitat), and timber harvesting (loss of foraging and roosting habitats) (Pierson *et al.* 1999).

Potential Conservation Areas supporting *Corynorhinus townsendii pallescens*:

Cave of the Winds on page 169

Cynomys gunnisoni (Gunnison's Prairie Dog)

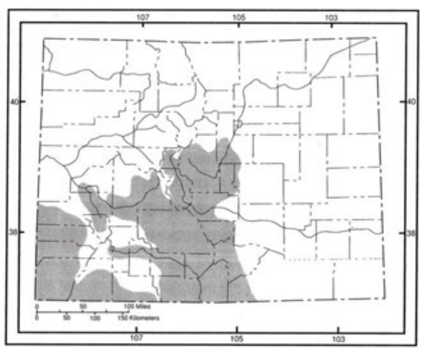
Taxonomy
Class: Mammalia
Order: Rodentia
Family: Sciuridae
Genus: *Cynomys*

Taxonomic Comments: The subspecies *Cynomys gunnisoni gunnisoni*, which is extinct over most of its former range, inhabits western El Paso County.

CNHP Ranking: G5 S5

State/Federal Status: None.

Photo by R. B. Forbes
Sevilleta LTR Data, sevilleta.unm.edu



Gunnison's prairie dog distribution in Colorado (from Fitzgerald et al. 1994)

Habitat Comments: Suitable habitat for Gunnison's prairie dogs includes grasslands and semidesert and montane shrublands (Fitzgerald *et al.* 1994). Flat or gently-rolling terrain with friable soils (to allow excavation of burrow systems) is preferred. The presence of prairie dog towns greatly increases the biological diversity of prairie ecosystems by providing vertical structure (the burrows and mounds) which affords sites for vertebrates and invertebrates to forage, breed, rest, and seek shelter (i.e., Wilcomb 1954, Clark *et al.* 1982).

Distribution: Gunnison's prairie dogs inhabit the montane valleys and high plateaus of the "Four Corners" area of Colorado, Utah, Arizona, and New Mexico, where they occur at elevations from 6,000 to 12,000 ft (1,830 to 3,660 m) (Pizzimenti and Hoffmann 1973). In many parts of their range their distribution is limited by pronounced physical barriers such as rivers and mountain ranges. *Cynomys gunnisoni zuniensis* occurs in parts of all four states, but *C. g. gunnisoni* occurs only from central Colorado through north-central New Mexico (Pizzimenti and Hoffmann 1973). South Park, Colorado marks the northern limit of the range of Gunnison's prairie dog (Pizzimenti and Hoffmann 1973).

Important Life History Characteristics: All five species of North American prairie dogs are diurnal, terrestrial, colonially-dwelling herbivores that excavate elaborate burrow systems for shelter and protection from predators (Nowak 1999). Gunnison's prairie dogs differ from the more common and widespread black-tailed prairie dogs (*Cynomys ludovicianus*) in several ways. Gunnison's prairie dogs are smaller-bodied, have a whitish (rather than blackish) tail tip, and hibernate (Pizzimenti and Hoffmann 1973, Rayor *et al.* 1987, Hoogland 1995). Less social than *C. ludovicianus*, Gunnison's prairie dogs have a relatively limited social behavioral repertoire and less well-developed cohesive behavior (Rayor 1988). Burrow and mound construction are less complex and colonies are smaller and less densely settled than in black-tailed prairie dogs (Fitzgerald *et al.* 1994). Gunnison's colonies are characterized by the presence of more protective plant cover than colonies of black-tailed prairie dogs because the latter species clips standing vegetation (non-food plants) to enhance detection of approaching predators (King 1955, Fitzgerald *et al.* 1994).

Known Threats and Management Issues: Extermination programs (public and private) have targeted Gunnison's prairie dogs for more than 100 years (Pizzimenti and Hoffmann 1973). Classified as a small game species in Colorado, Gunnison's prairie dogs receive no protection from harvest, and so poisoning and shooting campaigns continue unabated. Plague (caused by the bacillus *Yersinia pestis* and transmitted by fleas) historically has greatly influenced the distribution of this species in Colorado (Lechleitner *et al.* 1962, 1968; Rayor 1985, Fitzgerald *et al.* 1994) and will likely continue to do so. As in the past, however, the greatest threats to the Gunnison's prairie dog will come from humans due to real or perceived conflicts with agricultural economics.

Potential Conservation Areas supporting *Cynomys gunnisoni*:

Monument Southeast on page 183

Cynomys ludovicianus (Black-tailed Prairie Dog)

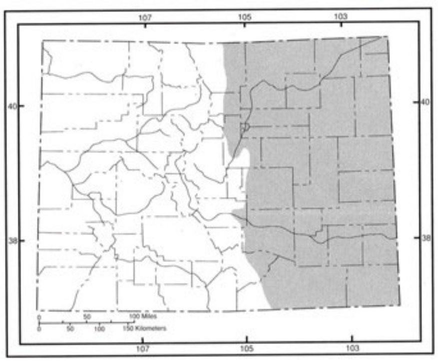
Taxonomy
Class: Mammalia
Order: Rodentia
Family: Sciuridae
Genus: *Cynomys*

Taxonomic Comments: Of the two recognized subspecies, only one occurs in Colorado (*Cynomys ludovicianus ludovicianus*).

CNHP Ranking: G4 S4

State/Federal Status: None.

Photo © copyright by Desert USA
desertusa.com



Black-tailed prairie dog distribution in Colorado (from Fitzgerald et al. 1994)

Habitat
Comments: *Cynomys ludovicianus* occupies shortgrass and mixed-grass prairie habitats with well-drained, friable soils that permit the construction of complex burrow systems. The shrubs and herbaceous vegetation within colonies of black-tailed prairie dogs tend to be shorter than those located within colonies of Gunnison's and white-tailed prairie dogs because black-tailed prairie dogs clip tall plants (without eating them) to increase the detectability of approaching aerial and terrestrial predators (King 1955, Pizzimenti 1975, Fitzgerald *et al.* 1994, Hoogland 1995).

Distribution: Of the five species of prairie dogs in North America, *Cynomys ludovicianus* is the most widely distributed (Hoogland 1996). Today the species occurs in isolated patches throughout its historical range, which included much of the Great Plains from southern Saskatchewan (Canada) to northern Mexico (Hoogland 1996). In Colorado, black-tailed prairie dogs occupy suitable included in the eastern 40 percent of the state, inhabiting shortgrass prairie and other areas of low-growing vegetation (Fitzgerald *et al.* 1994). Throughout its range, the species occurs in much lower densities and in smaller colonies than it did historically (Fitzgerald *et al.* 1994, Hoogland 1996).

Important Life History Characteristics: Black-tailed prairie dogs are diurnal, burrowing, colonially-dwelling, herbivorous rodents that are active above-ground throughout the year. Unlike the Gunnison's, Utah, and white-tailed prairie dogs, they do not hibernate (Hoogland 1996). Within a colony, black-tailed prairie dogs live in territorial family groups called coteries, which include an adult male, usually two or three adult females, and several non-breeding yearlings and juveniles (Hoogland 1996). Males tend to disperse (leave the natal coterie) before they mature sexually; this behavior reduces inbreeding and may result in colonization of new areas (Hoogland 1982, Garrett and Franklin 1988). Rather than dispersing, females tend to remain in the natal coterie throughout their lives; for this reason, females within a coterie usually are closely related (Hoogland 1995). Through their foraging behavior and their clipping of tall plants, black-tailed prairie dogs have dramatically changed the composition of plant communities throughout their range (Hoogland 1996). In addition, the presence of prairie dog towns greatly increases the zoological diversity of prairie ecosystems by attracting predators and many other animals (i.e., Tyler 1970, Campbell and Clark 1981, Clark *et al.* 1982, Hoogland 1995).

Known Threats and Management Issues: Black-tailed prairie dogs have been subjected to extermination programs (public and private) for more than 100 years (Hoogland 1995). Outbreaks of plague (caused by the bacillus *Yersinia pestis* and transmitted by fleas) continue to reduce or even eliminate some colonies (Barnes 1982, Ebasco Serv., Inc. 1989). As in the past, however, the greatest threats to black-tailed prairie dogs come from humans due to conflicts with agricultural and other economic interests.

Potential Conservation Areas supporting *Cynomys ludovicianus*:

Big Johnson Reservoir	on page 165
Colorado Springs Airport	on page 57
Edison Road	on page 172
Hanover Road	on page 176
Olney Prairie	on page 129
Marksheffel Road	on page 179
Squirrel Creek Road	on page 187
Squirrel Creek School	on page 83
Truckton Edison	on page 87
Widefield Fountain	on page 191

Vulpes velox (Swift Fox)

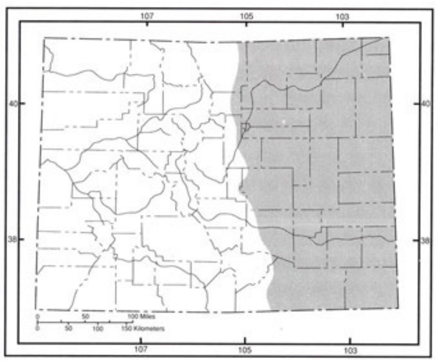
Taxonomy
Class: Mammalia
Order: Carnivora
Family: Canidae
Genus: *Vulpes*

Photo by J. P. Gionfriddo

Taxonomic Comments: Some taxonomists consider swift foxes and kit foxes (*Vulpes macrotis*) to be distinct subspecies within a single species which they designate *Vulpes velox*. We follow the more common classification in which these two foxes are regarded as distinct species.

CNHP Ranking: G3 S3

State/Federal Status: Forest Service sensitive; species of special concern (Colorado).



Swift fox distribution in Colorado (from Fitzgerald et al. 1994)

Habitat Comments: Swift foxes inhabit shortgrass, midgrass, and mixed-grass prairies, where they prefer well-drained, friable soils (Bee *et al.* 1981, Nowak 1999). Dens are excavated on slopes, ridges, or flat areas that afford good views of surrounding lands (Fitzgerald *et al.* 1994).

Distribution: Swift foxes formerly occurred throughout the Great Plains from Canada to Texas. Populations were severely depleted from the 1830s through the 1950s. Swift fox numbers remain very low throughout the northern portion of the species' former range. In Colorado, swift foxes inhabit the eastern third of the state, where they live in low densities on areas of native shortgrass prairie (Fitzgerald *et al*. 1994).

Important Life History Characteristics: The basic social unit in swift foxes consists of the mated pair (which remain together year-round and may mate for life) and their young (Nowak 1999). Occasionally a male may mate and live with two adult females. Young swift foxes are born in March or early April and remain with their parents at den sites through late August. This strong, protracted family group association at the den is unique among canids (Kilgore 1969, Hillman and Sharps 1978). Swift foxes use dens throughout the year (Egoscue 1979) and have been characterized as the most subterranean (burrow dependent) of native North American foxes (Seton 1929). Swift fox dens are important ecological features that provide refuges, breeding sites, and sources of food for a variety of vertebrates and invertebrates (Kilgore 1969).

Known Threats and Management Issues: Swift foxes occupy only 10 percent of their former range (Smeeton 1993, Allardyce 1995). Factors responsible for the reductions in their distribution and population sizes include trapping, hunting, predator and rodent control programs, attacks by unleashed dogs, collisions with automobiles, and habitat loss (Bailey 1926, Kilgore 1969, Hillman and Sharps 1978). Swift foxes are not as cautious as many other canids and so they are trapped and poisoned relatively easily (Egoscue 1979). In southeastern Colorado, predation by coyotes is a major source of mortality of swift foxes (Andersen *et al.* 1998).

Potential Conservation Areas supporting *Vulpes velox*:
Truckton Edison on page 87

Zapus hudsonius preblei (Preble's Meadow Jumping Mouse)

Taxonomy
Class: Mammalia
Order: Rodentia
Family: Zapodidae
Genus: *Zapus*

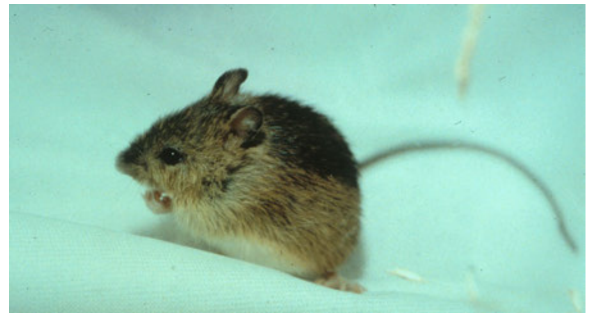
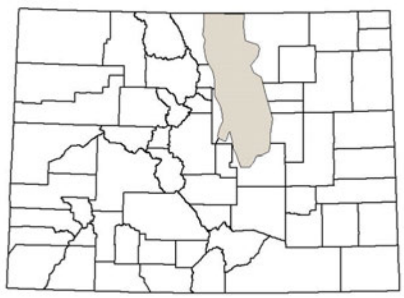


Photo by P. Schuerman

Taxonomic Comments: Some taxonomists use the family name "Dipodidae" instead of "Zapodidae."

CNHP Ranking: G5T2 S1

State/Federal Status: Forest Service sensitive; listed as federally threatened; species of special concern (Colorado).



Preble's meadow jumping mouse distribution in Colorado (CNHP data)

Habitat Comments: Preble's meadow jumping mouse occurs in areas of lush, rank vegetation along watercourses and in marshy areas and wet meadows (Krutzsch 1954, Whitaker 1972, Fitzgerald *et al*. 1994). Habitats often are characterized by high species richness and well-developed vegetative cover (Meaney *et al*. 1997). Hibernacula generally are located upslope (and may be quite distant) from areas used in summer (Hafner 1997).

Distribution: *Z. h. preblei* historically occurred in marshy areas along the upper drainages of the North Platte River in southeastern Wyoming (Long 1965, Clark and Stromberg 1987) and on the western edge of the Colorado piedmont along the South Platte River drainage south to the Denver area (Armstrong 1972). Current distribution is severely restricted and fragmented; habitats are likely to continue to decline both qualitatively and quantitatively (Hafner *et al.* 1998)

Important Life History Characteristics: *Zapus hudsonius preblei* hibernates for a longer period than most mammalian hibernators: from September or October through late April or early May each year (Whitaker 1963, 1972). During the 4-6 month period of activity each spring/summer, jumping mice feed on seeds, fruits, fungi, and insects; they do not cache food but store body fat before hibernating (Fitzgerald *et al.* 1994, Nowak 1999). Jumping mice generally are nocturnal and crepuscular, but they sometimes are active in daylight (Whitaker 1963, Fitzgerald *et al.* 1994). For protection, jumping mice construct nests of grasses, leaves, or other plant material. Nests are placed in protected locations beneath logs or shrubs and are usually underground but well above the water table (Fitzgerald *et al.* 1994). When hot summer weather reduces the availability of mesic habitat, Preble's meadow jumping mice sometimes abandon their home ranges and wander widely in search of moist sites (Fitzgerald *et al.* 1994:291, Nowak 1999).

Known Threats and Management Issues: The replacement of natural wetlands by reservoirs and by agricultural and urban development has severely impacted many populations (Fitzgerald *et al.* 1994, Garza 1995). Preble's meadow jumping mouse may have been extirpated over most of its former range in Wyoming by extensive overgrazing (habitat loss) and pesticide use (Hafner *et al.* 1998). Conservation of critical mesic forb-grassland habitats and the dispersal corridors that connect isolated patches of habitat is essential to the continued survival of this subspecies (Hafner 1997).

Potential Conservation Areas supporting *Zapus hudsonius preblei*:
Monument Creek on page 66

NOTEWORTHY ZOOLOGICAL ELEMENT OCCURRENCES FOR WHICH NO POTENTIAL CONSERVATION AREA WAS DRAWN

Mammals:

Vulpes velox **(Swift Fox)**
This small, cat-like canid is known to inhabit the native shortgrass prairie of El Paso County in low densities. Swift foxes were observed at three widely-scattered locations in the county during the summer of 2000.

Birds:

Calcarius mccownii **(McCown's Longspur)**
Observations of McCown's Longspurs at several locations in northern and eastern El Paso County during 2000 suggested that these birds may breed in El Paso County. Previous records indicated that some McCown's Longspurs migrate through El Paso County and others winter there. Additional fieldwork is needed to confirm the breeding status of longspurs in the county.

Melanerpes lewis **(Lewis' Woodpecker)**
This colonially-nesting, food-hoarding woodpecker is known from at least five breeding sites in southwestern El Paso County on the Fort Carson Military Reservation. At three sites, birds were observed each year from 1990 through 1999 or 2000; at the other two sites, birds were observed each year from 1996-1999 or from 1997-2000.

Numenius americanus **(Long-billed Curlew)**
Long-billed Curlews, which nest on shortgrass prairies, were observed at two widely-separated locations in eastern El Paso County during 2000 and 2001.

Reptiles:

Cnemidophorus neotesselatus **(Triploid Colorado Checkered Whiptail)**
This recently-described species of lizard, which lives only in southeastern Colorado, is known to inhabit Fremont, Pueblo, Otero, and Las Animas counties. The species also may occur in El Paso County, but its presence there has not yet been confirmed. Additional field surveys, especially in southwestern El Paso County, are needed to determine the status of *Cnemidophorus neotesselatus* in El Paso County.

Sistrurus catenatus **(Massasauga)**
This small rattlesnake is known to inhabit the dry grasslands and sandhills of southeastern El Paso County. Massasaugas have been observed recently at two locations in this part of the county.

Amphibians:

Rana blairi **(Plains Leopard Frog)**
Although the northern leopard frog (*Rana pipiens*) is widely distributed in El Paso County, the range of the plains leopard frog is relatively restricted. Historically, plains leopard frogs inhabited Fountain Creek. Recent observations suggest that plains leopard frogs (*Rana blairi*) and northern leopard frogs may be sympatric (i.e., their ranges may overlap) and they may interbreed in southwestern El Paso County. Ecologically important questions relating to *Rana blairi* and *Rana pipiens* distribution and reproductive biology in El Paso County await further study.

Rana pipiens **(Northern Leopard Frog)**
Once common throughout Colorado, the northern leopard frog has become scarce in many areas as local populations have been extirpated (Hammerson 1999). Factors causing the declines in abundance and distribution in Colorado are numerous and complex. In El Paso County, northern leopard frogs were found in many of the drainages and ponds in the northern and western parts of the county. Although they were found to be widespread in distribution within these higher elevation/wetter portions of El Paso County, the northern leopard frogs occurred in very low densities. In most cases only a few animals were observed at each site. A notable exception was the Judge Orr Road Potential Conservation Area where northern leopard frogs were abundant in select drainages and ponds. Successful reproduction by northern leopard frogs is most likely to occur in wetlands devoid of predatory fishes and bullfrogs (*Rana catesbeiana*). For that reason, the establishment of semi-permanent wetlands (in which northern leopard frogs can successfully breed but fishes and bullfrogs cannot) would be likely to help northern leopard frogs persist in areas from which they would otherwise disappear.

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Appendix. Known Natural Heritage Elements in El Paso County.

Elements are listed in alphabetical order.

Element Scientific Name	Element Common Name	GRank	SRank
Plants			
Ambrosia linearis	Plains ambrosia	G3G3	S3
Aquilegia chrysantha var *rydbergii*	Golden columbine	G4T1Q	S1
Aquilegia saximontana	Rocky Mountain columbine	G3	S3
Botrychium lineare	narrowleaf grapefern	G1	S1
Botrypus virginianus ssp. *europaeus*	Rattlesnake fern	G5	S1
Carex leptalea	Bristle-stalk sedge	G5	S1
Carex oreocharis	A dryland sage	G3	S1
Chenopodium cycloides	Sandhill goosefoot	G3G4	S1
Cypripedium calceolus ssp. *parviflorum*	Yellow lady's-slipper	G5	S2
Draba exunguiculata	Clawless draba	G2	S2
Draba fladnizensis	Arctic draba	G4	S2S3
Heuchera richardsonii	Richardson alumroot	G5	S1
Juncus brachycephalus	Small-headed rush	G5	S1
Mertensia alpina	Alpine bluebells	G4?	S1
Oreoxis humilis	Pikes Peak spring parsley	G1	S1
Papaver kluanense	Alpine poppy	G5T3T4	S3S4
Pellaea atropurpurea	Purple cliff-brake	G5	S2S3
Potentilla ambigens	Southern Rocky Mountain cinquefoil	G3	S1S2
Ptilagrostis porteri	Porter's feathergrass	G2	S2
Telesonix jamesii	James' telesonix	G2G3	S2?
Unamia alba	Prairie goldenrod	G5	S2S3
Viola pedatifida	Prairie violet	G5	S2
Viola selkirkii	Selkirk violet	G5?	S1
Woodsia neomexicana	New Mexico cliff fern	G4?	S2
Plant Communities			
*Alnus incana/*mesic graminoid	Montane riparian shrubland	G5Q	S3
Alnus incana-Cornus sericea	Thinleaf alder-red-osier dogwood riparian shrubland	G3G4	S3
Andropogon gerardii-Calamovilfa longifolia	Tallgrass prairie	G2	S2
Andropogon gerardii-Schizachyrium scoparium	Xeric tallgrass prairie	G2	S2
Andropogon gerardii-Sporobolus heterolepis	Xeric tallgrass prairie	G2	S1S2
Artemisia filifolia/Andropogon hallii	Northern sandhill prairie	G3	S2
Bouteloua gracilis	Blue grama shortgrass prairie	G4Q	S4
Bouteloua gracilis-Buchloe dactyloides	Shortgrass prairie	G4	S2?
Buchloe dactyloides-Ratibida tagetes-Ambrosia linearis	Buffalograss playa	G3	S3
Carex lanuginosa	Montane wet meadow	G3?	S3
Carex nebrascensis	Wet meadow	G4	S3
Carex praegracilis	Clustered sedge wetland	G3	S2

Plant Communities (cont.)			
Cercocarpus montanus/Stipa comata	Mixed foothill shrubland	G2	S2
Corylus cornuta	Lower montane forest	G3	S1
Danthonia parryi	Montane grassland	G3	S3
Distichlis spicata	Salt meadow	G5	S3
Eleocharis palustris	Emergent wetland	G5	S4
Hesperostipa comata-Bouteloua gracilis	Needle-and-thread – blue grama mixed-grass prairie	G5	S2S3
Juncus balticus var. *montanus*	Western slope wet meadow	G5	S5
Pascopyrum smithii-Bouteloua gracilis	Great Plains shortgrass prairie	G5	S4
Pascopyrum smithii-Eleocharis spp.	Playa grassland	G2	S2
Phragmites australis	Western slope marshes	G4	S3
Pinus aristata/Trifolium dasyphyllum	Upper montane woodlands	G3	S3
Pinus edulis/Stipa scribneri	Two-needle pinyon/Scribner's needle grass	G3	S2
Pinus ponderosa/Carex inops ssp. *heliophila* woodland	Ponderosa pine/sunsedge woodland	G3G4	S2
Pinus ponderosoa-Schizachyrium scoparium	Ponderosa pine bluestem prairie	G3G4	S1
Populus angustifolia/Alnus incana	Narrowleaf cottonwood-alder riparian forest	G3?	S3
Populus angustifolia/Prunus virginiana	Narrowleaf cottonwood-chokecherry forest	G2G3	S1
Populus angustifolia/Salix exigua	Narrowleaf cottonwood-coyote willow riparian forest	G4	S4
Populus deltoides ssp. *monilifera-Salix amygdaloides/Salix exigua*	Plains cottonwood riparian woodland	G4?	S3
Populus deltoides/Pascopyrum smithii-Panicum obtusum	Plains cottonwood/western wheatgrass-vine mesquite	G2	S2
Populus deltoides/Sporobolus airoides	Plains cottonwood/alkali sacaton	G3	S2
Pseudotsuga menziesii/Betula occidentalis	Montane riparian forest	G3?	S3
Quercus gambelii/Carex inops ssp. *helophila*	Mesic oak thicket	GU	SU
Quercus gambelii-Cercocarpus montanus/Muhlenbergia montana	Mesic oak thicket	GU	SU
Redfieldia flexuosa-Psoralidium lanceolatum	Dunes with blowout grass	G2G3	S2
Salix amygdaloides/Carex langinosa	Peachleaf willow alliance	G3	SU
Salix eriocephala var. *ligulifolia*	Montane willow carr	G2G3	S2S3
Salix exigua/mesic graminoid	Coyote willow/mesic graminoid	G5	S5
Salix lucida spp. *caudata*	Montane riparian shrubland	G3Q	S2S3

Plant Communities (cont.)			
Sarcobatus vermiculatus/Sporobolus airoides	Saline bottomland shrubland	G3?	SU
Schizachyrium scoparium-Bouteloua curtipendula	Great Plains mixed-grass prairie	G3	S2
Scirpus pungens	Bulrush complex	G3G4	S3
Scirpus tabernaemontani-Scirpus acutus	Great Plains marshes	G3	S2S3
Spartina pectinata	Prairie slough grass	G3?	S3
Sporobolus airoides	Great Plains salt meadow	G3Q	S3
Symphoricarpos occidentalis	Snowberry shrubland	G4G5	S3
Insects			
Amblyscirtes simius	Simius roadside skipper	G4	S2
Atrytonopsis hianna	Dusted skipper	G4G5	S3
Callophrys mossii schryveri	Moss' elfin	G3G4T3	S2S3
Celastrina humulus	Hops feeding azure	G2G3	S2
Polites origines	Crossline skipper	G5	S3
Fish			
Etheostoma cragini	Arkansas darter	G3	S2
Oncorhynchus clarki stomias	Greenback cutthroat trout	G4T2T3	S2
Amphibians			
Rana blairi	Plains leopard frog	G5	S3
Rana pipiens	Northern leopard frog	G5	S3
Reptiles			
Cnemidophorus neotesselatus	Triploid checkered whiptail	G2Q	S2
Sistrurus catenatus	Massasauga	G3G4	S2
Birds			
Athene cunicularia	Burrowing Owl*	G4	S4B
Calcarius mccownii	McCown’s Longspur*	G5	S2B, SZN
Charadrius montanus	Mountain Plover*	G2	S2B,SZN
Falco peregrinus anatum	American Peregrine Falcon*	G4T3	S2B,SZN
Haliaeetus leucocephalus	Bald Eagle*	G4	S1B, S3N
Melanerpes lewis	Lewis’ Woodpecker*	G4	S4
Numenius americanus	Long-billed Curlew*	G5	S2B, SZN
Seiurus aurocapillus	Ovenbird*	G5	S2B,SZN
Strix occidentalis lucida	Mexican Spotted Owl*	G3T3	S1B,SUN
Mammals			
Corynorhinus townsendii pallescens	Townsend's big-eared bat	G4	S2
Cynomys gunnisoni	Gunnison's prairie dog	G5	S5
Cynomys ludovicianus	Black-tailed prairie dog	G4T4	S4
Vulpes velox	Swift fox	G3	S3
Zapus hudsonius preblei	Preble's meadow jumping mouse	G5T2	S1

*The American Ornithologist's Union (AOU) recognizes common names as the official name for the species, thus common names are capitalized.