

**Survey of Critical Biological Resources  
Larimer County, Colorado  
2004**



**Colorado  
State**  
University

*Knowledge to Go Places*

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Cover photograph: Red Nose within the Table Mountain Hogbacks Potential Conservation Area  
in northeastern Larimer County.

*photo by Charlie Johnson*

## EXECUTIVE SUMMARY

Citizens of Larimer County are concerned about issues of open space, wildlife habitat, and conservation of their unique natural surroundings. They recognize the need to plan for the conservation of the plants, animals and plant communities that are native to Larimer County. They also recognize that with limited economic resources, it is important to prioritize conservation efforts. The need for information on the locations of the most significant biological resources of the area is urgent.

In 2004, Larimer County and the cities of Fort Collins and Loveland (the “Partners”) requested that the Colorado Natural Heritage Program (CNHP) survey for critical biological resources of Larimer County. This project was to supplement a biological survey conducted by CNHP in 1996. As in 1996, the goal of the project was to systematically identify the locations of rare species and significant natural plant communities in Larimer County, and to identify and prioritize areas of critical habitat (potential conservations areas) for these species and communities. Additional goals of the 2004 project were to help assess the biological integrity on specific lands under consideration for conservation action, update data on existing protected open space properties, and provide data for development review purposes through the Larimer County Planning Department.

Funding for this biological survey was provided by Larimer County, the cities of Fort Collins and Loveland, and a Great Outdoors Colorado (GOCO) planning grant.

Field survey work began in April 2004 and continued through September 2004. Private lands within the eastern half of the county and specific properties identified by the Partners were given the highest priority for inventory. The focus on the eastern half of the county was requested by the Partners to correspond to high priority areas identified in their respective Master Plans. Though not a high priority area, some survey locations were selected in the Laramie River Valley in northwestern Larimer County. Locations selected by CNHP for the survey were identified by examining existing biological data for rare plant and animal species, and significant plant communities (collectively called “elements”) from CNHP’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. Additional TIAs were identified by the Partners. Extensive field surveys were conducted within the TIAs, and areas found to contain significant elements were delineated as “Potential Conservation Areas” (PCAs).

Results of the survey confirm that there are many areas with high biological significance in Larimer County. There are several extremely rare plants and animals that depend on these areas for survival. All together, 71 rare or imperiled plant species, 48 rare or imperiled animal species (24 vertebrate and 24 invertebrate), and 94 plant communities of concern have been documented in Larimer County. Natural history summaries for many of these plants and animals are presented in the final section of this report. The CNHP database currently houses more than 680 element occurrence records (EORs) within Larimer County. As part of this project, 98 new EORs were created and 74 EORs were updated.

CNHP has identified over 135 PCAs in Larimer County. Sixty-seven of these PCAs include private or state lands and are presented in this report. PCAs that fall entirely within U.S. Forest Service or National Park Service lands were not updated as part of this project and are not presented in this report. Of the 67 PCAs presented in this report, two are of outstanding biodiversity significance (B1), 22 are of very high significance (B2), 33 are of high significance (B3), seven are of moderate significance (B4), and three are of general significance (B5). In addition, three networks of conservation areas (NCAs) that include portions of Larimer County have been identified as intact landscapes on a regional scale.

Of particular interest are intact shortgrass prairie and foothills communities in the northeastern corner of the county, newly documented locations of the rare plant Bell's twinpod (*Physaria bellii*), new discoveries of rare plants on shale outcrops in the Laramie River Valley (including a state record), newly discovered breeding locations for the rare boreal toad (*Bufo boreas*), newly documented ponderosa pine woodlands, a stonefly known only from Larimer County, and Preble's meadow jumping mouse populations along three major drainages. Larimer 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 Larimer County will have both statewide and global significance.

All of the PCAs presented in this report represent unique opportunities for the Partners to conserve significant components of the natural heritage of Larimer County, and each is worthy of conservation attention. However, some areas of the county stand out on a statewide or global scale, either because the species present are extremely rare and localized in their distribution, or because a suite of significant species and communities co-occur in a high quality landscape setting. These areas include the intact foothills to grassland complex in the northeastern part of the county, the rare plant concentration in the Laramie River Valley, and hogbacks supporting the rare Bell's twinpod.

The results of the survey will be provided to the Partners in GIS format and the report will be available to the public on the CNHP website ([www.cnhp.colostate.edu](http://www.cnhp.colostate.edu)).

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## INTRODUCTION

Larimer County is home to a vast array of plants, animals, and natural plant communities, but the numbers and diversity of these organisms is not fully understood. Landowners, local and state governments, and federal agencies, particularly in rapidly growing parts of the state, are expressing a desire to better understand their natural heritage resources. The Colorado Natural Heritage Program (CNHP) approached this project with the intent of addressing this need.

This survey of critical biological resources of Larimer County is part of an ongoing biological inventory of Colorado counties by CNHP. To date, similar inventories have been conducted in all or parts of 27 Colorado counties.

In 2004, Larimer County and the cities of Fort Collins and Loveland (the “Partners”) requested that the Colorado Natural Heritage Program (CNHP) survey for critical biological resources of Larimer County. This project was to supplement a biological survey conducted by CNHP in 1996 (Kettler *et al.* 1996). As in 1996, the goal of the project was to identify biologically significant areas within Larimer County, with an emphasis on private lands in the eastern half of the county. Larimer County is among the fastest growing areas in the nation; integrating population growth with conservation of the vast natural values of the county has been identified as a priority. This project was designed to assist Larimer County in gathering additional biological information on priority areas outlined in the Larimer County Open Lands Master Plan (Larimer County Parks and Open Lands Department 2001), as well as the City of Fort Collins (2004) and City of Loveland (City of Loveland and DHM Design Corporation 2003) planning documents. Identification of sites containing natural heritage resources will allow conservation of these resources for future generations, and proactive planning to avoid conflicts in the future between developers and natural resource managers.

The funding for this biological survey was provided by Larimer County, the cities of Fort Collins and Loveland, and Great Outdoors Colorado (GOCO).

This *Survey of Critical Biological Resources in Larimer County* used the methods that are employed worldwide throughout Natural Heritage Programs and Conservation Data Centers. The primary focus was to identify the locations of the plant and animal populations and plant communities on CNHP’s list of rare and imperiled elements of biodiversity, assess their conservation value, and systematically prioritize these for conservation action.

The locations of biologically significant areas were identified by:

- Examining existing biological data for rare or imperiled plant and animal species and significant plant communities (collectively called **elements**);
- Accumulating additional existing information (e.g., interviews of local experts)
- Conducting extensive field surveys.

Locations in the county with natural heritage significance (those places where elements have been documented) are presented in this report as Potential Conservation Areas (PCAs). The goal is to identify a land area that can provide the habitat and ecological needs upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, and current and potential land uses to delineate PCA boundaries.

**The PCA boundaries delineated in this report do not confer any regulatory protection of the site, nor do they automatically recommend exclusion of all activity.** It is hypothesized that some activities will prove degrading to the element(s) or the ecological processes on which they depend, while others will not. The boundaries represent the best professional estimate of the primary area supporting the long-term survival of the targeted species or plant communities and are presented for planning purposes. They delineate ecologically sensitive areas where land-use practices should be carefully planned and managed to ensure that they are compatible with protection of natural heritage resources and sensitive species. Please note that these boundaries are based primarily on our understanding of the ecological systems. A thorough analysis of the human context and potential stresses was not conducted. All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape that requires wise land-use planning at all levels.

CNHP uses the Heritage Ranking Methodology to prioritize conservation actions by identifying those areas that have the greatest chance of conservation success for the most imperiled elements. The sites are prioritized according to their **biodiversity significance rank**, or “B-rank,” which ranges from B1 (outstanding significance) to B5 (general or statewide significance). These ranks are based on the conservation (imperilment or rarity) ranks for each element and the element occurrence ranks (viability rank) for that particular location. Therefore, the highest quality occurrences (those with the greatest likelihood of long-term survival) of the most imperiled elements are the highest priority (receive the highest B-rank). See the section on Natural Heritage Ranking System for more details. The B1-B3 sites are the highest priorities for conservation actions. Based on current knowledge, the sites in this report represent areas CNHP recommends for protection in order to preserve the natural heritage of Larimer County.

In addition to presenting prioritized PCAs, this report also includes a section with summaries of selected plants and animals that are known to be found within the PCAs.

## **THE NATURAL HERITAGE NETWORK RANKING SYSTEM**

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 greenback cutthroat trout, 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, 11 Canadian provinces and territories, and many countries and territories in Latin 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 of 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.

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 and the results of their activities are also closely linked to all levels of this hierarchy and are integral parts of most landscapes. 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.

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

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

CNHP is the state's primary comprehensive biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. After operating in 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.

All Natural Heritage Programs house data about imperiled species and are implementing use of the Biodiversity Tracking and Conservation System (BIOTICS) developed by NatureServe. This database includes taxonomic group, global and state rarity ranks, federal and state legal status, observation source, observation date, county, township, range, watershed, and other relevant facts and observations. BIOTICS also has an ArcView based mapping program 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 may be threatening the biodiversity at 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 1.

This single rank system works readily for all species except those that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding, and resident species. As noted in Table 1, ranks followed by a "B," for example S1B, indicate that the rank

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

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

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

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

## Legal Designations for Rare Species

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

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

<b>Federal Status:</b>	
<b>1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993) and (61 Federal Register 7598, 1996)</b>	
LE	Listed Endangered: defined as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range.
LT	Listed Threatened: defined as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range.
P	Proposed: taxa formally proposed for listing as Endangered or Threatened (a proposal has been published in the Federal Register, but not a final rule).
C	Candidate: taxa for which substantial biological information exists on file to support proposals to list them as endangered or threatened, but no proposal has been published yet in the Federal Register.
PDL	Proposed for delisting.
XN	Nonessential experimental population.
<b>2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as S<sup>o</sup>)</b>	
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.
<b>3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as “S<sup>o</sup>)</b>	
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.
<b>4. State Status:</b>	
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. 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). This factor for an occurrence is evaluated relative to other known, and/or presumed viable, examples.

**Condition/Quality** – an integrated measure of the composition, structure, and biotic interactions that characterize the occurrence. This includes measures 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 rank and D representing a poor rank. These ranks for each factor 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 3.

**Table 3. Element Occurrence Ranks and their Definitions**

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

### **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 element occurrences or significant features.

The PCA is designed 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 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 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 that may extend far beyond PCA boundaries are necessary as well. This 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 4 for a summary of these B-ranks.

**Table 4. Natural Heritage Program Biological Diversity Ranks and their Definitions**

<b>B1</b>	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)
<b>B2</b>	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)
<b>B3</b>	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)
<b>B4</b>	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)
<b>B5</b>	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 5 summarizes the P-ranks and their definitions.

**Table 5. Natural Heritage Program Protection Urgency Ranks and their Definitions**

<b>P1</b>	Protection actions needed immediately. It is estimated that current stresses may reduce the viability of the elements in the PCA within 1 year.
<b>P2</b>	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.
<b>P3</b>	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.
<b>P4</b>	No protection actions are needed in the foreseeable future.
<b>P5</b>	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 may include the following

- 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 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, re-routing 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 6 summarizes M-ranks and their definitions.

**Table 6. Natural Heritage Program Management Urgency Ranks and their Definitions**

<b>M1</b>	Management actions may be required within one year or the element occurrences could be lost or irretrievably degraded.
<b>M2</b>	New management actions may be needed within 5 years to prevent the loss of the element occurrences within the PCA.
<b>M3</b>	New management actions may be needed within 5 years to maintain the current quality of the element occurrences in the PCA.
<b>M4</b>	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.
<b>M5</b>	No management needs are known or anticipated in the PCA.

## PROJECT BACKGROUND

### Location of Study Area

Larimer County is located along the convergence of the high plains and the Rocky Mountains in north-central Colorado (Fig. 1). It encompasses 2631 square miles (681,547 ha) and ranges in elevation from 4740 ft (1445 m) in the southeastern part of the county where the Cache la Poudre and Big Thompson rivers cross into Weld County to over 13,500 feet (4115 m) in Rocky Mountain National Park in the southwestern part of the county. The principal mountainous features located within Larimer County include the Front Range, the Medicine Bow Range, and the Laramie Mountains.



Figure 1. Location of Larimer County in Colorado.

### Ecoregions

Larimer County is located within the Southern Rocky Mountains, Central Shortgrass Prairie, and Wyoming Basins ecoregions as defined by The Nature Conservancy (modified from Bailey 1994) (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 shrublands (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). The Wyoming Basins Ecoregion extends just over the Wyoming border into northeastern Larimer County.

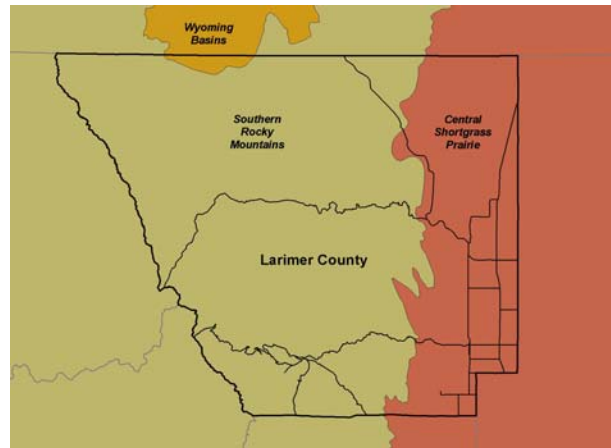


Figure 2. Ecoregions of Larimer County (modified from Bailey 1994).

The location of Larimer County at the meeting of the Great Plains and the Rocky Mountains creates a wide diversity of landscapes and topographic features. The eastern part is generally characterized by flat to rolling grasslands and croplands. Where the plains and the foothills meet, steep rugged canyons are formed. Further west, high mountains and parks (open grasslands) are common. Extending out from the foothills through the

northeastern part of the county is an area somewhat unusual for the Front Range. This region is a mosaic of bluffs, rolling hills, gullies, and washes that gradually transitions into forested mountain peaks and open parks at higher elevations.

### Rivers

The principal drainages within the county are the Cache la Poudre, Big Thompson, and Little Thompson rivers, all within the South Platte River Watershed (Fig. 3). The Laramie River Valley in the extreme northwestern portion of Larimer County is within the North Platte River watershed.

### Climate

The climate within Larimer County varies greatly with elevation. Average annual precipitation within the region ranges from less than 16 inches (41 cm) per year in eastern Larimer County to over 40 inches (102 cm) per year in the high mountains (Fig. 4).

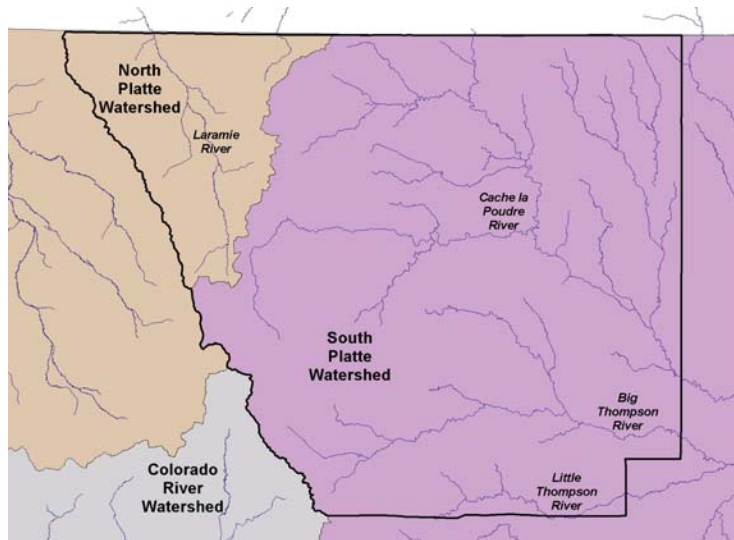


Figure 3. Major Watersheds and Rivers of Larimer County.

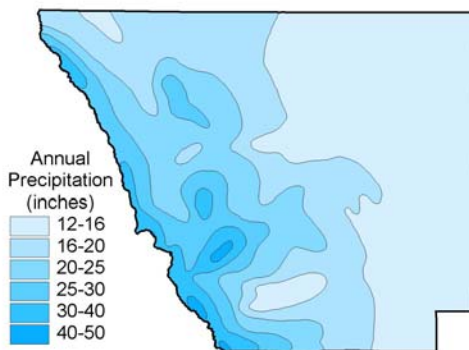


Figure 4. Average Annual Precipitation in Larimer County.

The climate of Larimer County is dominated, like most of the Colorado Piedmont, by continental air masses.

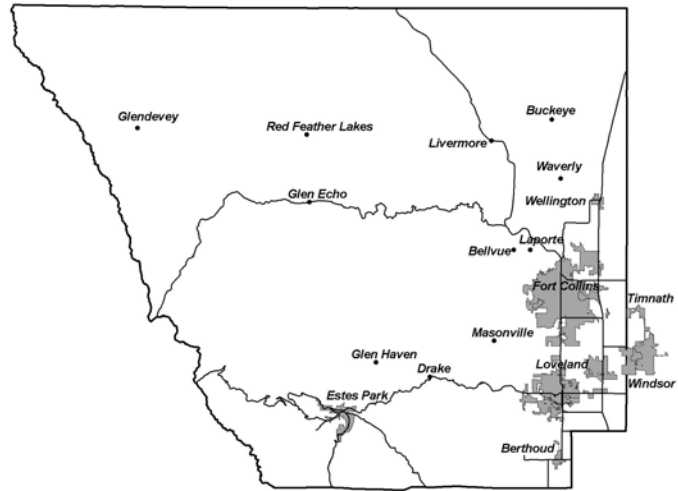
Precipitation events originate in the Pacific, Arctic, or the Gulf of Mexico. The Continental Divide to the west is also influential in determining the area's climate, helping to generate occasional high winds and intense summer precipitation. Winters are generally cold, with the valleys

often recording lower temperatures than the surrounding mountains because of cold air drainage. Summers are warm or hot on the plains and in the valleys and cool in the mountains. Climate data from Fort Collins are fairly typical of the eastern plains and data from Estes Park are typical for the mountainous parts of the county. In July, generally the hottest month in Fort Collins, high temperatures average 85° F and lows average 56° F. During January, the coldest month in Fort Collins, high temperatures average 41° F and

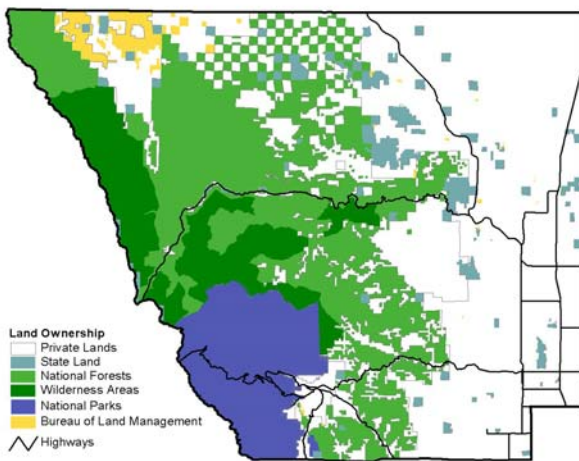
lows average 14° F (Western Regional Climate Center 2005). In Estes Park, July is generally the warmest month with high temperatures averaging 78° F and low temperatures averaging 46° F. In January, the average high in Estes Park is 38° F and the average low is 16° F (Western Regional Climate Center 2005). The growing season is about 140 days on the plains and about 90 days for the area around Estes Park (U.S.D.A. Soil Conservation Service 1980).

**Population**

Larimer County, with an estimated population of 283,000, is the seventh largest county in Colorado based on population (Larimer County 2005). About 70 percent of the population of Larimer County lives within the cities of Fort Collins and Loveland (Fig. 5) (Larimer County 2005). 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.



**Figure 5. Municipalities and Major Towns in Larimer County.**



**Figure 6. Land Ownership in Larimer County.**

**Land Ownership**

About half of the land within the county is privately owned (Fig. 6) (Colorado Division of Wildlife 1998). Private lands are concentrated in the eastern part of the county and along river corridors, in the Estes Valley, and in the Laramie River Valley. U.S. Forest Service lands make up about 37 percent of the county. These lands are managed as the Arapaho Roosevelt National Forest and include three Wilderness Areas. In the southwest corner of the county is

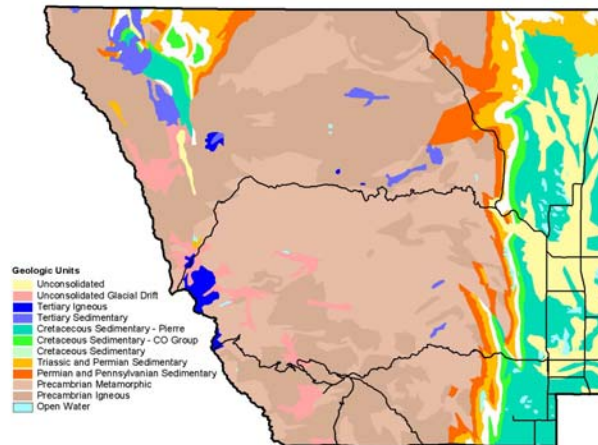
Rocky Mountain National Park that covers about eight percent of the county. State land includes Cherokee and Lone Pine State Wildlife Areas, the Colorado State Forest at the Jackson County border, Lory State Park, and State Land Board parcels; these lands make up about four percent of the county. Bureau of Land Management owns about two percent of the county, these lands are concentrated in the Laramie River Valley with scattered small parcels occurring elsewhere.

## Geology

The geology of Larimer County can be divided into three general groups varying from the Great Plains, to the foothills, and then to the higher mountains to the west (Fig. 7). The Great Plains in Larimer County are characterized by quaternary alluvium washed down from the mountains, which overlies sandstones and shales deposited by an ancient ocean (Chronic 1980).

The foothills in Larimer County are very diverse geologically with numerous sandstones, shales, siltstones, mudstones, and

limestones uplifted and exposed at various points. In many places steep ridges, referred to as hogbacks, are formed. This variety of geologic substrates helps to create some of the most diverse plant communities in the county. Most of the mountainous area of the county to the west is underlain by Precambrian granites, gneisses, and schists (see numerous geologic maps for Larimer County - most by Braddock *et al.*).



**Figure 7. Generalized Geology of Larimer County (adapted from Green 1992).**

## Soils

Soils on the Great Plains are highly variable in texture and drainage capacity, and are formed in alluvium, weathered sedimentary substrates, or wind blown sediments. Soils in the foothills are generally well drained and formed in materials weathered from sedimentary substrates. Most soils in the mountainous portions of the county are formed in materials weathered from granite and are well drained to excessively drained. The exceptions are those soils on stream terraces and benches formed in alluvium (USDA Soil Conservation Service 1980).

## Land Use

Prior to settlement by European Americans much of the county was used by both indigenous peoples and numerous ungulates. Bison and other large ungulates were hunted by Native Americans. Numerous teepee rings, bison wallows, and at least one bison “jump” are known to occur in the area. Folsom man lived in the area approximately 10,000 years ago (RBD Inc. and Camp, Dresser & McKee, Inc. 1994). Later, European miners and settlers came to the area in search of mineral deposits, furs, and productive ground.

Livestock ranchers, farmers, and military personnel settled the area in the middle to late 1800s.

Current land use in Larimer County is greatly influenced by topography and climate. Human use and development is highest in the eastern part of the county. This area contains many communities that are growing rapidly and serve as homes for people commuting to the cities of Fort Collins, Loveland, Boulder, and Denver. The rest of the county, however, still retains a semblance of rural or small-town character, although that too is being increasingly altered by growth. Agriculture, primarily livestock production, is widespread. Irrigated croplands are very common in the eastern part of the county from the southern boundary to north of Wellington.

Mineral extraction is prominent in the area. Numerous oil and gas wells, limestone mines, and sand and gravel quarries exist especially in the eastern part of the county. Sand and gravel mining occur along most of the major drainages in the eastern part of the county.

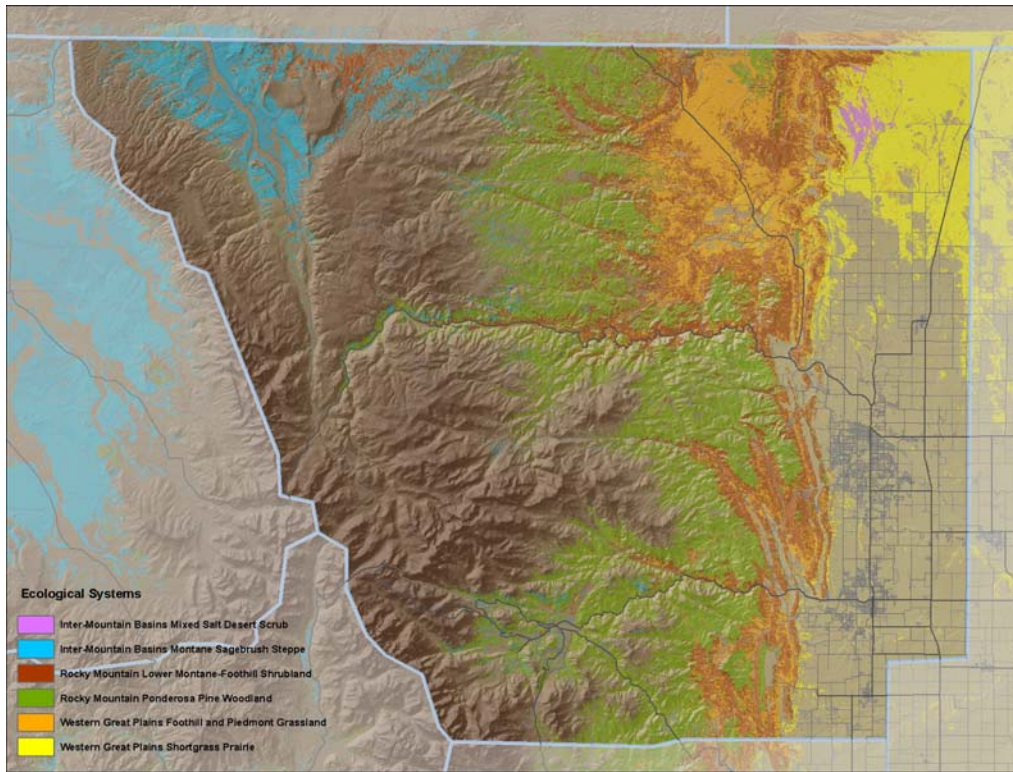
Many of the lands in the eastern part of the county have been converted to agricultural use. Larimer County is one of the leading counties in Colorado in agriculture producing corn, wheat, hay, barley, dry beans, sugar beets, and oats. Much of the land has at one time, or is currently being used as pasture for cattle and calves, dairy cows and heifers, hogs, pigs, and sheep (USDA Soil Conservation Service 1980).

### **Ecological Systems**

The diversity of climate, geology, elevation, and soils within Larimer County leads to a wide range of ecological systems, spanning from mountains to plains. Ecological systems are dynamic assemblages of plant and animal communities that occur together on the landscape, unified by similar ecological processes (e.g. climate as moderated by elevation and natural disturbance processes) and/or underlying abiotic environmental factors or gradients (e.g. bedrock geology and hydrology). Ecological systems in the county range from alpine tundra at the highest elevations in the county on its west side to shortgrass prairie occupying the lowest elevations on the east side.

The diversity of ecological systems in Larimer County may be best described along the wide elevation gradient. At the highest elevations, alpine tundra and shrublands grade into subalpine forests dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), which in turn grade into upper montane forests of lodgepole or limber pine (*Pinus contorta* and *Pinus flexilis*). Lower montane forests are strongly dominated by ponderosa pine (*Pinus ponderosa*), especially on dry slopes, although Douglas-fir (*Pseudotsuga menziesii*) can intermingle on moister, often north-facing slopes. The foothills between the mountains and plains are characterized by mountain mahogany (*Cercocarpus montanus*) shrublands, which blanket the dry, shallow soils of hogbacks and slopes. Grasslands occupy valleys and are scattered in areas of deeper soils throughout the montane and foothill areas in the county. Lower elevations in the northwest corner of the county, in the Laramie River Valley, are occupied by sagebrush shrublands. However, low elevations in the eastern portion of Larimer County fall in the rainshadow of the mountains to the west. Receiving much less moisture, this region of the county is comprised of mid-

and shortgrass prairie ecological systems. Within the prairie area in the northeast corner of Larimer County is an area of salt desert scrub ecological system. Scattered throughout the county are wetland and riparian areas, which round out the ecological diversity. The targeted ecological systems were within lower elevations of Larimer County. These are shown in Figure 8 and described in more detail below.



**Figure 8. Ecological Systems of Larimer County (at lower elevations) from USGS GAP Analysis Program (2004).**

#### *Ponderosa Pine Woodland*

Ponderosa Pine Woodland system is the most common woodland system of the foothills and montane elevations (6000-9000 feet) on the Front Range in Larimer County. Ponderosa pine (*Pinus ponderosa*) grows on warm dry slopes, is intolerant of shade, and grows well in full sun from bare mineral soil for germination and establishment (Mutel and Emerick 1992). These trees are the sole dominant on dry slopes, but they intermingle with Douglas-fir (*Pseudotsuga menziesii*) on moister, often north-facing slopes. Historically, these systems likely incurred frequent, low intensity fires and sporadic catastrophic burns (Shinneman and Baker 1997, Huckaby *et al.* 2003).

#### *Ponderosa Pine Savanna*

The Ponderosa Pine Savanna system consists of widely spaced ponderosa pine trees over grassland parks or shrublands. It occurs at relatively lower elevations and on somewhat rockier substrates, making this system moderately drier than the Woodland system. This system occurs at the tension zone between forests on higher slopes and grasslands in valley bottoms and combines elements of each. Unique in this association is the presence of big



bluestem (*Andropogon gerardii*), a species that abundantly occurs in the tallgrass prairie of the Plains states to the east, but is much less common in the foothills. At higher elevation in this range, this association tends to occur on more south-facing aspects. Like Ponderosa Pine Woodlands, this is a fire-dependent system historically maintained by frequent, low intensity, surface fires.

#### *Lower Montane-Foothills Shrubland*

The Lower Montane-Foothill Shrubland system occupies the very dry, exceedingly shallow and rocky soils between 6000 and 9000 feet in elevation. It is the most common ecological system on the sandstone hogbacks that span the east side of the Front Range throughout the count. This system is often a tessellated mosaic of mountain mahogany plant associations that respond to differences in bedrock geology and elevation at a site. Native grasses are diverse and dominant in the understory beneath the somewhat dense mountain mahogany.

#### *Foothill Grassland*

The Foothill Grassland system occupies the deeper soils in valleys and bottomlands and scattered areas forming a mosaic with Ponderosa Pine and Lower Montane-Foothills Shrubland systems. The Foothill Grassland is one of the most severely altered systems in the Southern Rocky Mountains ecoregion (Rondeau 2001); much of this system has been converted to agricultural land use or has been altered from its natural composition by livestock grazing in Colorado. This system is characterized by a mix of mid- and tallgrass plant associations, remnants of which are now relegated to shrubland, mountain parks, and edges of the ponderosa pine forest. Patches of this system still exist in the valley on rocky knolls that were likely too difficult to plow.

#### *Central Shortgrass Prairie*

The Central Shortgrass Prairie system occupied the low, rolling topography east of the Rocky Mountains in Colorado. This system is defined by sod-forming short grasses, especially buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*), although tallgrass and mixed grass species may be locally present, especially where there is more moisture. This system occurs where there is relatively little moisture (due to the rainshadow of the mountains to the west) and has been maintained by grazing. Fire is less important in shortgrass systems than in other grasslands due to lower fuel loads. However, historically, fires that did occur were often expansive.

#### *Salt Desert Scrub*

Salt Desert Scrub ecological system is rare and unique within Larimer County; it is more common further east on the plains and in the Inter-Mountain region on the West Slope in Colorado. This system is characterized by short, salt-tolerant shrubs like four-winged saltbush (*Atriplex canescens*) and winterfat (*Krascheninnikovia lanata*) scattered among native grasses. This system occurs on more fine-textured soils with high ion content (Kittel and Decker 2004).

#### *Lower Montane Riparian Woodlands and Shrublands*

The Lower Montane Riparian Woodland system occupies the immediate floodplain areas adjacent to river and stream drainages and draws within Larimer County. Riparian

woodlands are characterized by a stately tree canopy of narrowleaf cottonwood (*Populus angustifolia*) and occasionally Plains cottonwood (*Populus deltoides*) over diverse groves of shrubs, including willows (*Salix* spp.) and cherries (*Prunus* spp.), over a diverse ground layer of mesic forbs and graminoids.

### **Fauna**

As with the ecological systems, the varied topography and climate in Larimer County lead to a diversity of fauna. The Colorado Piedmont (the western edge of the High Plains with many low ridges, steep bluffs, and flat-topped mesas) supports a fauna representative of both the High Plains and the Southern Rocky Mountains. This diverse mixture of geology and biology contributes to Larimer County's ecological character. Transition zones like these tend to support higher levels of biological diversity than "non-transitional" areas (Armstrong 1972, Odum 1972, Brewer 1990).

No vertebrates and few invertebrates (at the species level) are endemic to the study area (Armstrong 1972, Ferris and Brown 1981, Woodling 1985, Kippenhan 1990, Andrews and Righter 1992, Hammerson 1999). Two exceptions are the winter stonefly, *Capnia arapahoe*, known only from two tributaries to the Poudre River and a little studied tortricid moth (*Decodes stevensi*) known only from Owl Canyon. On a wider scale, there are some species endemic to the Colorado Piedmont, including the globally imperiled hops feeding azure butterfly (*Celastrina humulus*). Opler (1995) has determined that the Front Range of Colorado is one of the nation's four most important areas for the conservation of lepidoptera (butterflies and moths) due to the area's very high species richness of that order.

Extirpations of large-sized and predaceous mammals are common in the study area. Black-footed ferret (*Mustela nigripes*), wolf (*Canis lupus*), grizzly bear (*Ursus arctos*) and bison (*Bison bison*) have been restricted throughout their range, and no longer occur here in natural populations (Fitzgerald *et al.* 1994). However, large ungulates such as mule deer (*Odocoileus hemionus*), elk (*Cervus elephus*), and antelope (*Antilocapra americana*) are all well known in the area, as are coyote (*Canis latrans*), black bear (*Ursus americanus*), and mountain lion (*Felis concolor*).

The mixture of bird species in Larimer County is very diverse. Species typical of prairies such as Mountain Plover (*Charadrius montanus*) and Western Meadowlark (*Sturnella neglecta*) are found in close proximity to species with montane affinities such as Steller's Jay (*Cyanocitta stelleri*), Pygmy Nuthatch (*Sitta pygmaea*), and Goshawk (*Accipiter gentilis*). A large number of passerine birds are known to breed in the study area. Raptors, including Northern Harrier, Prairie Falcon, Golden Eagle and many hawks are common. Shorebirds are less common, but Great Blue Heron (*Ardea herodias*) breed at dispersed rookeries throughout Larimer County.

The fish of Larimer County are similarly diverse in the transition zone streams typical of the study area. Such streams lie between headwaters and their cold-water environment and the warm waters of the eastern plains, and support fish species from both regions. Fish and their aquatic habitats have been highly impacted in Colorado due to water development and declines in water quality (Woodling 1985).

Amphibians are naturally rare in the study area due to the xeric conditions, although tiger salamanders (*Ambystoma tigrinum*) can be found in stock ponds and other pools. Reptiles such as plains garter snake (*Thamnophis radix*), western terrestrial garter snake (*Thamnophis elegans*), and western rattlesnake (*Crotalus viridis*) are common (Hammerson 1999).

## CONSERVATION ASSESSMENT

### Potential Impacts to Biological Diversity in Larimer County

General threats that may affect biodiversity on a large, landscape-level scale in Larimer County are summarized below. We understand that the issues discussed below are often important parts of a healthy economy and contribute to the well being of our society. We mention these general “impacts to biodiversity” with the hope that good planning can minimize the impacts where critical habitat resides.

#### ***Development***

Residential development is increasing in Larimer County, especially along the I-25 and Highway 287 corridors and in the foothills. Development creates a number of stresses, including habitat loss and fragmentation, introduction and proliferation of non-native species, fire suppression, and predation and disturbance from domestic animals (dogs and cats) (Oxley *et al.* 1974, Coleman and Temple 1994). Increasing human density in an area can lead to a change in the composition of wildlife populations (e.g., numbers of foxes and coyotes may increase, or number of bird species present may decrease), and may also alter movement patterns and behavior of wildlife. Loss of habitat to development is considered irreversible.

#### ***Recreation***

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in Larimer County. Different types of recreation (e.g., motorized versus non-motorized activities), 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; Miller *et al.* 1998, 2001). Wildlife behavior can be significantly altered by repeat visits of hikers or bicyclists. Trail placement should consider the range of potential impacts on the ecosystem. Considerations include minimizing fragmentation by leaving large undisturbed areas of wildlife habitat where possible (Colorado Department of Natural Resources 1998). Miller *et al.* (1998) found lower nest survival for grassland birds adjacent to trails; they also found that grassland birds were more likely to nest away from trails with a zone of influence approximating 250 feet (75 meters). 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.

#### ***Fragmentation and Edge Effects***

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat (e.g., edge of a mountain mahogany shrubland adjacent to a grassland (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, trails, timber harvesting, agricultural practices, and rangeland management. Human induced 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 in areas that may have had few “natural” edges. 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 (e.g., large mammals or migratory waterbirds).

### ***Roads***

There is a complex, dense network of roads in many parts of Larimer County due primarily to agricultural uses and residential development. 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 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 (e.g., 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.

### ***Livestock Grazing***

Domestic livestock grazing has been a traditional livelihood in Larimer County since the late 1800s and has left a broad and sometimes subtle impact on the landscape. For some

prairie species, such as the Mountain Plover and McCown's Longspur, properly managed grazing is not only a compatible activity, but is, in fact, considered essential (e.g. see Gillihan *et al.* 2001 for grazing recommendations for shortgrass prairie bird species). However, some range management practices can adversely affect the region's biological resources. Many riparian areas in Larimer 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 (slight shifts in species composition) to severe and essentially irreversible (extensive gullying and introduction of non-native forage species).

### ***Hydrological Modifications***

River impoundment in the form of lakes, reservoirs, irrigation ditches, and canals can affect aquatic dependent plants and animals (Chien 1985, Friedman *et al.* 1998). 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 the rivers and their tributaries. These periodic floods are necessary for continued viability of most riparian vegetation. For example, many plants, including cottonwood trees, reproduce primarily with flooding events (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 impoundment, rivers have also been altered by stream bank stabilization projects (e.g., 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 groundwater withdrawals. 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 number of species supported by a manmade pond

with minimal edge habitat is generally less than the number supported by an extensive intact seep and spring wetland or naturally occurring pond.

### ***Logging***

Most logging operations require a network of roads. The impacts from roads can result in threats to biodiversity (see “Roads” 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 Larimer County.

### **Recommended 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 in facilitating 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 most areas identified during the inventory. However, some general recommendations for conservation of biological diversity in Larimer County are given here.

**1. Develop and implement a plan for protecting the Potential Conservation Areas profiled in this report, with most attention directed toward areas with a biodiversity rank of B1, B2 and B3.** The PCAs in this report 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. Consider incentive-based programs such as purchasing development rights or outright purchase from willing owners of land for significant sites that are in need of protection. Support local organizations, such as land trusts, in purchasing or acquiring conservation easements for protection of biological diversity or open space. Explore opportunities to form partnerships to access state and federal funding for conservation projects, such as those offered through the Colorado Division of Wildlife or the Farm Bill. Continue to promote cooperation among local entities to preserve the county’s biodiversity. Encourage county leadership to institutionalize consideration of significant biological resources in land use planning.

**2. Use this report in the review of proposed activities in or near Potential Conservation Areas to determine whether or not activities adversely affect elements of biodiversity.** All of the PCAs presented contain elements of biodiversity 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 uses on or near a site may affect the element(s) present there. Range-restricted species may be especially vulnerable to habitat destruction, while wetland and riparian areas are particularly susceptible to impacts from off-site activities if the activities affect water quality or hydrologic regimes. In addition, cumulative impacts from many small changes can have effects as profound and far-reaching as one large change. As proposed land use changes are considered, they should be compared to the maps presented herein (also available in GIS format). If a proposed project has the potential to impact a site, planning personnel should contact persons, organizations, or agencies with the appropriate biological expertise for input in the planning process. The Colorado Natural Heritage Program 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 as well, particularly in evaluating potential impacts to biological resources not tracked by CNHP (e.g., game species).

**3. Recognize the importance of larger, contiguous natural communities.**

While the PCAs identified in this report contain known locations of significant elements of natural diversity, protection of large areas in each vegetation type, especially where these are connected, may ensure that we do not lose species that have not yet been located. Work to protect large blocks of land in each of the major vegetation types in the county, and avoid fragmenting large natural areas unnecessarily with roads, trails, etc. Although large migrating animals like deer and elk are not tracked by CNHP as rare species, they are part of our natural diversity, and their needs for winter range and access to protected corridors to food and water should be taken into consideration. Fragmentation of the landscape also affects smaller animals and plants, opening more edge habitats and introducing exotic species. Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with a house on each 35-acre parcel. Work with developers early in the planning process to educate them about the benefits of retaining natural areas. Locate trails and roads to minimize impacts on native plants and animals. See Forman and Alexander (1998) for an excellent review of the literature on the ecological effects of roads. See *Planning Trails with Wildlife in Mind* 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.** Involve all stakeholders in land use planning. The long-term protection of natural diversity in Larimer County 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 Potential Conservation Areas.** Development of a site-specific conservation plan is a necessary component of the long-term protection of a PCA. Because some of the most serious impacts to Larimer County's ecosystems are at a large scale (e.g., altered hydrology, residential encroachment, and non-native species invasion), considering each area in the context of its surroundings is critical. Several organizations and agencies are available for consultation in the development of conservation plans, including the Colorado Natural Heritage Program, the Colorado Division of Wildlife, the Natural Resources Conservation Service, The Nature Conservancy, and various academic institutions. With the current rate of population growth in Colorado, rare and imperiled species will likely decline if not given appropriate protection or management attention.

Coordinate with managers of public parks or other public lands that support sensitive biological resources. Engage local citizens, groups, and organizations (e.g., schools, 4-H clubs, Native Plant Society) in assisting with management and monitoring projects on public lands. Make a concerted effort to involve individual landowners in conservation dialogue, as applicable.

**6. Stay informed and involved in public land management decisions.** Approximately 50 percent of Larimer County is publicly owned. The U.S. Forest Service owns approximately 37 percent and the National Park Service approximately eight percent. The State and the Bureau of Land Management own approximately four percent and two percent, respectively. Many of the PCAs in Larimer County are on public land and may be protected from development, but not from incompatible uses. Even ownership is not always secure, since federal and state agencies are becoming more and more involved in land exchanges. Encourage protection for the most biologically significant sites on public lands by implementing compatible management activities designated in Forest Management Plans, Grazing Management Plans, etc.

**7. Continue inventories and monitoring where necessary, including inventories for species that cannot be surveyed adequately in one field season and continue inventories on lands that CNHP could not access in 2004.** Not all targeted inventory areas can be surveyed in one field season due to several factors, including lack of access, phenology of species, or time constraints. Because some species are ephemeral or migratory, completing an inventory in one field season is often difficult. Despite the best efforts during one field season, it is likely that some elements 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 Larimer County.

**8. Continue to take a proactive approach to weed and exotic species control.**

Recognize that weeds affect both agriculture and native plant communities. Discourage the introduction and/or sale of non-native species that are known to significantly impact natural areas. These include, but are not limited to, exotic, invasive species such as tamarisk, Russian olive, dalmation toadflax, purple loosestrife, and non-native fish species. Further, natural area managers, public agencies, and private landowners should be encouraged to remove these species from their properties. Enforce the use of weed-free forage on horse trails. Encourage the use of native species for revegetation and landscaping efforts. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of-ways. The Colorado Natural Areas Program has published a book entitled *Native Plant Revegetation Guide for Colorado* that describes appropriate species to be used for revegetation. This resource is available on the World Wide Web at <http://www.parks.state.co.us/home/publications.asp#CNAP>.

**9. Encourage public education functions and publications.** A significant early step in the process of conserving biodiversity is educating local citizens and other stakeholders on the value that such areas offer the public. As described in this report, Larimer County is rich in animal and plant diversity and includes 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 Larimer 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. Consider developing a community conservation website to provide information on natural resource, biological diversity, and conservation opportunities in Larimer County. Enlist the assistance of local media in public education efforts.

**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 Larimer County wetlands. Encourage and support statewide wetland protection efforts such as CDOW's Wetlands Program. 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 Larimer County. Utilize the expertise and breadth of experience within the South Platte River Wetland Focus Area Committee.

## **METHODS**

The methods for assessing and prioritizing conservation needs over a large area are necessarily diverse. The Colorado Natural Heritage Program follows a general method 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 Larimer County Parks and Open Lands, City of Fort Collins Natural Areas Program, and City of Loveland Natural Areas Program were sought at all stages.

### **Collect Available Information**

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

### **Identify Rare or Imperiled Species and Significant Plant Communities with the Potential to Occur 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 Larimer County or from adjacent counties, 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 200 rare species and significant plant communities were targeted in these surveys. Given the 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 was prioritized according to the element's global status rank. Globally rare (G1-G3) elements were given highest priority; globally common (G4 or G5) elements that are rare in the state (S1-S3) were of a lower priority.

### **Identify Targeted Inventory Areas**

Survey sites were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities (Fig. 9). Previously documented locations were targeted, and additional potential areas were chosen using available information sources. 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.

Using the biological information stored in the CNHP databases, areas having the highest potential for supporting specific elements were identified. Those chosen for survey sites appeared to be in the most natural condition. In general, this means those sites that are the largest, least fragmented, and relatively free of visible disturbances such as roads, trails, fences, and quarries were identified.

The above information was used to delineate Targeted Inventory Areas (TIAs) that were believed to have relatively high probability of harboring significant natural resources. These areas focused on private lands. Additional TIAs were identified by Larimer County and the cities of Fort Collins and Loveland. All TIAs are shown on Figure 9.

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 vegetation composition.

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 if encountered.

### **Contact 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 GIS land ownership coverage obtained from Larimer County GIS and Mapping Services Department (2004). 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 private properties surveyed without landowner permission.**

### **Conduct Field Surveys**

Survey sites where access could be obtained were visited at the appropriate time as dictated by the seasonal occurrence (or phenology) of the individual elements. It was essential that surveys took place during a time when the targeted elements were 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.

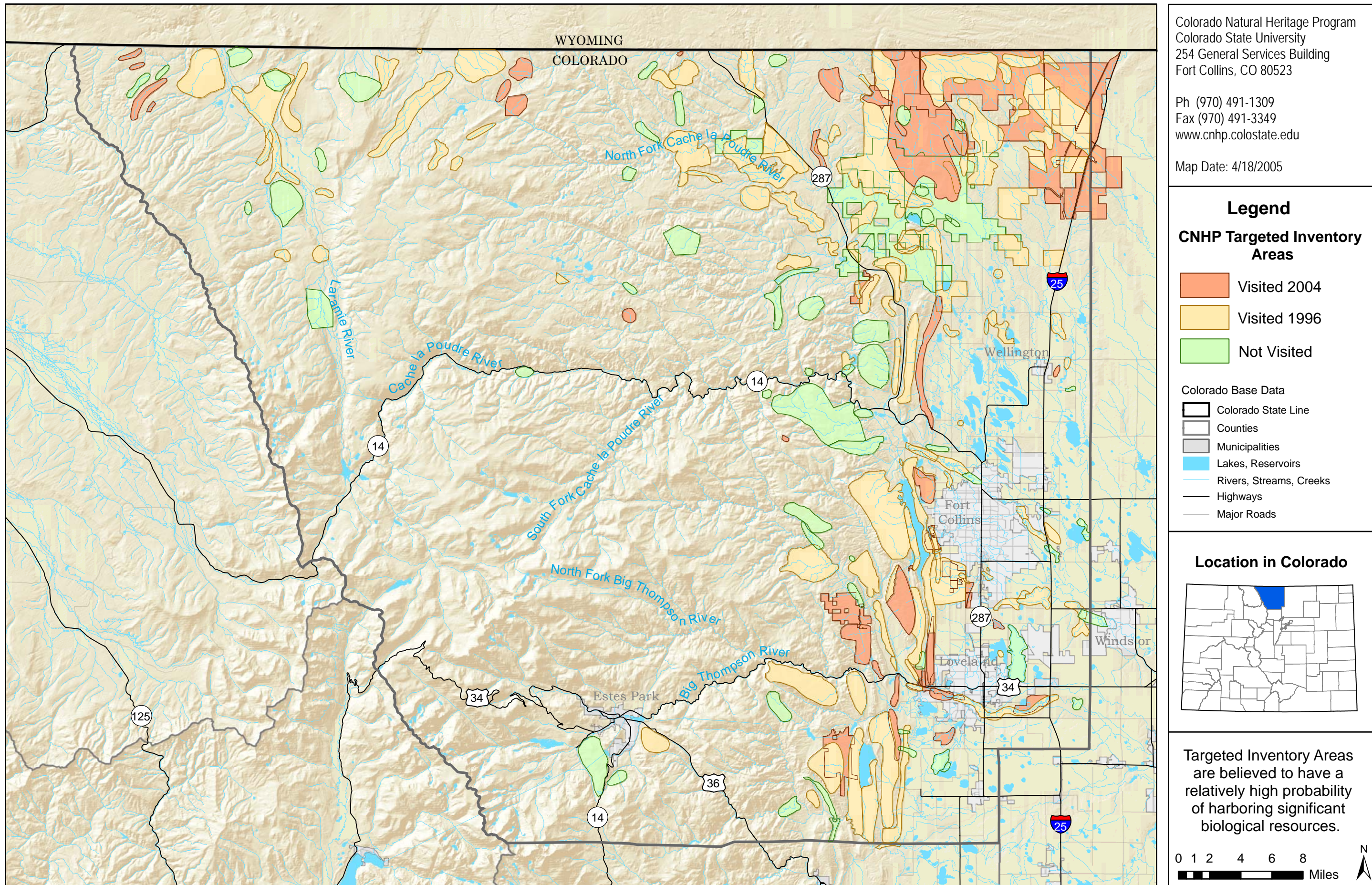


Figure 9. Targeted Inventory Areas in Larimer County

The methods used in the surveys vary according to the elements that were being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion that would attempt to cover the area as thoroughly as possible in the given time. Some types of organisms require special 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 with a global positioning system (GPS) unit. 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 (its connectivity and its 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.

Site visits and assessments were conducted on the following two levels:

- (1) Roadside or adjacent land assessments. Many of the sites could be viewed at a distance from a public road. While on the ground the field scientist can see, even from a distance, many features not apparent on maps and aerial photos. The road assessments determined the extent of human and livestock impacts on the targeted inventory area (TIA), which can include ditching, adventive plant species, plant species indicative of intensive livestock use, stream bank destabilization, major hydrologic alterations, extensive cover of non-native plant species, or new construction. Sites with one or more of these characteristics were generally excluded as potential conservation areas and no extensive data were gathered at these areas.
- (2) On-site assessments. On-site assessments was the preferred method, as it is the only technique that can yield high-confidence statements concerning the known or potential presence of rare and imperiled elements or excellent examples of common natural communities. On-site assessments are also the most resource intensive because of the effort required to contact landowners. In a few cases where on-site

assessments were desired, they could not be conducted because either field personnel were denied access to the property by the landowner, or CHHP was unable to contact the landowner during the time frame of this study.

### **Delineate Potential Conservation Areas**

Finally, since the objective for this inventory is to prioritize specific areas for conservation efforts, Potential Conservation Area (PCA) boundaries were delineated. The goal of the PCA 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 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.

### **Delineate Networks of Conservation Areas**

- Occasionally a landscape area will encompass many Potential Conservation Areas that share similar species or natural communities and ecological processes. Or a landscape will stand out on a regional scale as a large and minimally fragmented area that is relatively ecologically intact. In these cases, a Network of Conservation Areas (NCA) is delineated. 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 NCA is delineated. An example of a relatively intact landscape on a regional scale is the Laramie Foothills in northeastern Larimer County. Most NCAs are drawn at a regional scale that may be best represented on a statewide map.

## RESULTS

Results of the 2004 Larimer County survey confirm that there are many areas with high biological significance. Several extremely rare plants and animals depend on these areas for survival. All together

- 71 rare or imperiled plant species
- 48 rare or imperiled animal species (24 vertebrate and 24 invertebrate), and
- 94 plant communities of concern

have been documented in Larimer County (Table 7). The CNHP database currently houses more than 680 element occurrence records within Larimer County. As part of this project, 98 new element occurrence records were created and 74 element occurrence records were updated. Efforts focused on the eastern half of the county as identified by Larimer County and the cities of Fort Collins and Loveland as the area of highest priority due to the large amount of public land in the western half of the county.

CNHP has identified over 135 Potential Conservation Areas (PCAs) in Larimer County (Fig. 10). Sixty-seven of these PCAs include private or state lands and are presented in this report (Fig. 10 and Table 8). PCAs that fall entirely within U.S. Forest Service or National Park Service lands were not updated as part of this project and are not presented in this report. Of the 67 PCAs presented in this report, two are of outstanding biodiversity significance (B1), 22 are of very high significance (B2), 33 are of high significance (B3), seven are of moderate significance (B4), and three are of general significance (B5). In addition, three networks of conservation areas (NCAs) have been identified as intact landscapes on a regional scale.

Of the 71 PCAs presented in this report, 24 are newly created based on fieldwork conducted since 1996. Of the remaining 47 PCAs, many have been updated since 1996 (Kettler *et al.* 1996) with changes in site boundaries and in element occurrences of interest. The newly created PCAs include two of outstanding biodiversity significance (B1 biodiversity rank). One of these, the Laramie River Valley Shale Outcrops PCA, includes excellent occurrences of the globally imperiled (G1) North Park phacelia (*Phacelia formosula*) and other rare plants endemic to shale barrens. These rare plants were discovered in Larimer County during 2004. The other new B1 PCA is Young Gulch and Elkhorn Creek, the only known location in the world for the *Capnia arapahoe* stonefly.

Of the plant species targeted during the 2004 Larimer County biological survey, three are particularly significant because they occur within the eastern half of the county and are considered globally imperiled (G2). These species were the focus of most of the botanical fieldwork. In general, these globally imperiled plant species are confined to narrowly distributed geologic substrates. These plants, Bells's twinpod (*Physaria bellii*), Larimer aletes (*Aletes humilis*), and Rocky Mountain cinquefoil (*Potentilla rupincola*), are discussed in more detail below.



**Table 7. List of Known Elements of Concern for Larimer County.**

<b>Element</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal and State Status</b>
<b>ANIMALS</b>				
<b>Amphibians</b>				
<i>Bufo boreas</i> (S. Rocky Mtn. popn.)	Boreal Toad	G4T1Q	S1	C,FS, E
<i>Rana sylvatica</i>	Wood Frog	G5	S3	FS
<b>Birds</b>				
<i>Aegolius funereus</i>	Boreal Owl	G5	S2	FS
<i>Buteo regalis</i>	Ferruginous Hawk	G4	S3B,S4N	FS,BLM,SC
<i>Calcarius mccownii</i>	McCown's Longspur	G4	S2B	FS
<i>Calcarius ornatus</i>	Chestnut-collared Longspur	G5	S1B	FS
<i>Charadrius montanus</i>	Mountain Plover	G2	S2B	FS,BLM,SC
<i>Cypseloides niger</i>	Black Swift	G4	S3B	FS
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T3	S2B	FS,SC
<i>Grus canadensis tabida</i>	Greater Sandhill Crane	G5T4	S2B,S4N	SC
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B,S3N	LT,PDL,T
<i>Himantopus mexicanus</i>	Black-necked Stilt	G5	S3B	
<i>Seiurus aurocapillus</i>	Ovenbird	G5	S2B	
<b>Fish</b>				
<i>Oncorhynchus clarki stomias</i>	Greenback Cutthroat Trout	G4T2T3	S2	LT,T
<b>Mammals</b>				
<i>Corynorhinus townsendii pallescens</i>	Townsend's Big-eared Bat Subsp	G4T4	S2	FS,BLM,SC
<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	G4	S4	FS,SC
<i>Gulo gulo</i>	Wolverine	G4	S1	FS,E
<i>Lemmyscus curtatus</i>	Sagebrush Vole	G5	S1	
<i>Lynx canadensis</i>	Lynx	G5	S1	LT,E
<i>Mustela nigripes</i>	Black-footed Ferret	G1	S1	LE,XN,E
<i>Sorex hoyi montanus</i>	Pygmy Shrew	G5T2T3	S2	FS
<i>Sorex nanus</i>	Dwarf Shrew	G4	S2	
<i>Vulpes velox</i>	Swift Fox	G3	S3	FS,SC
<i>Zapus hudsonius preblei</i>	Meadow Jumping Mouse Subsp	G5T2	S1	LT,PDL,T
<b>Mollusks</b>				
<i>Physella utahensis</i>	Banded Physa	G2	S1	
<i>Pyganodon grandis</i>	Giant Floater	G5	S1	
<b>Insects-Butterflies and Moths</b>				
<i>Amblyscirtes simius</i>	Simius Roadside Skipper	G4	S3	
<i>Atrytone arogos</i>	Arogos Skipper	G3G4	S2	
<i>Atrytonopsis hianna</i>	Dusted Skipper	G4G5	S2	
<i>Boloria selene sabulocollis</i>	Sandhill Fritillary	G5T2	S1S2	
<i>Callophrys mossii schryveri</i>	Moss' Elfin	G4T3	S2S3	
<i>Celastrina humulus</i>	Hops Feeding Azure	G2G3	S2	
<i>Coloradia luski</i>	Lusk's Pinemoth	G4	S1?	
<i>Decodes stevensi</i>	Stevens' Tortricid Moth	GNR	S1	

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<i>Erynnis martialis</i>	Mottled Dusky Wing	G3G4	S2S3	
<i>Euphilotes rita coloradensis</i>	Colorado Blue	G3G4T2T3	S2	
<i>Euphyes bimacula</i>	Two-spotted Skipper	G4	S2	
<i>Hesperia ottoe</i>	Ottoo Skipper	G3G4	S2	FS
<i>Pachysphinx modesta</i>	Modest Sphinx Moth	G4G5	S3?	
<i>Polites origenes</i>	Cross-line Skipper	G5	S3	
<i>Polites rhesus</i>	Rhesus Skipper	G4	S2S3	
<i>Satyrodes eurydice fumosa</i>	Smoky Eyed Brown	G5T3T4	S1	
<i>Speyeria idalia</i>	Regal Fritillary	G3	S1	FS
<i>Stinga morrisoni</i>	Morrison's skipper	G4G5	S3S4	
<b>Insects-Stoneflies</b>				
<i>Alloperla pilosa</i>	Hairy Sallfly (Chloroperlidae)	G3	S2	
<i>Capnia arapahoe</i>	Arapahoe Snowfly (Capniidae)	G1	S1	
<i>Mesocapnia frisoni</i>	Plains Snowfly (Capniidae)	G5	S1	
<i>Pictetiella expansa</i>	Autumn Springfly (Perlodidae)	G3	S2	
<i>Suwallia wardi</i>	Larimide Sallfly (Chloroperlidae)	G3	S2	
<b>PLANTS</b>				
<i>Acorus calamus</i>	Sweet Flag	G4?	SH	
<i>Agastache foeniculum</i>	Lavender Hyssop	G4G5	S1	
<i>Aletes humilis</i>	Larimer Aletes	G2G3	S2S3	
<i>Aquilegia saximontana</i>	Rocky Mountain Columbine	G3	S3	
<i>Argyrosma fendleri</i>	Fendler Cloak-fern	G3	S3	
<i>Aristida basiramea</i>	Forktip Three-awn	G5	S1	
<i>Artemisia pattersonii</i>	Patterson's Wormwood	G3G4	S3	
<i>Besseyia wyomingensis</i>	Wyoming Kittentails	G5	S1	
<i>Botrychium echo</i>	Reflected Moonwort	G3	S3	
<i>Botrychium hesperium</i>	Western Moonwort	G3	S2	
<i>Botrychium hesperium</i>	Western Moonwort	G3	S2	
<i>Botrychium minganense</i>	Mingan's Moonwort	G4	S1	
<i>Botrychium multifidum</i> ssp. <i>coulteri</i>	Leathery Grape Fern	G5TNRQ	S1	
<i>Botrychium pallidum</i>	Pale Moonwort	G3	S2	
<i>Carex diandra</i>	Lesser Panicked Sedge	G5	S1	FS
<i>Carex lasiocarpa</i>	Slender Sedge	G5	S1	
<i>Carex limosa</i>	Mud Sedge	G5	S2	
<i>Carex livida</i>	Livid Sedge	G5	S1	FS, BLM
<i>Carex peckii</i>	Peck Sedge	G4G5	S1	
<i>Carex saximontana</i>	Rocky Mountain Sedge	G5	S1	
<i>Carex sprengei</i>	Sprengel's Sedge	G5?	S2S3	
<i>Castilleja puberula</i>	Downy Indian-Paintbrush	G2G3	SNR	
<i>Crataegus chrysocarpa</i>	Yellow Hawthorn	G5	S1	
<i>Cypripedium fasciculatum</i>	Clustered Lady's-slipper	G4	S3	

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<i>Cypripedium parviflorum</i>	American Yellow Lady's-slipper	G5	S2	
<i>Draba crassa</i>	Thick-leaf Whitlow-grass	G3	S3	
<i>Draba fladnizensis</i>	Arctic Draba	G4	S2S3	
<i>Draba grayana</i>	Gray's Peak Whitlow-grass	G2	S2	FS
<i>Draba lonchocarpa</i>	Lancepod Whitlow-grass	G3G4	S2	
<i>Draba porsildii</i>	Porsild's Whitlow-grass	G3G4	S1	
<i>Draba streptobrachia</i>	Colorado Divide Whitlow-grass	G3	S3	
<i>Dryopteris expansa</i>	Spreading Wood Fern	G5	S1	
<i>Eriogonum exilifolium</i>	Dropleaf Buckwheat	G3	S2	FS
<i>Festuca hallii</i>	Hall Fescue	G4	SH	FS
<i>Gaura neomexicana</i> ssp. <i>coloradensis</i>	Colorado Butterfly Weed	G3T2	S1	LT
<i>Gymnocarpium dryopteris</i>	Oak Fern	G5	S2S3	
<i>Isoetes echinospora</i> ssp. <i>muricata</i>	Spiny-spored Quillwort	G5?T5?	S2	
<i>Juncus tweedyi</i>	Tweedy's Rush	G3Q	S1	
<i>Juncus vaseyi</i>	Vasey Bulrush	G5?	S1	
<i>Liatris ligulistylis</i>	Gay-feather	G5?	S1S2	
<i>Listera borealis</i>	Northern Twayblade	G4	S2	BLM
<i>Listera convallarioides</i>	Broad-leaved Twayblade	G5	S2	
<i>Luzula subcapitata</i>	Colorado Wood Rush	G3?	S3?	
<i>Mentzelia sinuata</i>	Wavy-leaf stickleaf	G3	S2	
<i>Mimulus gemmiparus</i>	Weber's Monkey-flower	G1	S1	FS
<i>Musineon (Aletes) tenuifolium</i>	Slender Parsley	G4	S3	
<i>Naumburgia thrysiflora (Lysimachia)</i>	Tufted loosestrife	G5	SH	
<i>Oligoneuron album (Unamia alba)</i>	Prairie Goldenrod	G5	S2S3	
<i>Oenopsis wardii</i>	Ward's Goldenweed	G2	S1	
<i>Packera debilis</i>	Rocky Mountain Ragwort	G4	S1	
<i>Parnassia kotzebuei</i>	Kotzebue's Grass-of-parnassus	G4	S2	FS
<i>Pellaea atropurpurea</i>	Purple Cliff-brake	G5	S2S3	
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf Beardtongue	G4T2Q	S2	FS
<i>Phacelia denticulata</i>	Rocky Mountain Phacelia	G3?	S3	
<i>Phacelia formosula</i>	North Park Phacelia	G1	S1	LE
<i>Physaria bellii</i>	Bell's Twinpod	G2	S2	
<i>Polypodium hesperium</i>	Western Polypody	G5	S1S2	
<i>Potentilla ambigens</i>	S. Rocky Mountain Cinquefoil	G3	S1S2	
<i>Potentilla rupincola</i>	Rocky Mountain Cinquefoil	G2	S2	FS
<i>Rhododendron albiflorum</i>	White-flowered Azalea	G4	S2	
<i>Ribes americanum</i>	American Currant	G5	S2	
<i>Rorippa coloradensis</i>	Colorado Watercress	GH	SH	
<i>Salix candida</i>	Hoary or Silver Willow	G5	S2	FS,BLM
<i>Salix serissima</i>	Autumn Willow	G4	S1	FS,BLM
<i>Sisyrinchium pallidum</i>	Pale Blue-eyed Grass	G2G3	S2	BLM
<i>Spiranthes diluvialis</i>	Ute Ladies' Tresses	G2	S2	LT

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<b>Element</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal and State Status</b>
<i>Subularia aquatica</i>	Water Awlwort	G5	S1	
<i>Telesonix jamesii</i>	James' Telesonix	G2G3	S2?	
<i>Tonestus lyallii</i>	Lyall Haplopappus	G5	S1?	
<i>Triodanis leptocarpa</i>	Slim-pod Venus' Looking-glass	G5?	S1	
<i>Viola selkirkii</i>	Selkirk Violet	G5?	SH	FS
<b>PLANT COMMUNITIES</b>				
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Calamagrostis canadensis</i>	Montane Riparian Forests	G5	S3	
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Mertensia ciliata</i>	Montane Riparian Forests	G5	S5	
<i>Alnus incana</i> / <i>Equisetum arvense</i>	Montane Riparian Shrubland	G3	S3	
<i>Alnus incana</i> / Mesic graminoid	Montane Riparian Shrubland	G3	S3	
<i>Andropogon gerardii</i> - <i>Schizachyrium scoparium</i>	Xeric Tallgrass Prairie	G2?	S2	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i>	Western Slope Sagebrush Shrublands	G5	S3S4	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Leucopoa kingii</i>	Western Slope Sagebrush Shrublands	G3	S1S2	
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Leymus ambiguus</i>	Mixed Foothill Shrublands	G3Q	S2	
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Pseudoroegneria spicata</i>	Xeric Sagebrush Shrublands	G4	S3?	
<i>Artemisia tripartita</i> / <i>Festuca idahoensis</i>	Mixed Foothill Shrublands	G3	S1?	
<i>Atriplex canescens</i> / <i>Bouteloua gracilis</i>	Shortgrass Prairie	G3	S3	
<i>Betula occidentalis</i> / Mesic graminoid	Lower Montane Riparian Shrublands	G3	S2	
<i>Bouteloua gracilis</i> - <i>Buchloe dactyloides</i>	Shortgrass Prairie	G4	S2?	
<i>Calamagrostis canadensis</i>	Montane Wet Meadows	G4	S4	
<i>Caltha leptosepala</i>	Montane Wet Meadows	G4	S4	
<i>Carex aquatilis</i>	Montane Wet Meadows	G5	S4	
<i>Carex nebrascensis</i>	Wet Meadows	G4	S3	
<i>Carex praeegracilis</i>	Clustered Sedge Wetland	G3G4	S2	
<i>Carex simulata</i>	Wet Meadow	G4	S3	
<i>Carex utriculata</i>	Beaked Sedge Montane Wet Meadow	G5	S4	
<i>Catabrosa aquatica</i> - <i>Mimulus</i> spp.	Spring Wetland	GU	S3	
<i>Cercocarpus montanus</i> - <i>Rhus trilobata</i> / <i>Andropogon gerardii</i>	Mixed Foothill Shrublands	G2G3	S2S3	

**Table 7. List of Known Elements of Concern for Larimer County.**

<b>Element</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal and State Status</b>
<i>Cercocarpus montanus/ Elymus lanceolata x Pseudoroegneria spicata</i>	Mountain Mahogany/Griffith's Wheatgrass Shrubland	GU	S3	
<i>Cercocarpus montanus/ Muhlenbergia montana</i>	Mixed Mountain Shrublands	GU	S2	
<i>Cercocarpus montanus/ Pseudoroegneria spicata</i>	Mixed Mountain Shrublands	G4	S3	
<i>Cercocarpus montanus/ Stipa comata</i>	Mixed Foothill Shrublands	G2	S2	
<i>Cercocarpus montanus/ Stipa neomexicana</i>	Foothills Shrubland	G2G3	S2S3	
<i>Cercocarpus montanus/ Stipa scribneri</i>	Foothills Shrubland	G3	S3	
<i>Corylus cornuta</i>	Lower Montane Forests	G3	S1	
<i>Danthonia intermedia</i>	Montane Grasslands	G2G3	S2S3	
<i>Danthonia parryi</i>	Montane Grasslands	G3	S3	
<i>Distichlis spicata</i>	Salt Meadows	G5	S3	
<i>Eleocharis quinqueflora-Triglochin</i> spp.	Alkaline Spring Wetland	GU	S2	
<i>Eleocharis quinqueflora</i>	Alpine Wetlands	G4	S3S4	
<i>Geum rossii/ Trifolium</i> spp.	Alpine Meadows	G3	S3	
<i>Glyceria borealis</i>	Montane Emergent Wetland	G4	S3	
<i>Juncus balticus</i>	Western Slope Wet Meadows	G5	S5	
<i>Juniperus scopulorum/ Cercocarpus montanus</i>	Foothills Pinyon-Juniper Woodlands/Scarp Woodlands	G2	S2	
<i>Juniperus scopulorum/ Purshia tridentata</i>	Foothills Pinyon-Juniper Woodlands	G2	S2	
<i>Krascheninnikovia lanata/ Pascopyrum smithii-Bouteloua gracilis</i>	Western Slope Grasslands	G4	SU	
<i>Muhlenbergia montana-Stipa comata</i>	Montane Grasslands	G2	S2	
<i>Picea engelmannii/ Trifolium dasyphyllum</i>	Timberline Forests	G2?	S2	
<i>Picea pungens/ Alnus incana-Corylus cornuta</i>	Foothills Riparian Forest	GU	SU	
<i>Picea pungens/ Alnus incana</i>	Montane Riparian Forests	G3	S3	
<i>Picea pungens/ Cornus sericea</i>	Montane Riparian Forest	G4	S2	
<i>Pinus contorta/ Vaccinium scoparium</i>	Seral Lodgepole Pine Forests	G5	S4	
<i>Pinus edulis/ Cercocarpus montanus</i>	Mesic Western Slope Pinyon-Juniper Woodlands	G5	S4	
<i>Pinus flexilis/ Leucopoa kingii</i>	Lower Montane Woodlands	G3	S3	
<i>Pinus ponderosa/ Alnus incana</i>	Ponderosa Pine/Thin Leaf Alder	G2	S2	
<i>Pinus ponderosa/ Cercocarpus montanus/ Andropogon gerardii</i>	Foothills Ponderosa Pine Scrub Woodlands	G2	S2?	
<i>Pinus ponderosa/ Leucopoa kingii</i>	Foothills Ponderosa Pine	G3	S3	

**Table 7. List of Known Elements of Concern for Larimer County.**

<b>Element</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal and State Status</b>
	Savannas			
<i>Pinus ponderosa/ Purshia tridentata</i>	Foothills Ponderosa Pine Scrub Woodlands	G3G5	S3?	
<i>Pinus ponderosa/ Rosa woodsii</i>	Foothills Ponderosa Pine Savannas	G4	S4	
<i>Populus acuminata</i>	Montane Riparian Forest	GU	SU	
<i>Populus angustifolia/ Alnus incana</i>	Montane Riparian Forest	G3	S3	
<i>Populus angustifolia/ Betula occidentalis</i>	Montane Riparian Forest	G3	S2	
<i>Populus angustifolia/ Prunus virginiana</i>	Narrowleaf Cottonwood/Common Chokecherry	G2Q	S1	
<i>Populus angustifolia/ Salix exigua</i>	Narrowleaf Cottonwood Riparian Forests	G4	S4	
<i>Populus angustifolia/ Salix irrorata</i>	Foothills Riparian Woodland	G2	S2	
<i>Populus angustifolia/ Symphoricarpos spp.</i>	Narrowleaf Cottonwood/Snowberry Montane Riparian Forest	G3	S3	
<i>Populus deltoides ssp. monilifera-(Salix amygdaloides)/ Salix exigua</i>	Plains Cottonwood Riparian Woodland	G3G4	S3	
<i>Populus deltoides ssp. monilifera/ Carex lanuginosa</i>	Plains Cottonwood Riparian Woodland	G2	S1	
<i>Populus deltoides ssp. monilifera/ Symphoricarpos occidentalis</i>	Plains Cottonwood Riparian Woodland	G2G3	S2	
<i>Populus tremuloides/ Acer glabrum</i>	Montane Riparian Forests	G2	S1S2	
<i>Populus tremuloides/ Corylus cornuta</i>	Montane Riparian Forests	G3	S1	
<i>Potamogeton natans</i>	Montane Floating/Submergent Wetland	G5?	S1	
<i>Pseuroegneria spicata-Poa secunda</i>	Montane Grasslands	G4?	S1	
<i>Purshia tridentata/ Artemisia frigida/ Stipa comata</i>	Mixed Foothill Shrublands	G1G2	S1S2	
<i>Purshia tridentata/ Muhlenbergia montana</i>	Mixed Foothill Shrublands	G2	S2	
<i>Rhus trilobata</i>	Skunkbrush Riparian Shrubland	G2	S2	
<i>Ribes cereum/ Leymus ambiguus</i>	Mixed Foothill Shrublands	G2	S2?	
<i>Salix brachycarpa/ Deschampsia cespitosa-Geum rossii</i>	Alpine Willow Scrub	G4	S3S4	
<i>Salix drummondiana/ Mesic forb</i>	Drummonds Willow/Mesic Forb	G4	S4	
<i>Salix geyeriana-Salix monticola/ Calamagrostis canadensis</i>	Montane Willow Carrs	G3	S3	
<i>Salix geyeriana-Salix monticola/ Mesic graminoid</i>	Montane Riparian Willow Carr	GU	S3	
<i>Salix geyeriana/ Calamagrostis canadensis</i>	Montane Riparian Willow Carr	G5	S3	

**Table 7. List of Known Elements of Concern for Larimer County.**

<b>Element</b>	<b>Common Name</b>	<b>Global Rank</b>	<b>State Rank</b>	<b>Federal and State Status</b>
<i>Salix geyeriana/ Carex utriculata</i>	Geyer's Willow/Beaked Sedge	G5	S3	
<i>Salix ligulifolia</i>	Montane Willow Carr	G2G3	S2S3	
<i>Salix lucida ssp. caudata</i>	Montane Riparian Shrubland	G3Q	S2S3	
<i>Salix monticola/ Calamagrostis canadensis</i>	Montane Willow Carr	G3	S3	
<i>Salix monticola/ Carex aquatilis</i>	Montane Riparian Willow Carr	G3	S3	
<i>Salix monticola/ Carex utriculata</i>	Montane Riparian Willow Carr	G3	S3	
<i>Salix monticola/ Mesic forb</i>	Montane Riparian Willow Carr	G4	S3	
<i>Salix planifolia/ Calamagrostis canadensis</i>	Subalpine Riparian Willow Carr	G4	S2S3	
<i>Salix planifolia/ Caltha leptosepala</i>	Subalpine Riparian Willow Carr	G4	S4	
<i>Salix planifolia/ Carex aquatilis</i>	Subalpine Riparian Willow Carr	G5	S4	
<i>Salix planifolia/ Deschampsia cespitosa</i>	Subalpine Riparian Willow Carr	G2G3	S3	
<i>Salix wolfii/ Mesic forb</i>	Subalpine Riparian Willow Carr	G3	S3	
<i>Scirpus tabernaemontani-Scirpus acutus</i>	Great Plains Marsh	G4	S2S3	
<i>Scirpus maritimus</i>	Emergent Wetland (Marsh)	G4	S2	
<i>Sparganium angustifolium</i>	Montane Floating/submergent Palustrine Wetlands	G4	SU	
<i>Stipa comata-Bouteloua gracilis</i>	Montane Grasslands	G5	S2S3	
<i>Typha angustifolia-Typha latifolia</i>	Narrow-leaf Cattail Marsh	G5	S4	
<i>Utricularia vulgaris</i>	Montane Floating/Submergent Wetland	G3?	S1	

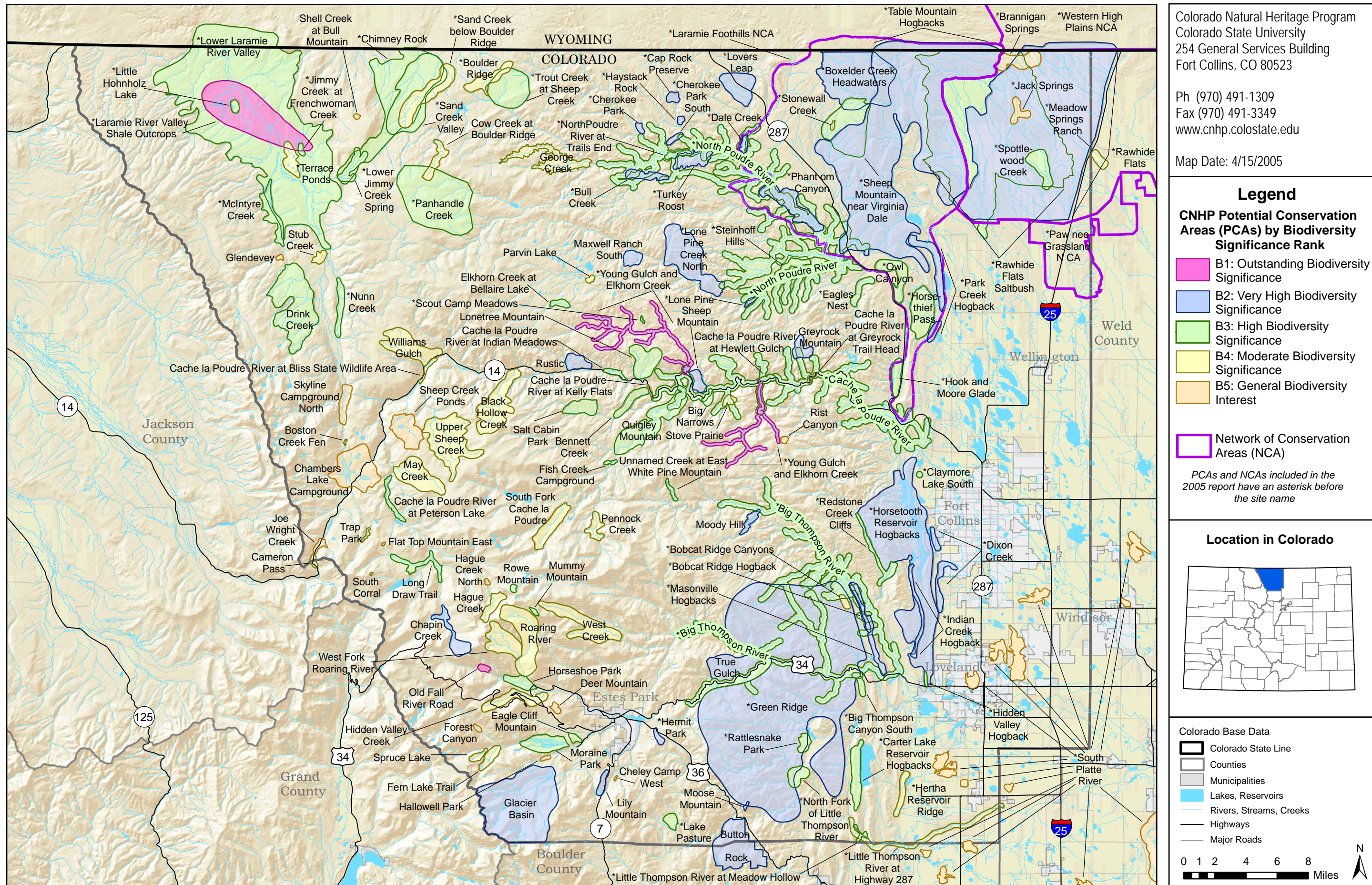


Figure 10. Potential Conservation Areas and Networks of Conservation Areas in Larimer County



**Table 8. Larimer County Potential Conservation Areas and Networks of Conservation Areas.\***

Potential Conservation Area	Protection Urgency Rank	Management Urgency Rank
<b><i>B1: Outstanding Biodiversity Significance</i></b>		
Laramie River Valley Shale Outcrops	P2	M4
Young Gulch and Elkhorn Creek	P3	M3
<b><i>B2: Very High Biodiversity Significance</i></b>		
Bobcat Ridge Hogback	P4	M4
Boxelder Creek Headwaters	P3	M3
Bull Creek	P4	M4
Cap Rock Preserve	P4	M4
Cherokee Park	P4	M4
Cherokee Park South	P4	M4
Dale Creek	P5	M3
Dixon Creek	P4	M3
Green Ridge	P3	M3
Haystack Rock	P3	M4
Hermit Park	P3	M4
Horsetooth Reservoir Hogbacks	P4	M3
Indian Creek Hogback	P5	M4
Lone Pine	P5	M3
Lone Pine Creek North	P5	M4
Lovers Leap	P2	M3
Masonville Hogbacks	P3	M3
Park Creek Hogback	P1	M4
Phantom Canyon	P4	M3
Rawhide Flats	P3	M3
Table Mountain Hogbacks	P2	M3
Turkey Roost	P4	M4
<b><i>B3: High Biodiversity Significance</i></b>		
Big Thompson Canyon South	P2	M3
Big Thompson River	P2	M3
Cache la Poudre River	P2	M3
Carter Lake Reservoir Hogbacks	P2	M4
Chimney Rock	P4	M4
Claymore Lake South	P4	M2
Eagles Nest	P5	M2
Hidden Valley Hogback	P2	M4
Hook and Moore Glade	P1	M3
Horsethief Pass	P2	M4
Jimmy Creek at Frenchwoman Creek	P3	M4
Lake Pasture	P5	M4
Little Hohnholz Lake	P4	M2

**Table 8. Larimer County Potential Conservation Areas and Networks of Conservation Areas.\***

<b>Potential Conservation Area</b>	<b>Protection Urgency Rank</b>	<b>Management Urgency Rank</b>
Little Thompson River at Meadow Hollow	P2	M3
Lower Jimmy Creek Spring	P4	M2
Lower Laramie River Valley	P3	M4
McIntyre Creek	P3	M4
Meadow Springs Ranch	P4	M2
North Fork of Little Thompson River	P5	M4
North Poudre River	P2	M3
North Poudre River at Trails End	P3	M3
Nunn Creek	P3	M3
Owl Canyon	P2	M4
Panhandle Creek	P3	M3
Rattlesnake Park	P4	M4
Rawhide Flats Saltbush	P2	M3
Redstone Creek Cliffs	P3	M3
Sand Creek Valley	P3	M4
Scout Camp Meadows	P4	M4
Sheep Mountain near Virginia Dale	P3	M3
Spottlewood Creek	P3	M3
Steinhoff Hills	P3	M3
Trout Creek at Sheep Creek	P3	M3
<b><i>B4: Moderate Biodiversity Significance</i></b>		
Bobcat Ridge Canyons	P5	M3
Boulder Ridge	P3	M4
Hertha Reservoir Ridge	P2	M3
Little Thompson River at Highway 287	P2	M3
Sand Creek below Boulder Ridge	P3	M3
Stonewall Creek	P4	M1
Terrace Ponds	P3	M3
<b><i>B5: General Biodiversity Significance</i></b>		
Brannigan Springs	P5	M3
Jack Springs	P5	M3
South Platte River	P3	M3
<b><i>Networks of Conservation Areas</i></b>		
Laramie Foothills		
Pawnee Grasslands		
Western High Plains		

\* PCAs located entirely within U.S. Forest Service or National Parks Service lands are not included in this table or report.

### Bell's Twinpod

Bell's twinpod is known only from the hogbacks and shale outcrops along the eastern edge of the Front Range within Larimer, Boulder, and Jefferson counties (Fig. 11). A significant portion of this species' global range is located on private lands in Larimer County, in areas that are experiencing rapid development pressures. It is considered globally imperiled (G2) due to its restricted range and high level of threats to its habitat. There are eight PCAs within Larimer County supporting Bell's twinpod (Table 9). An additional seven PCAs supporting this plant occur in Boulder and Jefferson counties. Bell's twinpod is known primarily from Niobrara Formation limestones and shales with a few locations on red sandstone hogbacks. Prior to 2004, the occurrences on red sandstones were considered to be exceptions. However, during 2004, additional occurrences were located on a range of red sandstone formations (Table 9). Newly discovered occurrences include those within

the Bobcat Ridge Hogback, Hidden Valley Hogback, and portions of the Indian Creek Hogback PCAs. The Bell's twinpod in Boulder and Jefferson counties is known primarily from the Niobrara Formation.

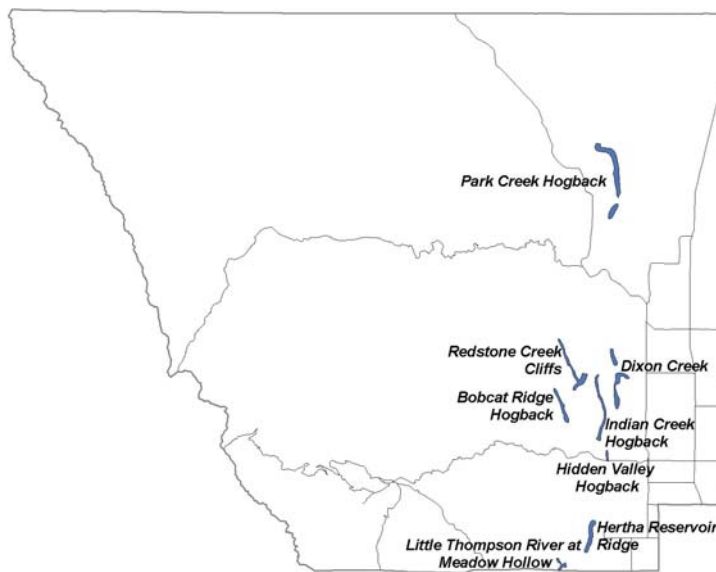


Fig. 11. Larimer County PCAs supporting Bell's twinpod.

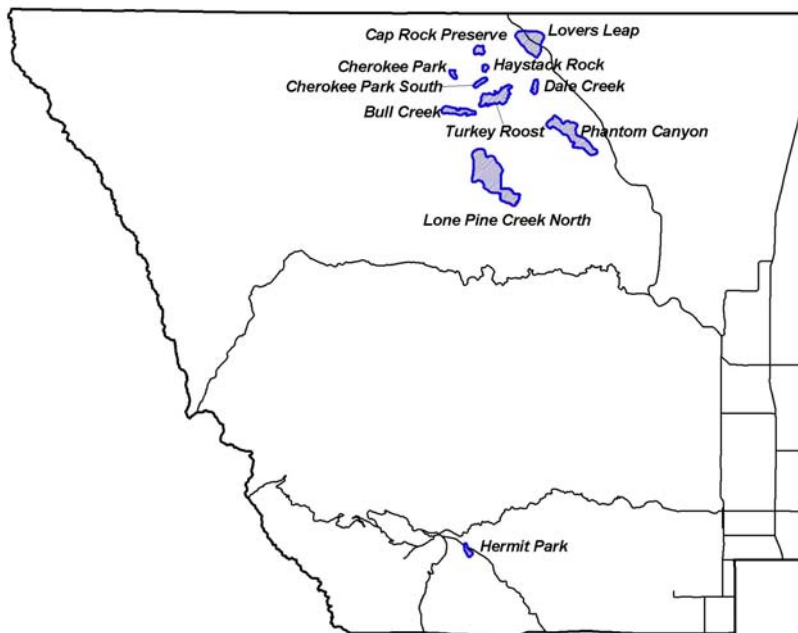
Table 9. Larimer County PCAs supporting Bell's twinpod.

Potential Conservation Area	Biodiversity Rank	Geologic Formation(s)
Bobcat Ridge Hogback	B2	Fountain/Ingleside
Dixon Creek	B2	Niobrara
Indian Creek Hogback	B2	Fountain/Ingleside
Park Creek Hogback	B2	Niobrara
Hidden Valley Hogback	B3	Lykins
Little Thompson River at Meadow Hollow	B3	Fountain/Ingleside and Lykins
Redstone Creek Cliffs	B3	Fountain/Ingleside
Hertha Reservoir Ridge	B4	Niobrara

As mentioned above, Bell's twinpod is considered globally imperiled (G2) due to its restricted range and high level of threats to its habitat. Three of the PCAs are protected as Larimer County or City of Fort Collins open space: Bobcat Ridge Hogback is part of the City of Fort Collins Bobcat Ridge Natural Area; Indian Creek Hogback is part of the Larimer County Devil's Backbone Open Space and Rimrock Open Space; and Pine Ridge Natural Area, Cathy Fromme Prairie, and Coyote Ridge Natural Area are within the Dixon Creek PCA. *The highest quality occurrence at the Park Creek Hogback PCA currently has no formal protection status.* Several smaller occurrences of Bell's twinpod have been eliminated or degraded since the 1996 survey due to residential development or limestone mining. These degraded occurrences are near Poison Lake, Waverly, Hertha Reservoir Hogback, and Leslie Road Hogback. Additionally, the Niobrara Formation hogback running north from Laporte has been mined extensively over the past decades. This mined area is known to support Bell's twinpod but is not considered of conservation concern by CNHP due to the highly altered condition of the habitat.

**Larimer Aletes and Rocky Mountain Cinquefoil**

Larimer aletes (*Aletes humilis*) (G2G3) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (G2) are also known only from the Front Range of Colorado, and are confined to areas with large outcrops of Silver Plume Granite. These species are afforded some level of protection because of the relatively inaccessible nature of most of the known locations. There are 16 PCAs within Larimer County supporting one or both of these regional endemics. Eleven of these PCAs occur at least partially on private or state land and are shown in Table 10 and Figure 12. These 10 PCAs for Larimer aletes and Rocky Mountain cinquefoil were presented in the 1996 report (Kettler *et al.* 1996). During the 2004 field season, additional locations for Rocky Mountain cinquefoil were discovered near Virginia Dale; the Lovers Leap PCA was expanded to include these plants.



**Fig. 12. Larimer County PCAs supporting Larimer aletes and/or Rocky Mountain cinquefoil.**  
(PCAs entirely within USFS or NPS lands not shown)

**Table 10. Larimer County PCAs supporting Larimer aletes and/or Rocky Mountain cinquefoil**

(Note: PCAs entirely within USFS or NPS land not shown)

Potential Conservation Area	Biodiversity Rank
Bull Creek	B2
Cap Rock Preserve	B2
Cherokee Park	B2
Cherokee Park South	B2
Dale Creek	B2
Haystack Rock	B2
Hermit Park	B2
Lone Pine Creek North	B2
Phantom Canyon	B2
Lovers Leap	B2
Turkey Roost	B2

### **Other Highlights**

Two new locations for the globally vulnerable (G3) Southern Rocky Mountain cinquefoil (*Potentilla ambigens*) were discovered as part of this project. The Rattlesnake Park and Scout Camp Meadows PCAs report these findings.

Significant new findings within shortgrass prairie in the northeastern portion of the county include abundant McCown's Longspur within the Rawhide Flats PCA, excellent condition saltbush shrublands (Rawhide Flats Saltbush PCA), and good condition wetlands at the Spottlewood Creek PCA. At slightly higher elevations in the northeastern portion of the county element occurrences for many excellent and good condition mountain mahogany shrublands (Table Mountain Hogbacks PCA) and foothills grasslands (Sheep Mountain near Virginia Dale PCA) were created or expanded.

The newly created Green Ridge PCA contains several good to fair occurrences of ponderosa pine woodlands in the south central portion of the county. New occurrences of mountain mahogany shrublands were also documented nearby at the Masonville Hogbacks PCA.

Two new breeding locations for the state endangered boreal toad (*Bufo boreas*) were discovered in Larimer County during 2004. The Trout Creek at Sheep Creek and Panhandle Creek PCA profiles summarize these findings.

Three new PCAs are based on occurrences of the globally imperiled subspecies (G5T2) Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Cache la Poudre River, North Fork of the Cache la Poudre River, and Big Thompson River PCAs are watershed based PCAs covering large areas of both occupied and unsurveyed riparian habitat.

The Little Thompson River has been identified as a transition zone (linking foothills and plains) stream with relict assemblages of aquatic invertebrates and fish (Kondratieff and Baumann 2002). The Little Thompson River at Highway 287 highlights these findings.

Horsetooth Reservoir Hogbacks PCA was expanded as part of this project to include much of the newly expanded Larimer County Devil's Backbone Open Space. This area continues to provide important conservation opportunities for rare foothills communities and butterflies.

At Owl Canyon, the pinyon pine (*Pinus edulis*) community was delineated. Additionally, a tortricid moth (*Decodes stevensi*) collected only from this area was added to the CNHP database (Owl Canyon PCA).

Although not an area of focus for this project, three new PCAs were created in the Laramie River Valley in the northwestern portion of the county. These include the Lower Laramie River Valley PCA for the endemic larchleaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*), the Sand Creek Valley PCA for a rare threetip sagebrush (*Artemisia tripartita*) community, and the previously mentioned Laramie River Valley Shale Outcrops PCA.

Larimer 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 Larimer County will have both statewide and global significance. This is substantiated by conservation assessments conducted by other agencies. For example, The Nature Conservancy has completed assessments of the Central Shortgrass Prairie (The Nature Conservancy 1998) and Southern Rocky Mountain (Neely *et al.* 2001) ecoregions and outlined 14 TNC priority areas with important conservation values in Larimer County (Figure 13).

Recently observed and accurately documented element occurrence form the basis for the Potential Conservation Areas (PCAs) in Larimer County. Future surveys will almost certainly locate additional biologically significant areas, especially in undersurveyed areas.

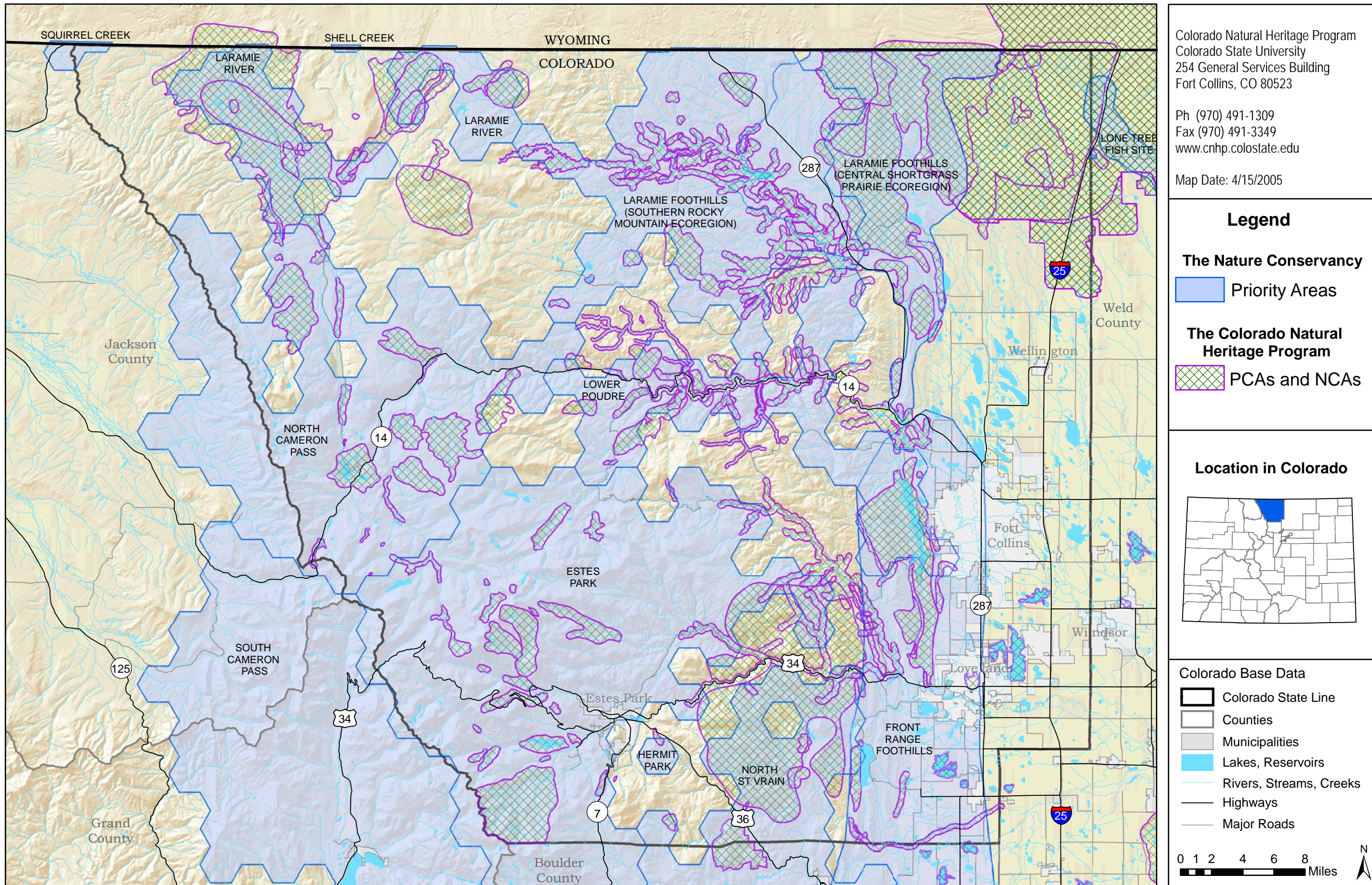


Figure 13. TNC Priority Areas and CNHP Potential Conservation Areas (PCAs) and Networks of Conservation Areas (NCAs) in Larimer County

## Potential Conservation Area Profiles

The 70 Larimer County PCAs documented in this report are profiled in this section. The PCAs are organized in ascending order according to their Biodiversity Rank (e.g., B1 to B5). Although the amount of information we have on the PCAs is highly variable, each PCA profile includes the following information:

**Biodiversity Rank (B-rank):** The overall significance of the PCA in terms of rarity of the Natural Heritage resources and the quality (condition, abundance, etc.) of the occurrences. Please see Table 4 for rating criteria for the biodiversity ranks.

**Protection Urgency Rank (P-rank):** An estimate of the timeframe in which conservation protection should occur. This rank generally refers to the need for a major change of protective status (e.g., ownership or designation as a natural area). Please see Table 5 for the definitions of the ranks.

**Management Urgency Rank (M-rank):** An estimate of the timeframe in which conservation management should occur. Using best scientific estimates, this rank refers to the need for management in contrast to protection (legal, political, or administrative measures). See Table 6 for the definitions of the ranks.

**Location:** General location and specific road/trail directions.

**Legal Description:** U.S.G.S. 7.5-minute quadrangle name and Township, Range, and Section(s).

**General Description:** A brief narrative describing the topography, vegetation, current use, and size of the potential conservation area. Common names are used along with the scientific names.

**Biodiversity Comments:** A synopsis of the rare species and significant plant communities that occur in the PCA. A table within the PCA profile lists the element occurrences found within the PCA, their rarity ranks, the occurrence ranks, federal and state agency designations, and the last observation date. When the same element is listed more than once in the table, it is because there are multiple element occurrences of that element within the PCA. Where there is more than one element occurrence in the PCA, the occurrence(s) of primary of concern is in boldface in the table. See Table 1 for explanations of global and state imperilment ranks and Table 2 for legal designations.

**Boundary Justification:** Justification for the location of the preliminary conservation planning boundary delineated in this report, which includes all known occurrences of natural heritage resources and, in some cases, adjacent lands required for their protection.

**Protection Comments:** A summary of major land ownership issues that may affect the PCA and the element(s) in the PCA.



**Management Comments:** A summary of PCA management issues that may affect the long-term viability of the PCA.

Please note that 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 is available to assist with these types of analyses where conservation priority and local interest warrant additional research.

## B1 Potential Conservation Areas

### Laramie River Valley Shale Outcrops

**Biodiversity Rank: B1 (Outstanding biodiversity significance)**

The Laramie River Valley Shale Outcrops site supports two excellent (A-ranked) and one good (B-ranked) occurrences of a plant currently identified as the globally critically imperiled (G1) North Park phacelia (*Phacelia formosula*). In addition, the site supports a good (B-ranked) occurrence of the globally imperiled (G2) Ward's goldenweed (*Oonopsis wardii*) and excellent and good occurrences of dropleaf buckwheat (*Eriogonum exilifolium*), a globally vulnerable species (G3).

**Protection Urgency Rank: P2 (High urgency)**

The PCA is under private and public (BLM and State Land Board) ownership. The private property is generally large ranches and will likely be subject to development pressures within the near future.

**Management Urgency Rank: M4 (Low urgency)**

There are few to no non-native plant species on the outcrops favored by the rare plants. The primary land uses within the PCA appear to be ranching and limited recreational use. The current land uses appear to be compatible with the persistence of the rare plant species.

**Location:** This PCA is in northwestern Larimer County within the Laramie River Valley about two miles south of Wyoming. The PCA includes areas east and west of the Laramie River and Road 103 and runs about eight miles in length.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Old Roach and Crazy Mountain

T11N R76W Sections 5-9 and 15-22

T11N R77W Sections 1-4 and 9-15

T12N R77W Sections 34-36

**Size:** 9651 acres (3905 ha)

**Elevation:** 7800 – 8600 ft. (2377 – 2621 m)

**General Description:** Sparsely vegetated shaley outcrops among the rolling hills and ravines of the Laramie River Valley support a variety of rare plant species. The relatively barren outcrops supporting the rare plants are primarily of the calcareous Niobrara Formation. The strongly calcareous clay loam soils, though sparsely vegetated, support a wide range of species including winterfat (*Krascheninnikovia lanata*), snakeweed (*Gutierrezia sarothrae*), horsebrush (*Tetradymia canescens*), and rabbitbrush (*Chrysothamnus viscidiflorus*). Sagebrush shrublands form the matrix community of the valley floor and include short-stature species such as black sagebrush (*Artemisia nova*) and Bigelow sagebrush (*Artemisia bigelovii*) (R. Rosentreter, pers. comm. 2004). Little to no sagebrush occurs where the rare plants are found.

North Park phacelia was documented only from the Niobrara outcrops. Ward's goldenweed was documented from outcrops of Niobrara Shale and Lower Pierre Shale.

Dropleaf buckwheat occurs on a wider variety of shaley substrates. The dropleaf buckwheat was abundant on Niobrara outcrops but also occurred on nearby outcrops of Benton Shale, Lower Pierre Shale, and redbeds (R. Scully, pers. comm. 2004). The range of these rare plants is naturally restricted by habitat – they grow specifically on sparsely vegetated outcrops and Ward’s goldenweed apparently grows only on seleniferous soils (Wyoming Natural Diversity Database 2000b).

The PCA also contains an abundance of an endemic plant, larchleaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*). However, the extent of this plant in the upper Laramie River valley is much more widespread in the valley than just the PCA, as it occurs on additional geologic formations and to higher altitudes.

The Laramie River flows through the PCA, however, the river and associated riparian zone are not habitat for the rare plants. Similarly, the Hohnholz Lakes State Wildlife Area is situated within the PCA, but the lakes and the associated wetland habitat do not support these rare plants.

The Laramie River Valley is botanically interesting and botanically under explored. Further research will likely expand the known range of the three rare plants documented in this report and likely more discoveries will be made. For example, the matrix sagebrush species of the valley are not well documented. A useful tool for prioritizing future surveys for the rare plants may be Basinwide Vegetation Mapping (Colorado Division of Wildlife 2003). The bare soil mapping unit appears to correlate well with known occurrences of the rare plants.

**Biodiversity Comments:** This PCA supports two excellent (A-ranked) and one good (B-ranked) occurrences of a *Phacelia* currently identified as the globally critically imperiled North Park phacelia (*Phacelia formosula*). The taxonomy of the *Phacelia* is under investigation by Duane Atwood, BYU, who indicates that the plant is likely either *Phacelia formosula* or a previously undocumented species (D. Atwood, pers. comm. 2004). Prior to this discovery in 2004 by Richard Scully and Mary Jane Howell of the Colorado Native Plant Society, *Phacelia formosula* was known only from North Park, some twenty miles to the southwest and across the Medicine Bow Mountains, where it grows on a different substrate, the Coalmont Formation.

In addition, the site supports a good occurrence of Ward’s goldenweed (*Oenopsis wardii*), a globally imperiled (G2) plant species. Prior to this discovery in 2004, Ward’s goldenweed had been documented only in Wyoming.

The PCA also includes excellent and good occurrences of dropleaf buckwheat (*Eriogonum exilifolium*), a globally vulnerable (G3) species. The largest known occurrence of this species is included within this PCA.

Natural Heritage element occurrences at the Laramie River Valley Shale Outcrops PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i><b>Phacelia cf. formosula</b></i>	<b>North Park phacelia</b>	<b>G1</b>	<b>S1</b>	<b>LE</b>			<b>A</b>	<b>8/11/04</b>
<i><b>Phacelia cf. formosula</b></i>	<b>North Park phacelia</b>	<b>G1</b>	<b>S1</b>	<b>LE</b>			<b>A</b>	<b>8/26/04</b>
<i>Phacelia cf. formosula</i>	North Park phacelia	G1	S1	LE			B	8/26/04
<i>Oonopsis wardii</i>	Ward's goldenweed	G2	S1				B	8/26/04
<i>Eriogonum exilifolium</i>	Dropleaf buckwheat	G3	S2			FS	A	8/26/04
<i>Eriogonum exilifolium</i>	Dropleaf buckwheat	G3	S2			FS	B	8/13/04
<i>Eriogonum exilifolium</i>	Dropleaf buckwheat	G3	S2			FS	B	8/26/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The PCA includes shaley outcrops, primarily of the Niobrara Formation, where the rare plants have been documented. The outcrops occur within a matrix of sagebrush shrublands, which are not habitat for the rare plants. Included within the PCA are the Hohnholz Lakes State Wildlife Area and the Laramie River and floodplain, which are also not habitat for the rare plants. Future surveys will likely extend the PCA boundary to the south where unsurveyed Niobrara outcrops occur on private lands.

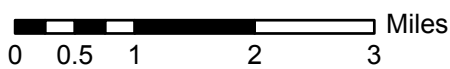
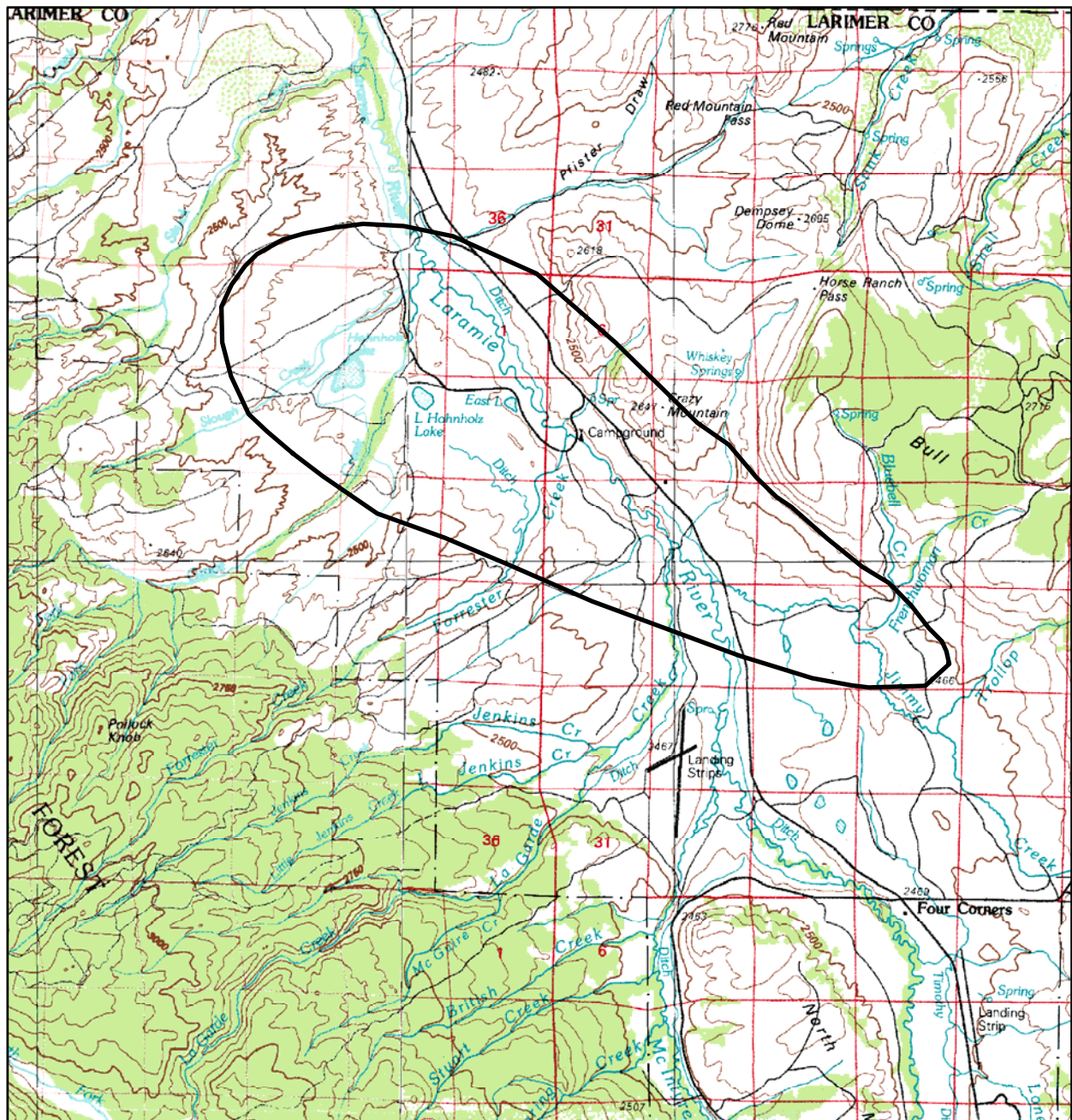
**Protection Comments:** The outcrops that support the rare plants occur on private, BLM, and State Land Board properties. About 60 percent of the property within the PCA is privately owned; primarily as large private ranches used for cattle grazing. There is no special protection status on any of the public or private parcels.

**Management Comments:** The current primary land use on the outcrops and surrounding lands is livestock grazing. Additionally, at least one two-track road traverses one of the occurrences. The cattle grazing and occasional vehicle use appear compatible with the persistence of the rare plants. In some cases, the rare plants were observed growing within the road and cattle trails. Recreational uses on the Laramie River and Hohnholz Lakes complex likely do not affect the rare plants as these uses are generally away from the outcrops. Few to no non-native plant species were observed on the barren outcrops favored by the rare plants.



**Photo 1. Shale outcrops at the Laramie River Valley Shale Outcrops PCA.**  
(see Natural History section beginning on page 297 for photos of rare plants)

*photo by G. Doyle*




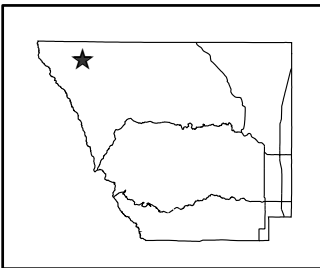
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/23/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1          Walden, 40106-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 14. Laramie River Valley Shale Outcrops Potential Conservation Area B1: Outstanding Biodiversity Significance

## Young Gulch and Elkhorn Creek

**Biodiversity Rank: B1 (Outstanding biodiversity significance)**

This PCA contains the only known occurrences of a globally critically imperiled (G1) stonefly (*Capnia arapahoe*).

**Protection Urgency Rank: P3 (Moderate urgency)**

About half of the land within the two watersheds is U.S. Forest Service land with the other half privately owned. Residential development pressures are increasing in the area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management concerns include sedimentation of the creek due to road building, home building, and other land grading activities. Another concern is water diversions resulting in dewatering of the creek or impoundments resulting in a change in seasonal flows. Winter stoneflies such as *Capnia arapahoe* require flowing water in the winter.

**Location:** The Elkhorn Creek PCA is located along the Poudre River Canyon and includes Elkhorn Creek and its tributaries and Young Gulch and its tributaries. Young Gulch is located about 12 miles up the canyon from Ted's Place and Elkhorn Creek is about eight miles farther upstream, just north of the Narrows.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Big Narrows, Haystack Gulch, Red Feather Lakes, Rustic, Poudre Park, Crystal Mountain, and Buckhorn Mountain  
T7N R71W, T8N R71W, T9N R72W, T9N R73W.

**Size:** 4979 acres (2015 ha)

**Elevation:** 5800 – 8200 ft. (1770 – 2500 m)

**General Description:** Elkhorn Creek and Young Gulch are small streams tributary to the Cache la Poudre River. The upper reaches are typified by steep slopes and canyons with ponderosa pine dominating the sparse riparian vegetation, whereas the lower reaches near the confluence with the Cache la Poudre are more open in topography with narrowleaf cottonwood (*Populus angustifolia*), coyote willow (*Salix exigua*), Drummond's willow (*S. drummondiana*) Rocky Mountain maple (*Acer glabrum*), chokecherry (*Padus virginiana*), and alder (*Alnus incana*) occurring along the stream margins. The substrate consists of pebble, cobble, and areas of bedrock. In summer and fall, sections of both streams become intermittent. (Nelson and Kondratieff 1988). Elkhorn Creek and Young Gulch are the only known locations for the small winter stonefly *Capnia arapahoe*. Other species of winter stoneflies collected in association with *C. arapahoe* include *C. confusa*, *C. decepta*, *C. gracilaria*, *Capnura wanica*, *Zapada cinctipes*, and *Prostoia besametsa* (Nelson and Kondratieff 1988).

Numerous visits to the Young Gulch locality have failed to yield any additional specimens of *Capnia arapahoe* (Nelson and Kondratieff 1988, B.C. Kondratieff, pers. comm. 2005). Another species of rare stonefly, *Suwallia wardi*, has been documented on a tributary to Elkhorn Creek on the Ben Delatour Boy Scout Ranch.

**Biodiversity Comments:** This site contains two extant (E-ranked) occurrences of a globally critically imperiled (G1) stonefly (*Capnia arapahoe*). These are the only known locations for this species in the world. Also included within the PCA is an occurrence of a globally vulnerable (G3) stonefly (*Suwallia wardi*).

Natural Heritage element occurrences at the Young Gulch and Elkhorn Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Aquatic insects								
<i>Capnia arapahoe</i>	<b>A stonefly</b>	<b>G1</b>	<b>S1</b>				<b>E</b>	<b>4/3/87</b>
<i>Capnia arapahoe</i>	<b>A stonefly</b>	<b>G1</b>	<b>S1</b>				<b>E</b>	<b>3/22/86</b>
<i>Suwallia wardi</i>	A stonefly	G3	S2				E	6/21/90

\*EO = Element Occurrence

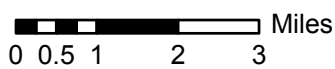
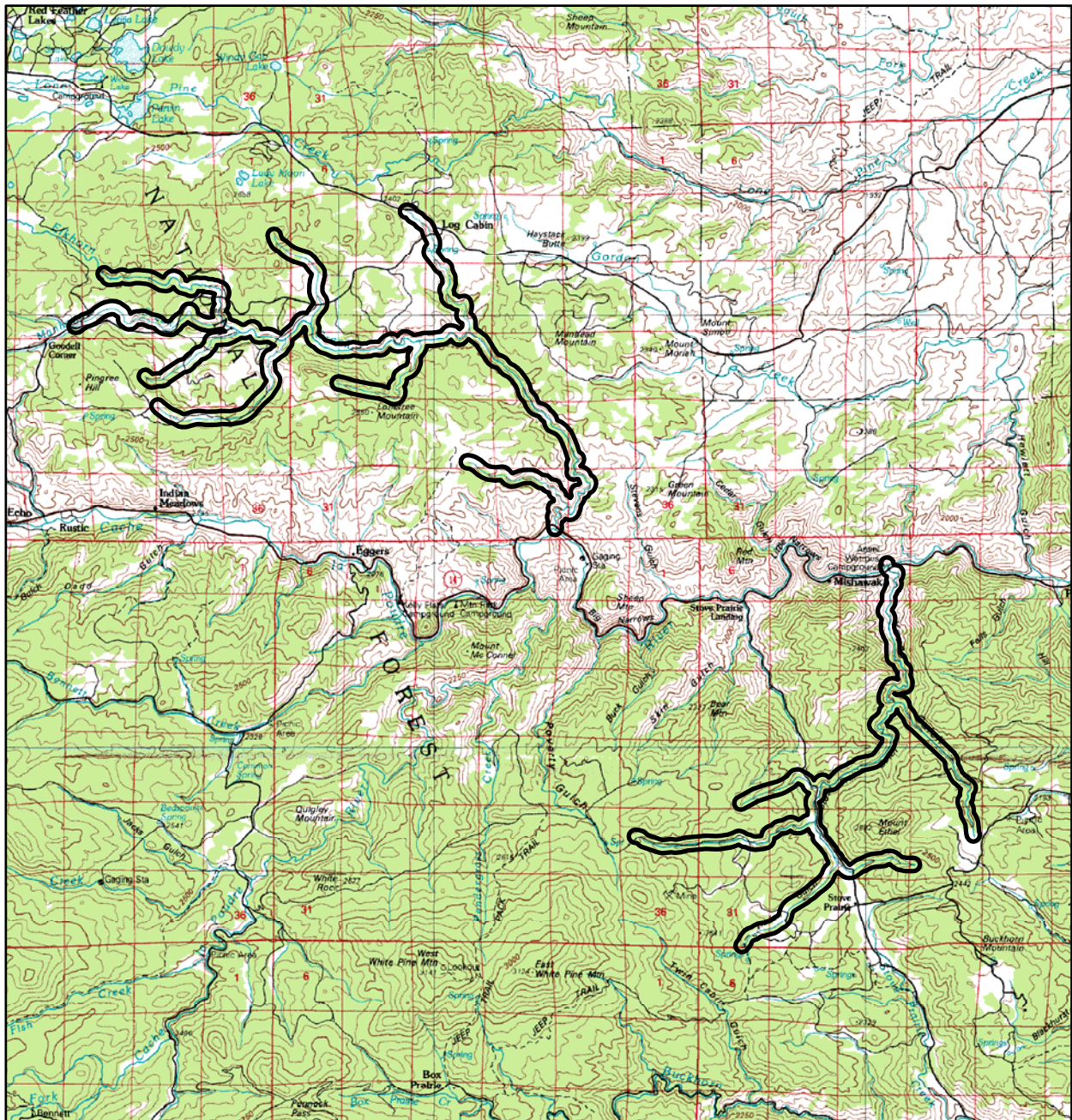
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based..

**Boundary Justification:** The boundary encompasses the portion of the creeks known to support *Capnia arapahoe* and portions of the upstream watersheds. The full areal extent of the stonefly population is not known at this time. *Capnia arapahoe* was collected at the confluence of the creeks with the Cache la Poudre River. The PCA could be expanded to include a greater proportion of the upstream watershed to ensure maintenance of the ecological and hydrological processes as these are necessary for the viability of the occurrence.

**Protection Comments:** Development pressure is high in the area. Most of the land within the Elkhorn Creek and Young Gulch watersheds is either privately owned or U.S. Forest Service property. Private lands within the Elkhorn Creek watershed include the Ben Delatour Boy Scout Ranch, Shambhala Mountain Center, portions of Glacier View subdivision, and numerous small privately owned acreages. The Young Gulch watershed is about half public property and half private lands including small acreages accessed via Rist Canyon and Stove Prairie roads.

**Management Comments:** Management concerns are minimization of siltation, maintenance of water quality, maintaining natural flows especially during the winter, and maintenance of the natural flooding regime to flush accumulated fine-grained sediments from the stream sands and gravels. *Capnia arapahoe* is a winter-emerging stonefly that spends its larval (immature) stage in sediments beneath and adjacent to the creek (hyporheic zone). Therefore, siltation of the creek could result in clogging of these sediments resulting in extirpation of the stonefly from this reach.






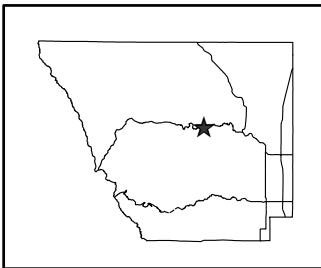
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/23/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 15. Young Gulch and Elkhorn Creek Potential Conservation Area  
 B1: Outstanding Biodiversity Significance

## B2 Potential Conservation Areas

### Bobcat Ridge Hogback

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

This PCA supports a good (B-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P4 (Low urgency)**

Most of the PCA is within the City of Fort Collins Bobcat Ridge Natural Area. Private property within and north and south of the PCA have no protection status

**Management Urgency Rank: M4 (Low urgency)**

Current management appears to be adequate to maintain the quality of the element occurrence.

**Location:** From Fort Collins, follow 38E Road west around Horsetooth Reservoir to Masonville. Go south on 27 Road for approximately 0.6 miles. Turn west on dirt road, go under water sluice to Bobcat Ridge Natural Area gate. Hogbacks extend both south and north from gate.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Masonville and Horsetooth Reservoir  
T6N R70W Sections 9, 15, 16, 22, and 27

**Size:** 567 acres (229 ha)

**Elevation:** 5400 – 5600 ft. (1646 – 1707 m)

**General Description:** The site is comprised of the westernmost north-south trending hogback within the foothills on the Front Range. The sandstone hogback is comprised of Fountain Formation, Ingleside Formation, Lyons Sandstone, and Lykins Formation, sandstones with calcareous elements (Braddock *et al.* 1970). Mountain mahogany (*Cercocarpus montanus*) shrublands occupy shallow soils on the slopes of the hogback with sporadic small patches of grassland occupying deeper soils. A significant portion of the valley below has been converted to hayfield or pasture with remnants of foothills grassland ecological system vegetation on knolls that were too rocky to plow.

Bell's twinpod grows on the Fountain Formation from the base of vertical outcrops to the toe of the slope. The plant is generally most abundant where vegetation is sparse such as in areas of active erosion.

**Biodiversity Comments:** This site contains a good occurrence of the Bell's twinpod. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). Bell's twinpod has long been considered to be primarily restricted to Niobrara shale. The occurrence on Fountain and Ingleside formation sandstone such as within this PCA is little studied.

Natural Heritage element occurrences at the Bobcat Ridge Hogback PCA.

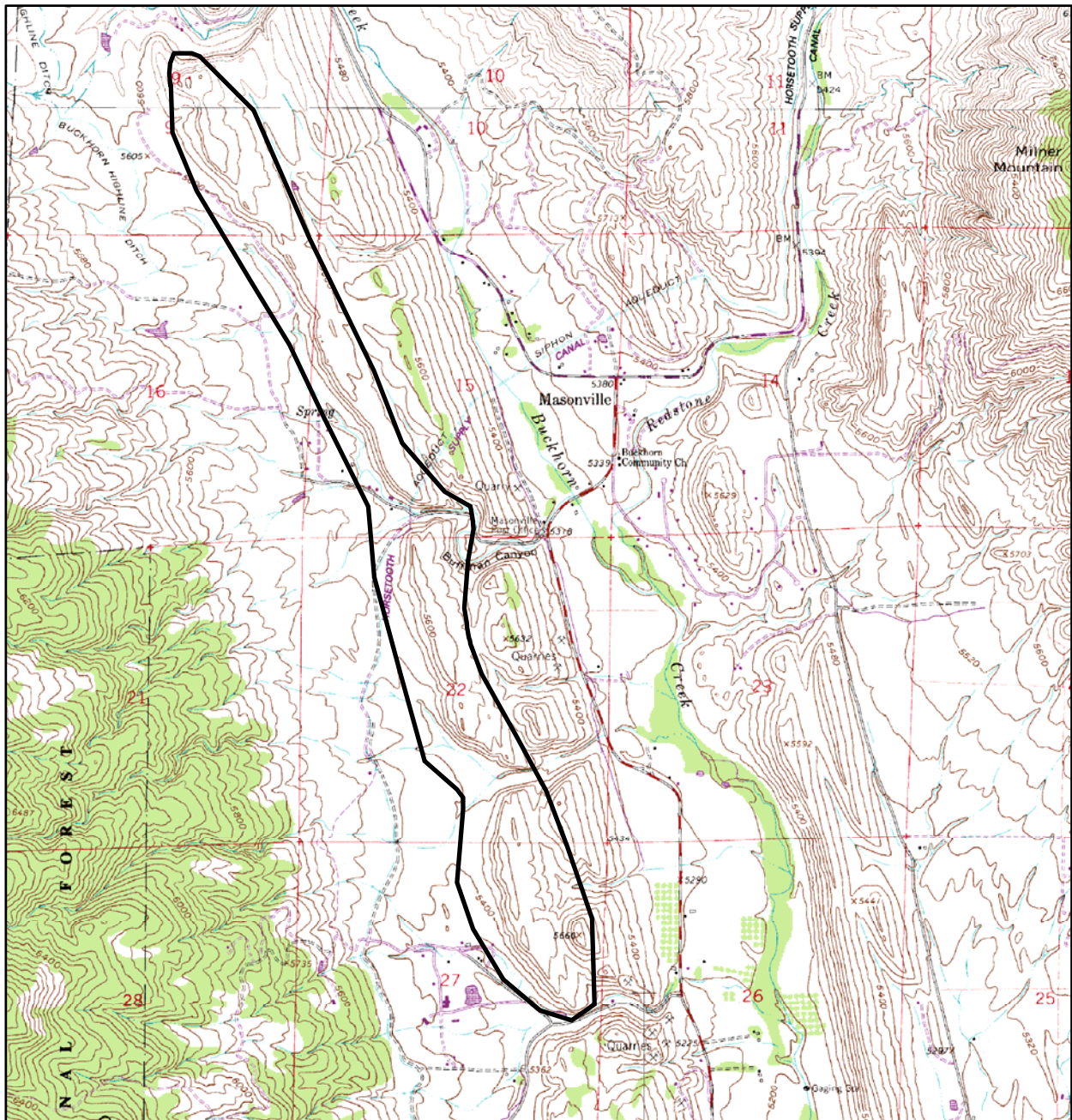
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				B	6/19/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the known occurrence of Bell's twinpod and a small buffer to protect from direct disturbance. The Bell's twinpod likely extends north and south onto private properties that have not been surveyed for the plant.

**Protection Comments:** Most of the site is within the City of Fort Collins Bobcat Ridge Natural Area. Part of the hogback is privately owned.

**Management Comments:** Existing management appears to be adequate to maintain the Bell's twinpod. Spread of non-native plant species is the primary management concern. Although these mountain mahogany communities are somewhat resistant to invasive weeds, there are pockets of weedy infestation, especially by cheatgrass (*Bromus tectorum*), which has crept up from the pasture and hayfields below as well as colonizing patches at higher elevations just below the cliffs, likely where the rocks have fallen from the eroding bluffs causing localized disturbance.




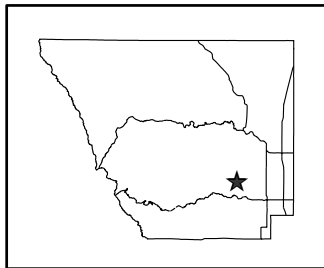
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Masonville, 40105-D2          Horsetooth Reservoir, 40105-E2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 16. Bobcat Ridge Hogback Potential Conservation Area B2: Very High Biodiversity Significance

## Boxelder Creek Headwaters

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

This site supports good (B-ranked) occurrences of two globally imperiled (G2) narrowleaf cottonwood riparian woodland plant communities.

***Protection Urgency Rank: P3 (Moderate urgency)***

Haygood Canyon and its immediate surroundings were recently purchased by Larimer County and will be maintained as open space. The canyon of Boxelder Creek is privately owned. Most of the upstream portion of the watershed has been subdivided as 35-acre parcels.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management issues at this PCA include invasive species and livestock grazing.

**Location:** This PCA is located in northern Larimer County about five air miles west of Virginia Dale. The site can be accessed via County Road 37 or 23.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Table Mountain and Virginia Dale

T11N R70W Sections 1-6, 9, and 10

T12N R70W Sections 19-23 and 25-36

**Size:** 9268 acres (3750 ha)

**Elevation:** 6350 – 7200 ft. (1935 – 2195 m)

**General Description:** The site contains the upper watershed and two foothills canyons carved into a sandstone hogback by Boxelder and Sand Creeks in northern Larimer County. Sand Creek and Boxelder Creek, perennial streams, have incised deep canyons through the Fountain and Ingleside formation sandstones that forms the hogback. The streams turn into broad, gravel washes once out of their respective canyons, and they converge just south of Table Mountain, an isolated butte covered by a mosaic of mountain mahogany (*Cercocarpus montanus*) shrublands and midgrass grasslands. Within the canyons, cottonwoods (especially narrowleaf cottonwood, *Populus angustifolia*) and willows (*Salix* spp.) create a multi-layered structure of trees and shrubs over a diverse, mesic herbaceous layer adjacent to the perennial stream channels. Flood debris a ways from the stream channel includes large logs, indicating intense flooding episodes occur through the canyons. The steep canyon walls have dense stands of Douglas-fir (*Pseudotsuga menziesii*) on the north-facing slopes and mountain mahogany shrublands dominant on the south-facing sides.

The narrowleaf cottonwood/bluestem willow (*Populus angustifolia/Salix irrorata*) woodland in Boxelder Creek is considered to be an early-seral community following the establishment of narrowleaf cottonwood. The dense cover of bluestem and other willows indicates frequent flooding. The narrowleaf cottonwood/chokecherry (*Populus*

*angustifolia/Prunus virginiana*) woodland along Sand Creek is considered a late-seral community. These natural communities are maintained by regular flooding.

**Biodiversity Comments:** This site includes a good (B-ranked) occurrence of a globally imperiled (G2 S2) riparian woodland, narrowleaf cottonwood/bluestem willow (*Populus angustifolia/Salix irrorata*) woodland along Boxelder Creek and a good occurrence of a globally imperiled and state critically imperiled (G2Q S1) riparian woodland, narrowleaf cottonwood/chokecherry (*Populus angustifolia/Prunus virginiana*) woodland that occurs in Haygood Canyon of Sand Creek.

Natural Heritage element occurrences at the Boxelder Creek Headwaters PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plant Communities</b>								
<i>Populus angustifolia/Salix irrorata</i>	<b>Narrowleaf cottonwood/bluestem willow riparian woodland</b>	<b>G2</b>	<b>S2</b>				<b>B</b>	<b>7/22/96</b>
<i>Populus angustifolia/Prunus virginiana</i>	<b>Narrowleaf cottonwood/chokecherry riparian woodland</b>	<b>G2Q</b>	<b>S1</b>				<b>B</b>	<b>9/17/04</b>

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based..

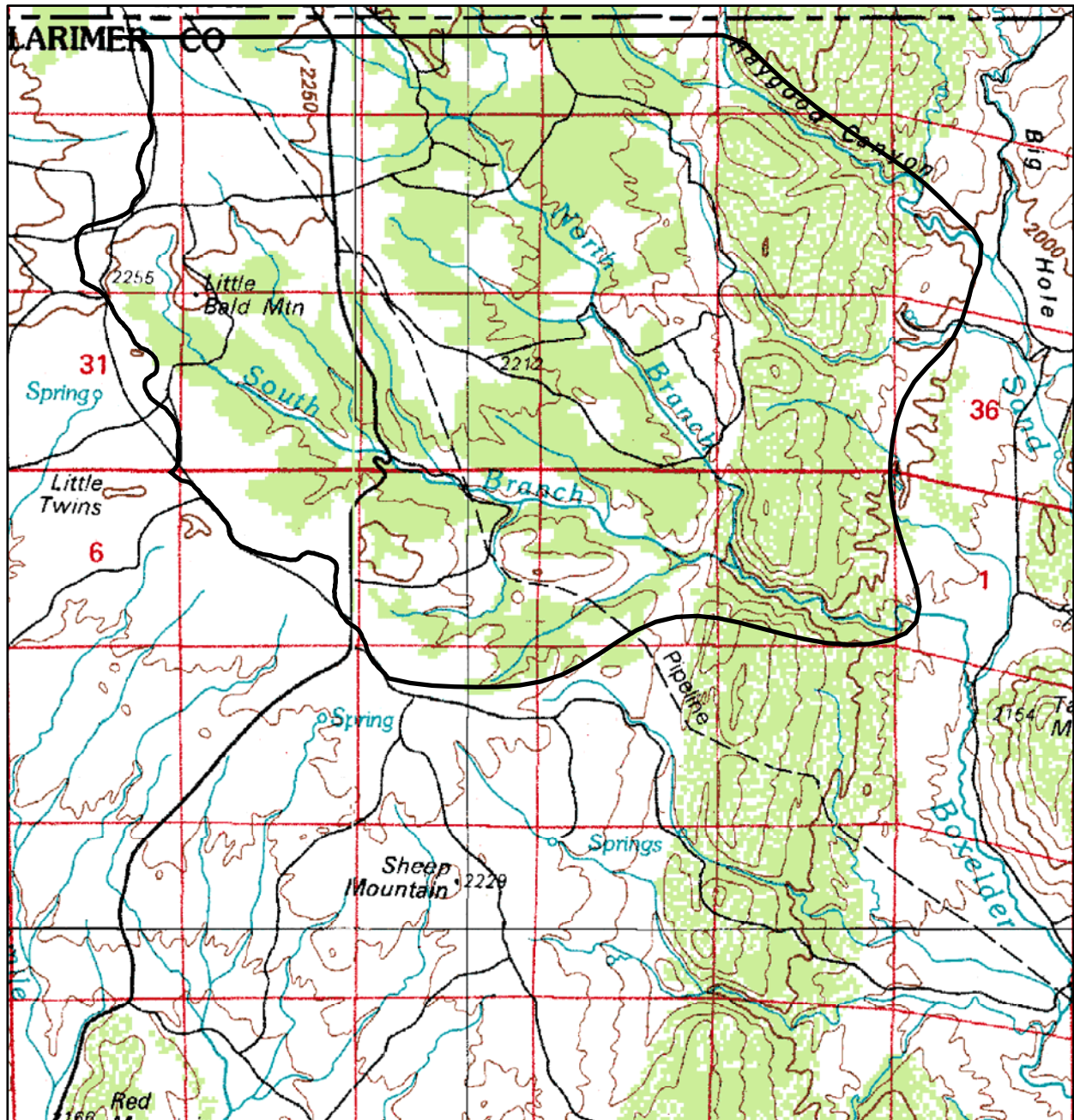
**Boundary Justification:** The site includes the sandstone hogback between two primary drainage channels (Sand and Boxelder creeks) flowing through incised canyons, both of which have element occurrences. The site includes area upstream from the riparian woodlands as delineated by the Boxelder Creek Headwaters subwatershed to draw attention to potential upstream impacts to water quality.

**Protection Comments:** Haygood Canyon and its immediate surroundings were recently purchased by Larimer County and will be maintained as open space. The canyon of Boxelder Creek is privately owned as a large parcel. A portion of the South Fork of Boxelder Creek is part of the Colorado State University owned Maxwell Ranch. Most of the upstream portion of the watershed has been subdivided into 35-acre parcels.

**Management Comments:** Invasive weeds, like Canada thistle (*Cirsium arvense*) and smooth brome (*Bromus inermis*) occur within the canyons. Control or eradication of these weeds would improve the condition of the riparian vegetation. Further, heavy use by cattle has caused bank erosion in certain locations. Fencing off certain portions of the riparian corridor and developing designated watering areas would prevent pervasive streambank erosion. Natural hydrologic regimes benefit riparian communities; working with upstream landowners to ensure maintenance of natural flow regimes would benefit the occurrences.



**Photo 2. Sand Creek through Haygood Canyon at the Boxelder Creek Headwaters PCA.**  
*photo by S. Neid*




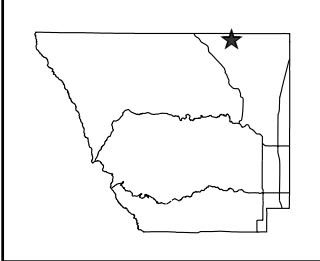
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 17. Boxelder Creek Headwaters Potential Conservation Area B2: Very High Biodiversity Significance



## Bull Creek

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

This PCA contains excellent (A-ranked) occurrences of two globally imperiled plants: Larimer aletes (*Aletes humilis*) (G2G3) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (G2).

**Protection Urgency Rank: P4 (Low urgency)**

The western two-thirds of the PCA is US Forest Service land and the eastern third is privately owned as 35-acre parcels.

**Management Urgency Rank: M4 (Low urgency)**

Management appears to be adequate to maintain the quality of the element occurrences.

**Location:** Along Prairie Divide Road, about one mile south of the junction with Cherokee Park Road (80C) and west onto USFS property. Bull Creek bisects the site.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Cherokee Park and Diamond Peak  
T11N R72W Sections 30-34

**Size:** 792 acres (320 ha)

**Elevation:** 7400 – 8040 ft. (2255 – 2450 m)

**General Description:** Silver Plume granite outcrops and ponderosa pine (*Pinus ponderosa*) woodlands characterize this Front Range foothills site. Larimer aletes (*Aletes humilis*) and Rocky Mountain cinquefoil (*Potentilla rupincola*) occur in shallow granitic soils and granite crevices within the open montane forest and on exposed outcrops. Associated woody vegetation includes Douglas-fir (*Pseudotsuga menziesii*), waxflower (*Jamesia americana*), and common juniper (*Juniperus communis*). Associated forbs include cinquefoil (*Potentilla effusa* and *Drymocallis fissa*), alum-root (*Heuchera* spp.), buttercup (*Ranunculus ranunculinus*), penstemon (*Penstemon virens*), and stonecrop (*Sedum lanceolatum*).

**Biodiversity Comments:** This site includes excellent occurrences of Larimer aletes (*Aletes humilis*) (G2G3) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (G2), two globally imperiled species. These species are endemic to Colorado and restricted to areas with large Silver Plume granite outcrops.

Natural Heritage element occurrences at the Bull Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Aletes humilis</i>	<b>Larimer aletes</b>	<b>G2G3</b>	<b>S2S3</b>				<b>A</b>	<b>6/22/97</b>
<i>Aletes humilis</i>	<b>Larimer aletes</b>	<b>G2G3</b>	<b>S2S3</b>				<b>B</b>	<b>7/4/95</b>
<i>Potentilla rupicola</i>	<b>Rocky Mtn. cinquefoil</b>	<b>G2</b>	<b>S2</b>			<b>FS</b>	<b>A</b>	<b>8/13/95</b>

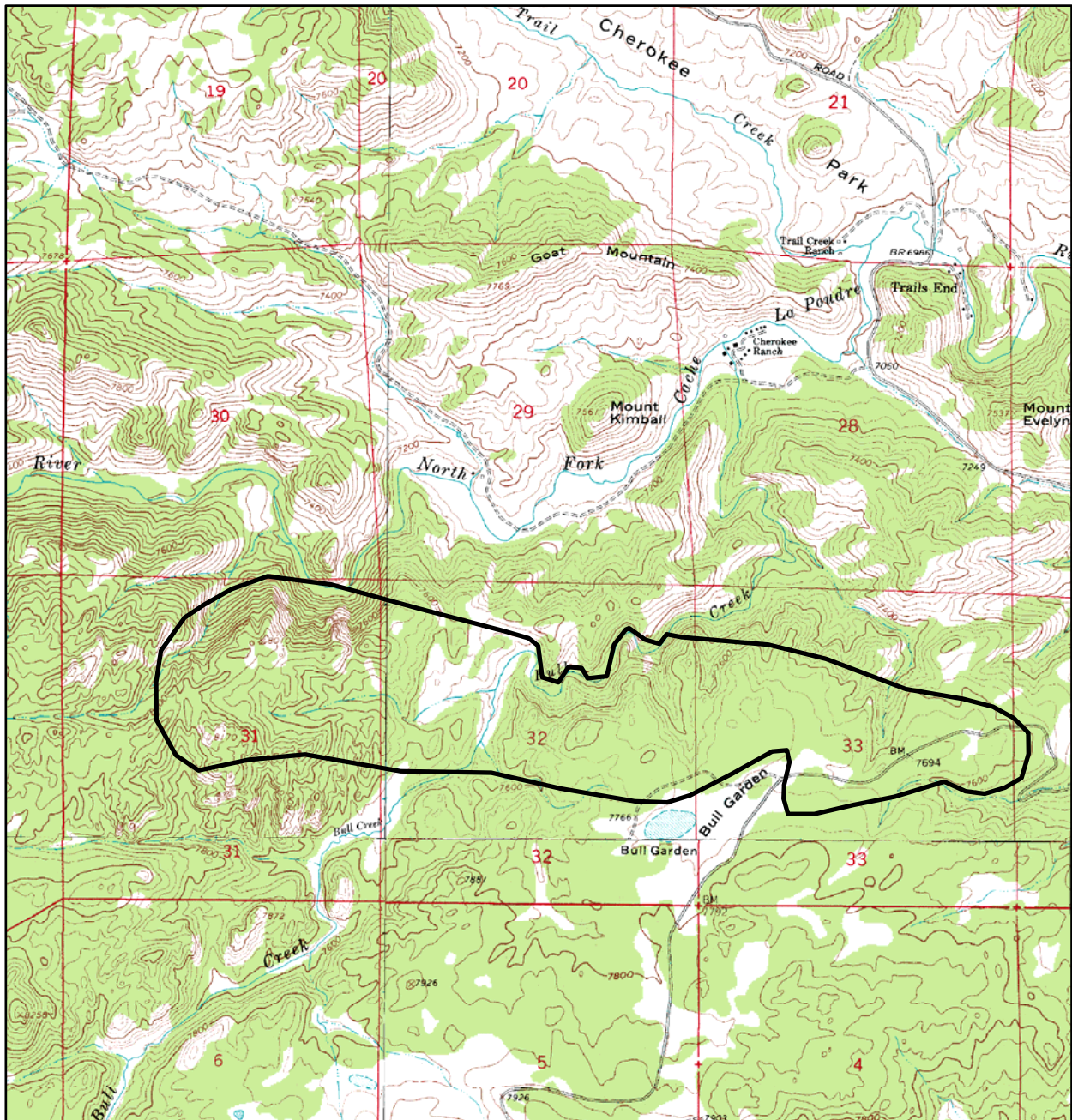
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based..

**Boundary Justification:** The boundary encompasses the rare plant occurrences, intervening potential habitat, and a buffer to protect from direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** Most of the site is US Forest Service property. The eastern third of the site is privately owned as 35-acre parcels. The habitat for the rare plants is generally steep outcrops and slopes that are not directly threatened by development.

**Management Comments:** Current management appears adequate to maintain the quality of the element occurrences.




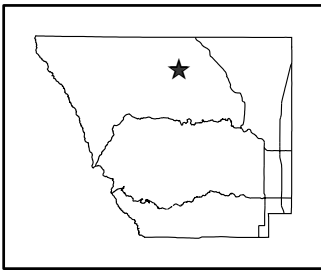
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Haystack Gulch, 40105-G4          Red Feather Lakes, 40105-G5          Cherokee Park, 40105-H4          Diamond Peak, 40105-H5</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 18. Bull Creek Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Cap Rock Preserve

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

This PCA contains an excellent (A-ranked) occurrence of the globally imperiled (G2G3) Larimer aletes (*Aletes humilis*) and a fair (C-ranked) occurrence of globally imperiled (G2) Rocky Mountain cinquefoil (*Potentilla rupincola*).

**Protection Urgency Rank: P4 (Low urgency)**

Part of the PCA is protected as The Nature Conservancy's Cap Rock Preserve. Other portions are privately owned as 35-acre parcels. Most development will avoid the steep outcrops and slopes, thus providing some form of protection to the rare plants.

**Management Urgency Rank: M4 (Low urgency)**

Current management appears adequate to maintain the quality of the element occurrences

**Location:** This PCA is located approximately six miles west of Virginia Dale.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Cherokee Park  
T11N R72W Sections 3 and 4  
T12N R72W Sections 33 and 34

**Size:** 315 acres (128 ha)

**Elevation:** 7400 – 7800 ft. (2255 – 2377 m)

**General Description:** The site is characterized by a steep canyon with vertical walls of blocky reddish Silver Plume granite. North-facing slopes are dominated by ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and mountain ninebark (*Physocarpus monogynus*). Slopes are dry and soils are formed in decomposed granitic gravel. South-facing slopes are more open with ponderosa pine, antelope bitterbrush (*Purshia tridentata*) and King's spikefescue (*Leucopoa kingii*). The top of the canyon is weedy; cheatgrass (*Bromus tectorum*) and Kentucky bluegrass (*Poa pratensis*) are common.

Larimer aletes and Rocky Mountain cinquefoil occur within the site. This location is unusual for Larimer aletes because plants are growing in pine duff and not on rocky outcrops. Plants here probably receive greater snowfall and moisture than other sites for Larimer aletes. Plants are more protected in the forest from wind, rock fall, etc. Wyoming kittentails (*Besseya wyomingensis*), a state rare plant (G5 S1) has been noted at the site. The site also includes the uncommon grass fern (*Asplenium septentrionale*) (G3G4 S3S4).

**Biodiversity Comments:** A large population of Larimer aletes (*Aletes humilis*) within the context of a high quality community is included in this site. Also within the boundaries is a small occurrence of Rocky Mountain cinquefoil (*Potentilla rupincola*) in fair condition. These species are endemic to Colorado and restricted to areas with large Silver Plume granite outcrops.

Natural Heritage element occurrences at the Cap Rock Preserve PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Aletes humilis</i>	<b>Larimer aletes</b>	<b>G2G3</b>	<b>S2S3</b>				<b>A</b>	<b>6/12/96</b>
<i>Potentilla rupicola</i>	Rocky Mountain cinquefoil	G2	S2			FS	C	6/12/96

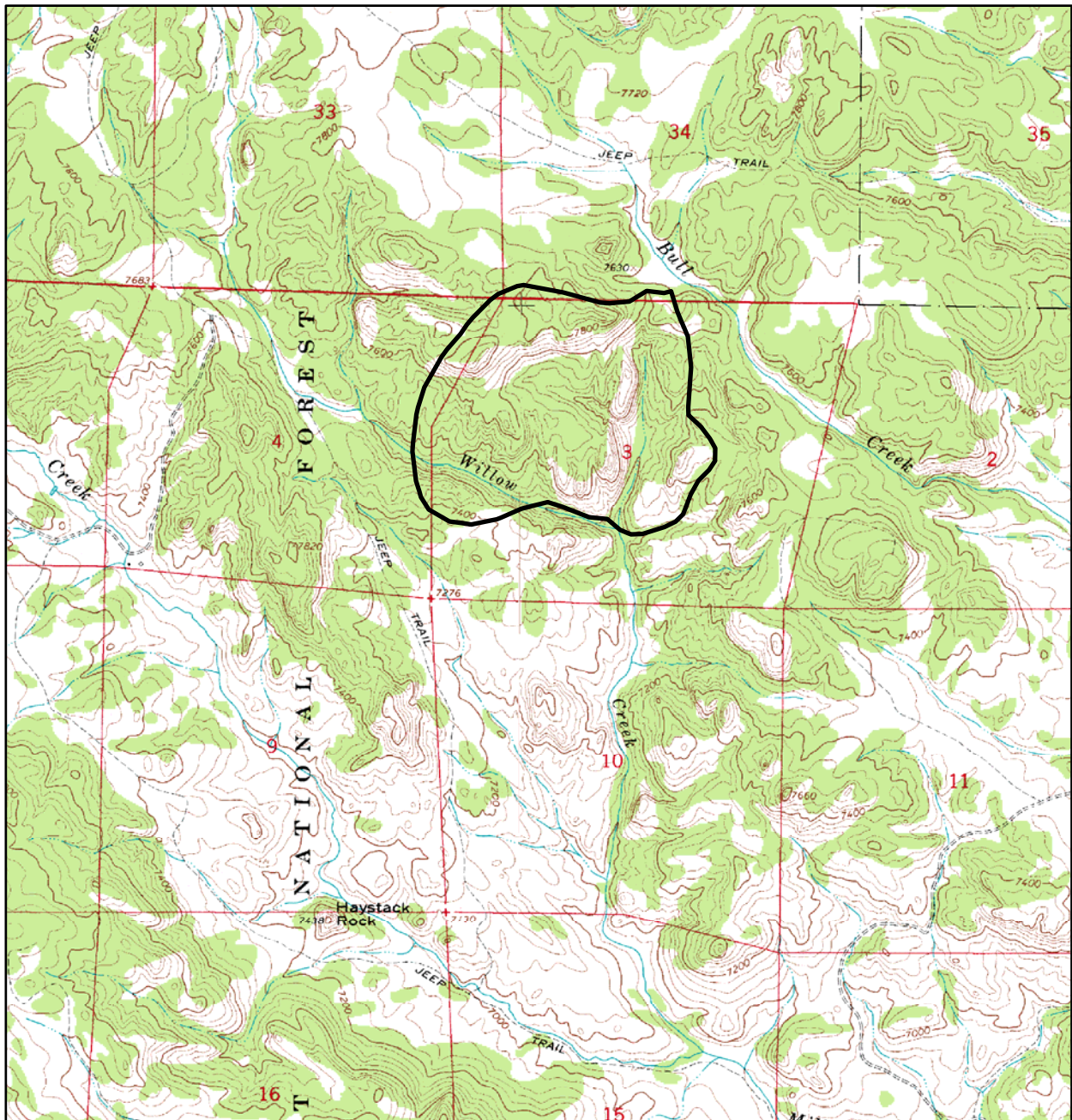
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary encompasses the rare plant occurrences, intervening potential habitat, and a buffer to protect from direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** The occurrence of Larimer aletes is protected within The Nature Conservancy's Cap Rock Preserve. It is a remote location without trail access. Portions of the site are privately owned as 35-acre parcels, including the area supporting the small population of Rocky Mountain cinquefoil.

**Management Comments:** Management concerns are low at this site although consideration of invasive species may be warranted at times. Cheatgrass (*Bromus tectorum*) and Kentucky bluegrass (*Poa pratensis*) occur at the top of the canyon.




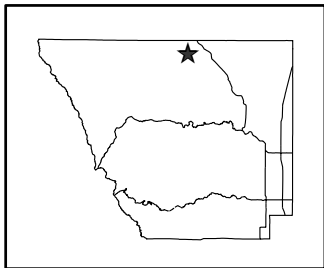
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 19. Cap Rock Preserve Potential Conservation Area B2: Very High Biodiversity Significance

## Cherokee Park

**Biodiversity Rank: B2 (Very high biodiversity significance)**  
 This PCA contains an occurrence of the globally imperiled (G2G3) Larimer aletes (*Aletes humilis*). This occurrence is ranked as historic but is considered of excellent viability.

**Protection Urgency Rank: P4 (Low urgency)**  
 The PCA is within the Cherokee Park State Wildlife Area.

**Management Urgency Rank: M4 (Low urgency)**  
 The occurrence is within a remote area of the State Wildlife Area with little recreational use.

**Location:** This PCA is located north of Cherokee Park Road (80C) approximately 15 miles west of Highway 287.

**Legal Description:**  
 U.S.G.S. 7.5-minute quadrangles: Cherokee Park and Diamond Peak  
 T11N R72W Sections 17 and 18

**Size:** 168 acres (68 ha)                      **Elevation:** 7240 – 7764 ft. (2207 – 2366 m)

**General Description:** The site is a Silver Plume granite outcrop in foothills ponderosa pine forest. Larimer aletes occurs on a granite outcrop within the site. Associated species include antelope bitterbrush (*Purshia tridentata*), wax currant (*Ribes cereum*), and needle-and-thread grass (*Stipa comata*).

**Biodiversity Comments:** This site contains an excellent occurrence of the globally imperiled (G2G3) Larimer aletes (*Aletes humilis*). The occurrence was last visited in 1985; given the land use, it is likely that the condition of the population has not changed.

Natural Heritage element occurrences at the Cherokee Park PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				A	5/12/85

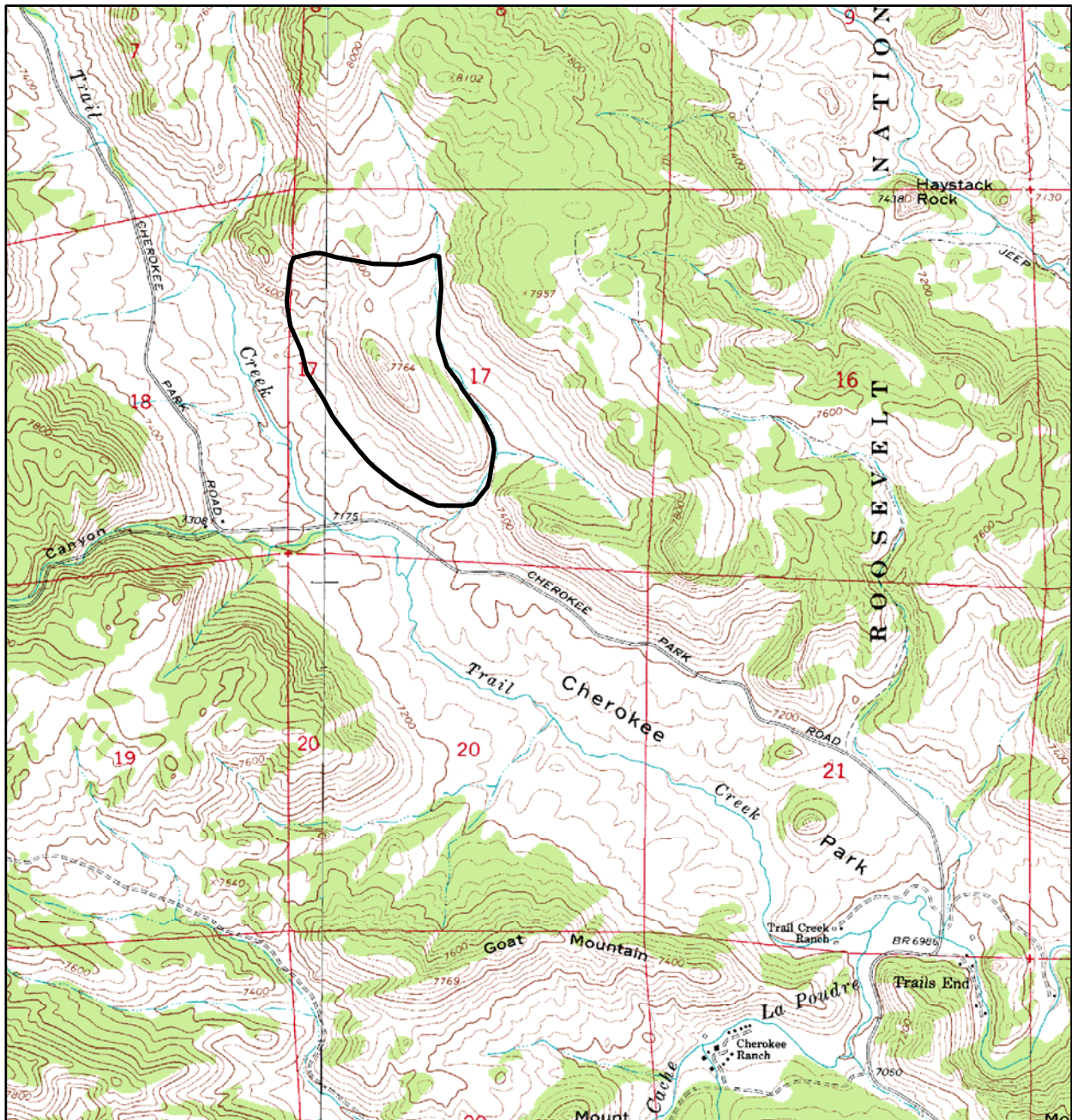
\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the rare plant occurrence and a buffer to protect from direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** This site is within the Cherokee Park State Wildlife Area.

**Management Comments:** Current management appears adequate to maintain the quality of the element occurrence. The Larimer aletes grows in an area not frequented by recreationists.






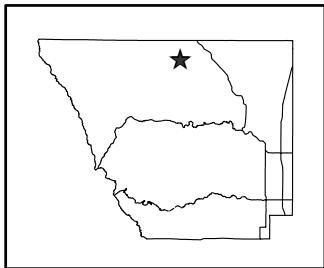
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4          Diamond Peak, 40105-H5</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 20. Cherokee Park Potential Conservation Area B2: Very High Biodiversity Significance

## Cherokee Park South

**Biodiversity Rank: B2 (Very high biodiversity significance)**  
 This PCA contains a good (B-ranked) occurrence of Larimer aletes (*Aletes humilis*), a globally imperiled (G2G3) species.

**Protection Urgency Rank: P4 (Low urgency)**  
 This PCA is within the Cherokee Park State Wildlife Area and US Forest Service lands.

**Management Urgency Rank: M4 (Low urgency)** Management may be needed in the future to maintain the current quality of the element occurrences if recreational use increases.

**Location:** This PCA is located about 7 miles south of the Colorado-Wyoming border. Access is from a trailhead along Cherokee Park Road (80C), one half mile north of Trail's End.

**Legal Description:**  
 U.S.G.S. 7.5-minute quadrangle: Cherokee Park  
 T11N R72W Sections 14, 15, 21, and 22

**Size:** 240 acres (97 ha)                      **Elevation:** 7200 – 7729 ft. (2195 – 2356 m)

**General Description:** Larimer aletes (*Aletes humilis*) is found here on north and west-facing Silver Plume granite outcrops within a foothills woodland.

**Biodiversity Comments:** This PCA supports a good occurrence of Larimer aletes (*Aletes humilis*), a globally imperiled (G2G3) plant. Larimer aletes is known only from Larimer and Boulder counties and is restricted to areas with large Silver Plume granite outcrops.

Natural Heritage element occurrences at the Cherokee Park South PCA.

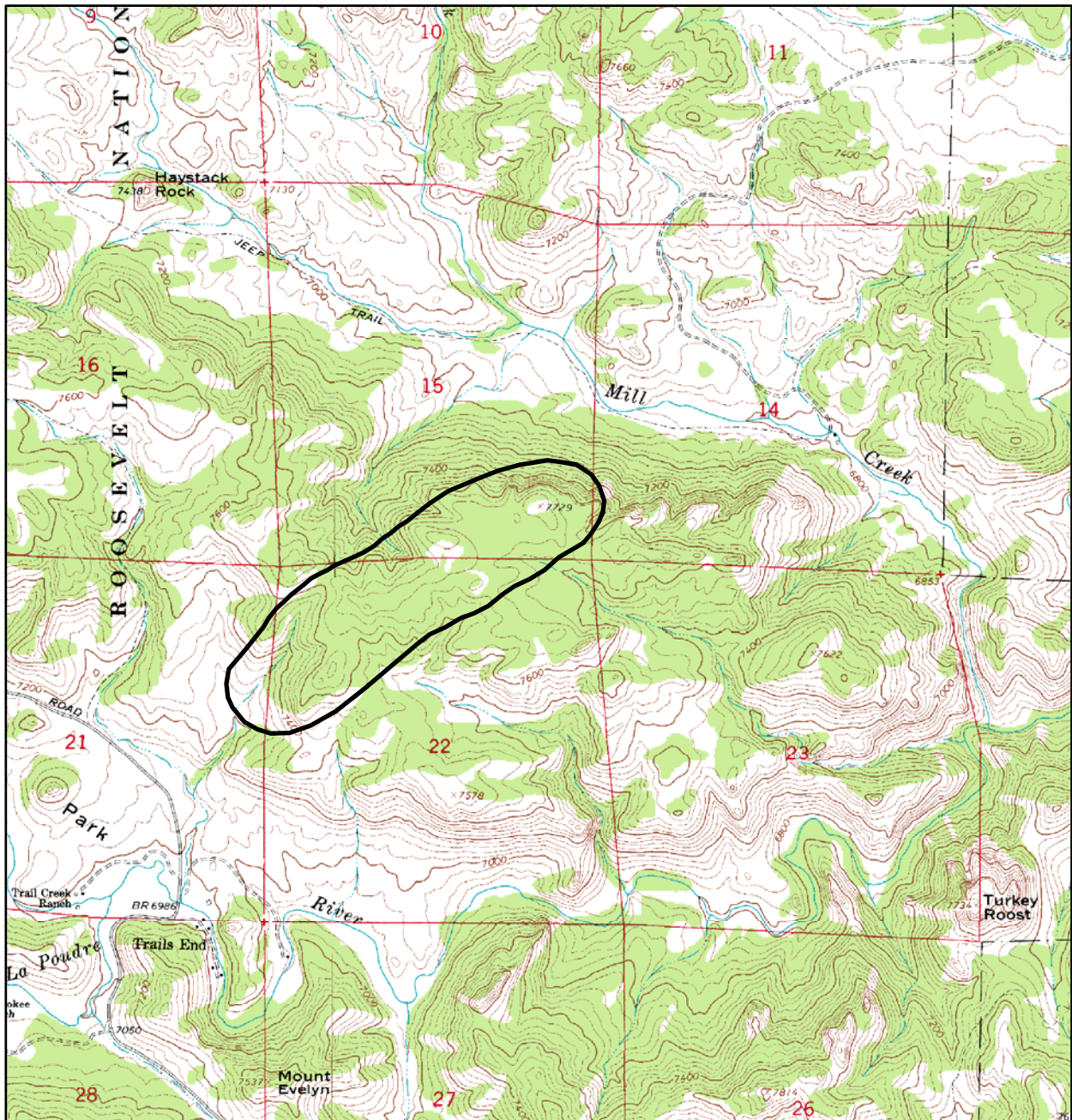
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				B	6/8/01

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the rare plant occurrence and a small buffer to protect from direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** This site is within the Cherokee Park State Wildlife Area, managed by the Colorado Division of Wildlife and US Forest Service lands. The site is currently not threatened but an increase in recreational use could impact the plant by trampling and increasing erosion along trails.

**Management Comments:** The future plans for this site are unknown. Work with Colorado Division of Wildlife to assure appropriate management, including routing of trails if necessary.




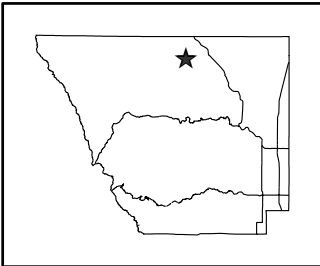
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 21. Cherokee Park South Potential Conservation Area B2: Very High Biodiversity Significance

## Dale Creek

**Biodiversity Rank: B2 (Very high biodiversity significance)**  
 This PCA contains an excellent (A-ranked) occurrence of Larimer aletes (*Aletes humilis*), a globally imperiled (G2G3) species.

**Protection Urgency Rank: P5 (Low urgency)**  
 This site is within a conservation easement on a large privately owned ranch.

**Management Urgency Rank: M3 (Moderate urgency)**  
 Management may be needed in the future to maintain the current quality of the element occurrence.

**Location:** Dale Creek drainage approximately 1.5 miles north of Halligan Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Virginia Dale  
 T11N R71W Sections 16, 17, 20, and 21

**Size:** 276 acres (112 ha)

**Elevation:** 6600 – 7180 ft. (2012 – 2188 m)

**General Description:** The Dale Creek drainage is surrounded by granite hills and vertical cliffs. The creek flows north to south and most of the surrounding slopes have east or west-facing aspects. Ponderosa pine (*Pinus ponderosa*) is sparse on the hillsides which are mostly dominated by mountain mahogany (*Cercocarpus montanus*), golden current (*Ribes aureum*), and three-leaf sumac (*Rhus trilobata*). The understory consists mainly of buckwheat (*Eriogonum umbellatum*), pricklypear cactus (*Opuntia*), fringed sage (*Artemisia frigida*), mountain muhly (*Muhlenbergia montana*), and hairy golden aster (*Heterotheca villosa*) often with much exposed bare rock. Large dramatic outcrops of Silver Plume granite are common.

**Biodiversity Comments:** This site supports an occurrence of the Larimer aletes (*Aletes humilis*) on Silver Plume granite cliffs. This species is only known from Larimer and Boulder counties and is restricted to areas with large Silver Plume granite outcrops. The scenic values and the large, natural landscape surrounding this occurrence add to its importance.

Natural Heritage element occurrences at the Dale Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				A	8/8/96

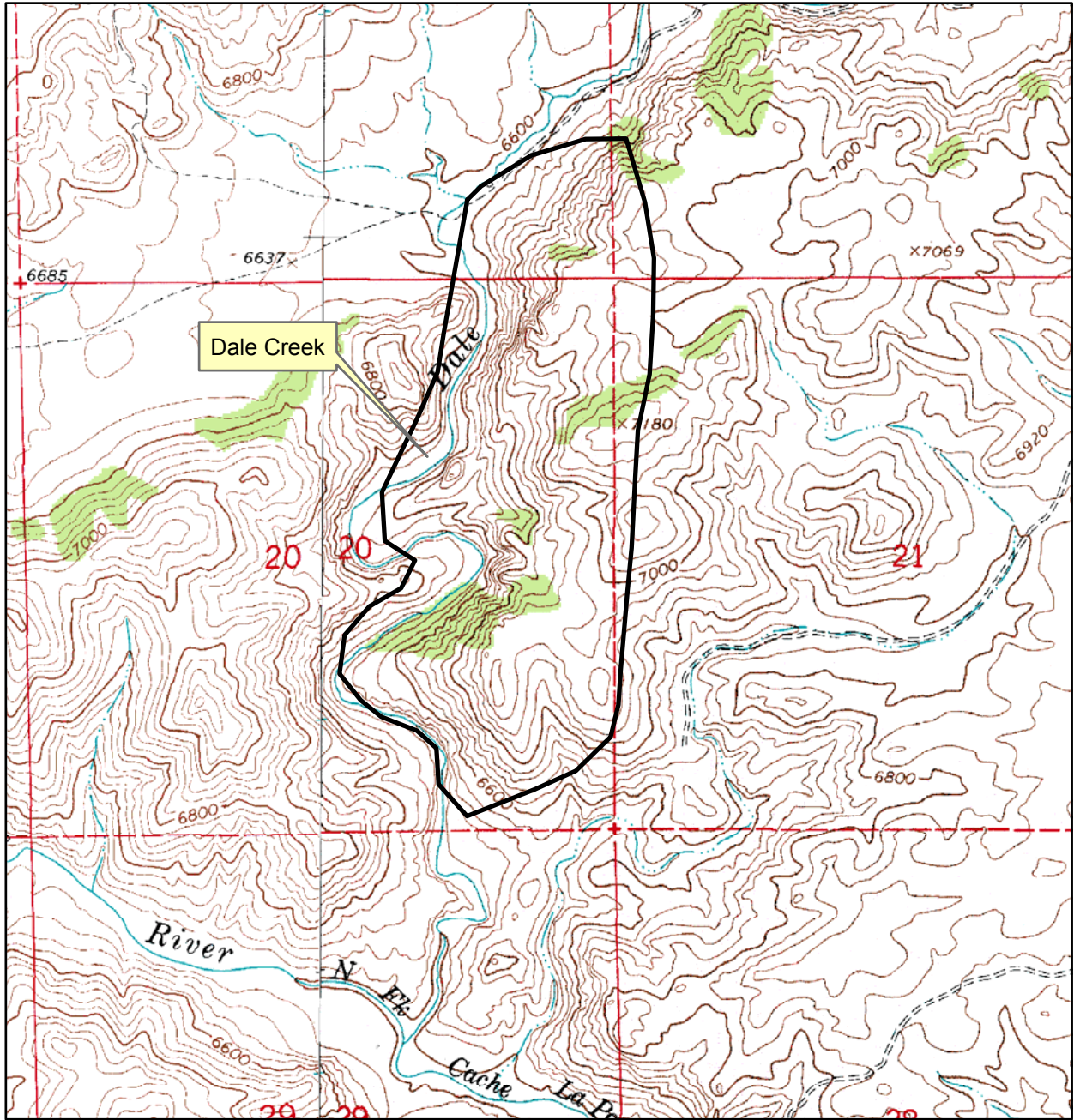
\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the rare plant occurrence and a buffer to protect from direct disturbance. The steep slopes on which the plant occurs offer

some natural protection. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** This PCA is within a privately owned ranch on which The Nature Conservancy recently secured a conservation easement.

**Management Comments:** Cheatgrass (*Bromus tectorum*) was found to be dense in areas within the site. Planned expansion of Halligan Reservoir, which is downstream, may inundate habitat close to this site. Impacts from recreation or other activities associated with reservoirs should be considered if the reservoir is expanded.




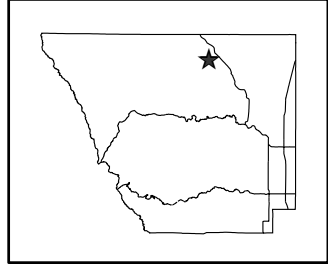
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/23/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Virginia Dale, 40105-H3          Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 22. Dale Creek Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Dixon Creek

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

This PCA supports two good (B-ranked) occurrences of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P4 (Low urgency)**

Most of the shale ridge is owned by the City of Fort Collins and Larimer County and managed as natural areas. Of the privately owned portions, much has already been developed as subdivisions.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrences. The primary management concern is control of non-native invasive plants.

**Location:** This PCA extends along five miles of shale ridge from the City of Fort Collins Pine Ridge Natural Area south to the Coyote Ridge Natural Area. The ridge is about ½ mile west of Taft Hill Road south of Fort Collins.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Horsetooth Reservoir, Fort Collins, Masonville, and Loveland

T6N R69W Sections 3, 4, 9, 16, and 21

T7N R69W Sections 20, 28, 29, 32, and 33

**Size:** 1161 acres (470 ha)

**Elevation:** 5050 – 5300 ft. (1539 – 1615 m)

**General Description:** The primary feature of this site is a Niobrara Formation shale hogback. This ridge runs north south at this location for approximately five miles. The northern portion of the site includes the Pine Ridge Natural Area. The southern portion of the site includes City of Fort Collins Cathy Fromme Prairie and Coyote Ridge Natural Areas: The Westridge Housing subdivision abuts the Cathy Fromme Prairie and displaces previously occupied habitat. The Larimer County landfill (occurring between Cathy Fromme and Coyote Ridge) probably displaced occupied habitat as well.

The Niobrara shale outcrops are sparsely vegetated with mountain mahogany, yucca, and a range of native grasses. There are many trails used by hikers, and mountain bikers that dissect the City Natural Areas.

**Biodiversity Comments:** This site contains two good and one fair occurrence of the globally imperiled (G2) Bell's twinpod. This site also contains a fair occurrence of the globally imperiled (G2G3) mountain mahogany/ New Mexico feathergrass shrubland (*Cercocarpus montanus/Stipa neomexicana*). Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2).



Natural Heritage element occurrences at the Dixon Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Physaria bellii</i>	<b>Bell's twinpod</b>	<b>G2</b>	<b>S2</b>				<b>B</b>	<b>9/3/04</b>
<i>Physaria bellii</i>	<b>Bell's twinpod</b>	<b>G2</b>	<b>S2</b>				<b>B</b>	<b>5/21/04</b>
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	6/7/04
<b>Plant Communities</b>								
<i>Cercocarpus montanus/ Stipa neomexicana</i>	Mountain mahogany/ New Mexico feathergrass foothills shrubland	G2G3	S2S3				C	6/24/96

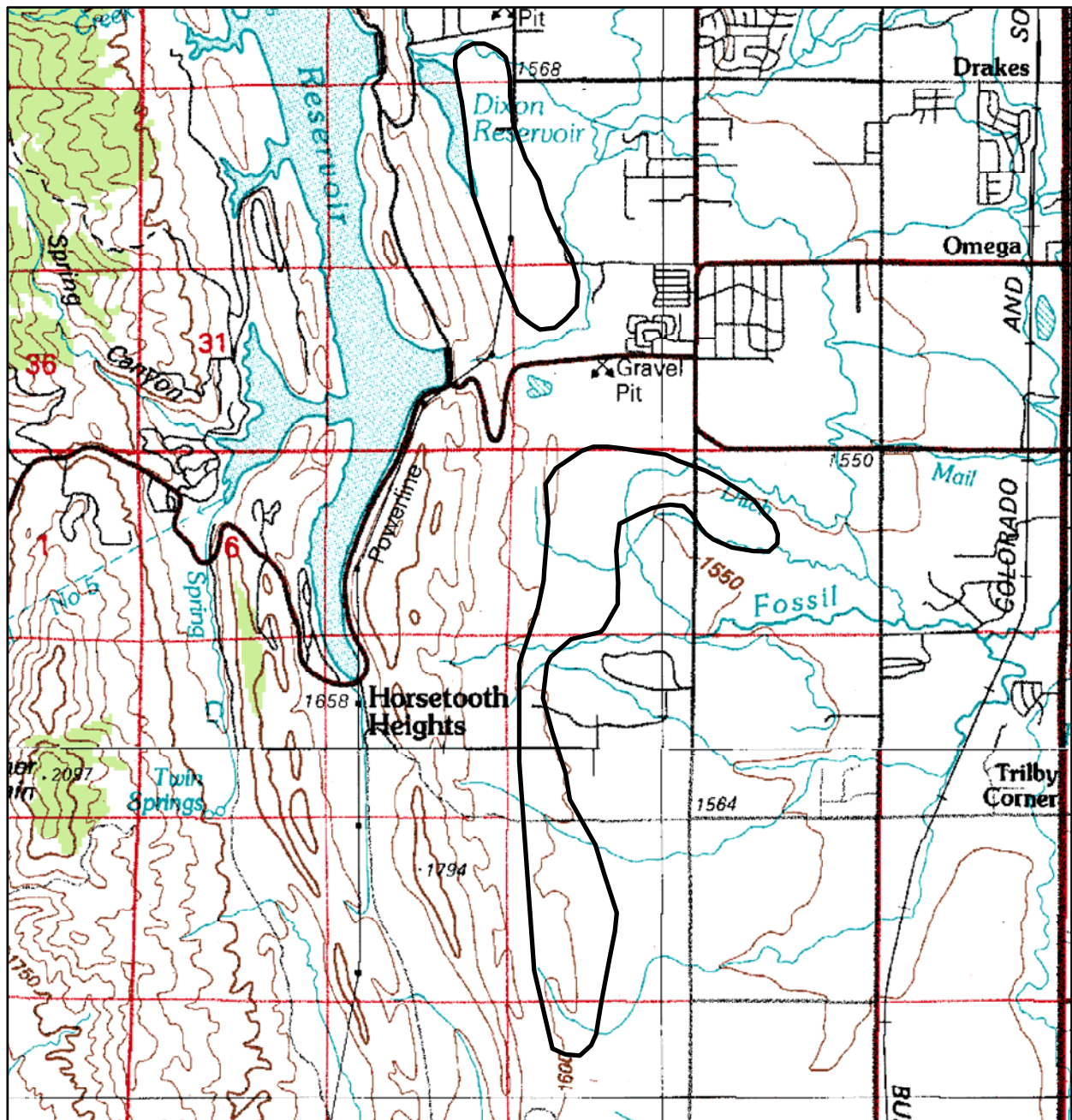
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site boundary includes the known occurrences of Bell's twinpod and the adjacent slopes. Lands to the south have been plowed for agriculture and are not considered potential habitat. Land north of the PCA has been surveyed for Bell's twinpod with none located. The boundary excludes portions of the Westridge subdivision and the Larimer County landfill. Bell's twinpod has been documented within the subdivision but these lands are not considered of conservation value. A portion of the Westridge subdivision adjacent to Cathy Fromme Prairie is included within the boundary as multiple dry washes there support Bell's twinpod; however, these washes are considered of very low conservation value.

**Protection Comments:** Much of the PCA is protected as City and County owned open space. Some privately owned portions have not been surveyed and have no land protection status.

**Management Comments:** The primary management concern within the PCA is invasion by non-native grasses including smooth brome (*Bromus inermis*) and cheatgrass (*Bromus tectorum*). These grasses have invaded portions of the sparsely vegetated shale outcrops crowding out Bell's twinpod. Encroachment by landscaping plants from the subdivisions is also an issue. Notification and education of the homeowners within the housing development may prove useful in the plants protection. Recreational use is a management concern within the open spaces due to trampling and the potential for increases in non-native species. A certain amount of recreation appears to be compatible with the twinpod; however, repeated trampling of individual plants will reduce the size of the population, thus social trails through the population are discouraged.




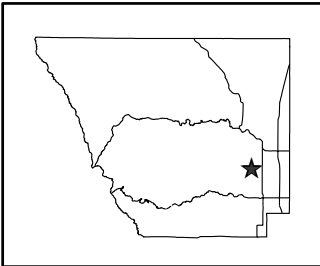
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 23. Dixon Creek Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Green Ridge

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

This site supports a good (B-ranked) occurrence of a globally imperiled (G2) ponderosa pine community.

***Protection Urgency Rank: P3 (Moderate urgency)***

The site is a mixture of U.S. Forest Service, county and city open space, and private land.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management concerns within this PCA include invasive species and fire.

**Location** This site covers a large portion of south central Larimer County. The northeast corner of the site is east of Masonville; the site continues about 15 miles south to near the Boulder County line.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Buckhorn Mountain, Carter Lake Reservoir, Drake, Glen Haven, Horsetooth Reservoir, Masonville, Pinewood Lake, and Panorama Peak

T4N R70W Sections 4-9, 17, and 20

T4N R71W Sections 1-12 and 14-28

T4N R72W Sections 1, 12, and 13

T5N R70W Section 3-10, 15-21, and 28-33

T5N R71W Sections 1-3 and 8-36

T5N R72W Sections 13, 24, 25, and 36

T6N R70W Sections 7-19, 16-22, and 27-34

T6N R71W Sections 8-30 and 32-36

**Size:** 68,471 acres (27,710 ha)      **Elevation:** 5400 – 9550 ft. (1646 – 2911 m)

**General Description:** This site occupies the transition zone between foothills and montane regions; it is just west of the westernmost sandstone hogbacks that span the Front Range. The granitic mountains that comprise the site are blanketed by the Ponderosa Pine Woodland system, the most common matrix-forming type of the foothills and montane elevations (6000-9000 feet) on the Front Range. This site spans 5400-9550 feet on predominantly east-facing slopes. Ponderosa pine (*Pinus ponderosa*) dominates the canopy throughout, although Douglas-fir (*Pseudotsuga menziesii*) can co-dominate on north-facing slopes. Understory vegetation varies across the site but includes shrub patches of various sizes and/or carpets of graminoids as well as sparse understory with thick needle duff.

At lower elevations on the east- and south-facing slopes, the woodland system grades into the Ponderosa Pine Savanna, a mosaic of shrubs, grasses, and scattered trees. The valleys below are occupied by remnants of Foothill Grassland systems, the majority of which has been converted to agricultural land use or has an altered composition due to livestock grazing.

A portion of the site was impacted by the Bobcat Gulch fire of 2000. This fire consumed 10,600 acres and proved to be a catastrophic natural disturbance. Most of the trees in the impacted area were killed by the severe crown fire, even in usually protected steep

drainages and north-facing slopes. Further, much of the understory was consumed, lost to erosion following denudation, or suppressed by emergence of early successional weeds (e.g., mullein, *Verbascum thapsus*) or plants from post-fire seeding measures (primarily slender wheatgrass, *Elymus trachycaulus* among others). Only small vestiges of what was likely present before the fire are currently recognizable; only small vestiges of pre-fire vegetation remain in the impacted area.

**Biodiversity Comments:** This site includes two occurrences of the globally imperiled (G2) ponderosa pine/mountain mahogany/big bluestem (*Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii*) savanna. One is a good (B-ranked) occurrence and the other is fair (C-ranked) due to its closer proximity to municipal areas. The latter occurrence was impacted by the Bobcat Gulch fire in 2000. The site also supports two occurrences, one good and one fair, of the globally vulnerable (G3) ponderosa pine/spike fescue (*Pinus ponderosa/Leucopoa kingii*) Woodland. The Ponderosa Pine/Mountain Mahogany/Big Bluestem (*Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii*) Sparse Woodland plant association is known only from the Front Range north of Boulder and it occurs at the tension zone between forests on higher slopes and grasslands in valley bottoms and combines elements of each. Unique in this association is the presence of big bluestem, a species that abundantly occurs in the tallgrass prairie of the Plains states to the east, but is much less common in the Foothills. Ponderosa Pine/Spike Fescue Woodland is considered an indicator of late successional forest stands.

Natural Heritage element occurrences at the Green Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plant Communities</b>								
<i>Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii</i>	Foothills ponderosa pine woodland	G2	S2?				B	8/24/04
<i>Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii</i>	Foothills ponderosa pine woodland	G2	S2?				C	8/10/04
<i>Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii</i>	Foothills ponderosa pine woodland	G2	S2?				C	11/20/94
<i>Pinus ponderosa/Leucopoa kingii</i>	Foothills ponderosa pine savanna	G3	S3				B	8/24/04

<i>Pinus ponderosa/ Leucopoa kingii</i>	Foothills ponderosa pine savanna	G3	S3				C	9/24/04
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\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** This site boundary comprises a portion of lower elevation ponderosa pine woodland and savanna that is minimally fragmented by roads and achieves twice the minimum size for the ecological system to be viable (Rondeau. 2001). Portions of Roosevelt National Forest that have several inholdings are included in this site. The site is bisected by Highway 34 west of Loveland where it goes through the Big Thompson Canyon. As the canyon is very deep and steep-sided, direct impacts of this road to the ponderosa pine system are minimal. The canyon does form a natural fire break, however, the site was drawn to include the same ecological elements found on both sides of the canyon.

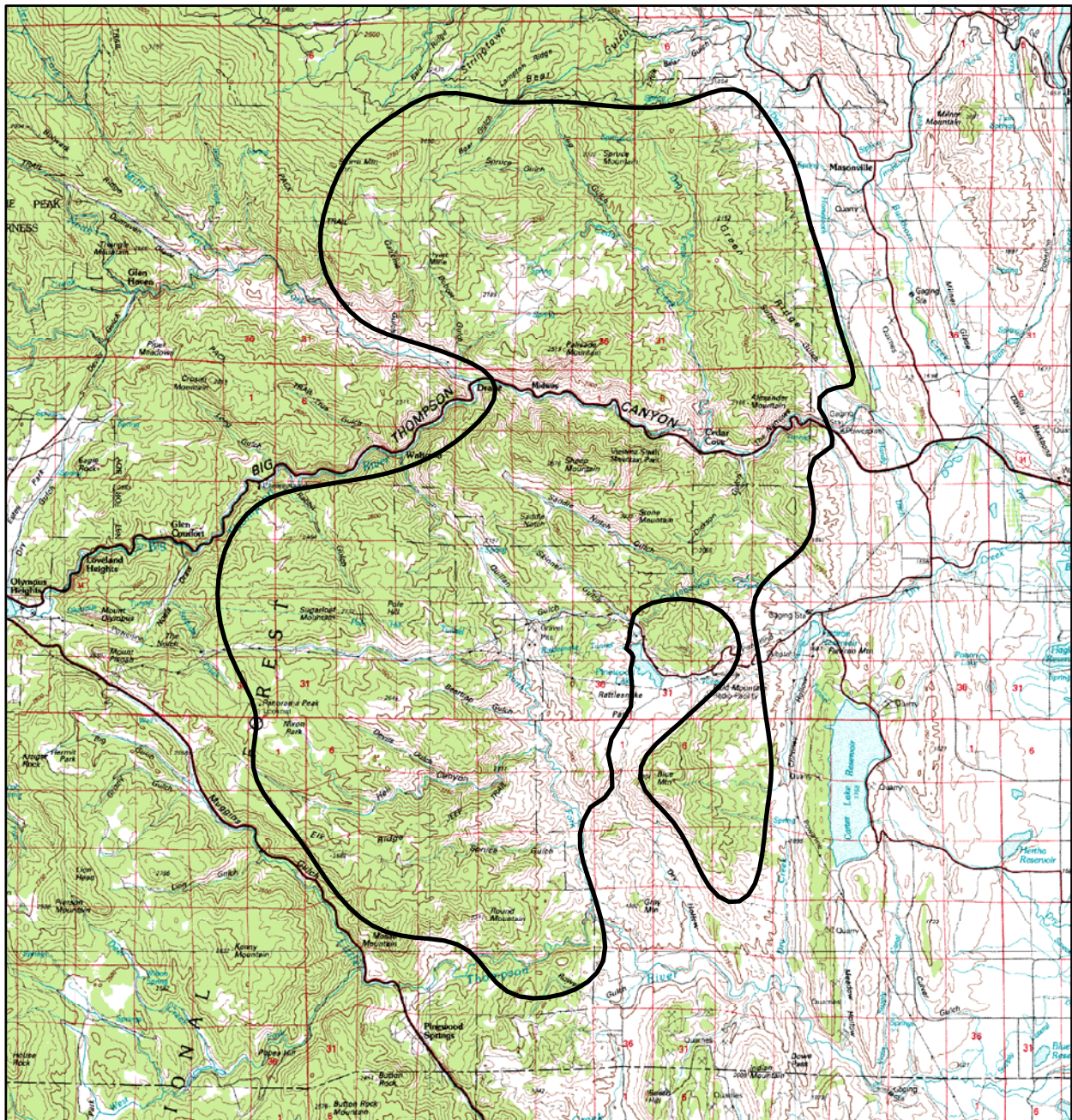
**Protection Comments:** The site is a mixture of U.S. Forest Service, county open space, city open space, and private land. The site includes several inholdings within the Roosevelt National Forest. Development of these areas will challenge efforts to manage the ecological systems present within the site.

**Management Comments:** The site includes the entirety of the area burned by the 2000 Bobcat Gulch Fire, a catastrophic crown fire that burned 10,600 acres. The burn area has begun to be colonized by invasive, exotic weeds. Control of weeds before they expand in area would benefit the condition of the occurrence. Prescribed, low intensity fire management is an available tool for fuel reduction to potentially prevent catastrophic fires and maintain a functioning ecosystem.



Photo 3. Chimney Hollow at the Green Ridge PCA.

photo by S. Neid




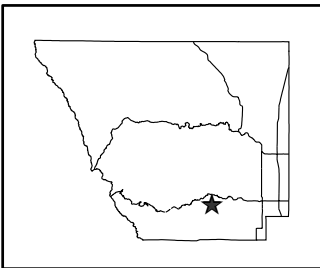
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 24. Green Ridge Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Haystack Rock

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

This PCA contains a good (B-ranked) occurrence of Larimer aletes (*Aletes humilis*), a globally imperiled (G2G3) species.

**Protection Urgency Rank: P3 (Moderate urgency)**

US Forest Service and multiple private individuals own this site.

**Management Urgency Rank: M4 (Low urgency)**

Management of recreational activities may be needed in the future to maintain the current quality of the element occurrences.

**Location:** This PCA is located about five miles west southwest of Virginia Dale, one mile east of Haystack Rock on promontory locally called Rattlesnake Rock.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Cherokee Park  
T11N R72W Sections 10, 11, and 15

**Size:** 128 acres (52 ha)

**Elevation:** 7000 – 7480 ft. (2133 – 2280 m)

**General Description:** The site is an outcrop of Silver Plume granite in a foothills ponderosa pine (*Pinus ponderosa*) forest. Larimer aletes (*Aletes humilis*) grows on and around the rock outcrops.

**Biodiversity Comments:** This site supports a good (B-ranked) occurrence of Larimer aletes (*Aletes humilis*), a globally imperiled (G2G3) plant. This species is known only from Larimer and Boulder counties and is restricted to areas with large Silver Plume granite outcrops.

Natural Heritage element occurrences at the Haystack Rock PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				B	5/6/90

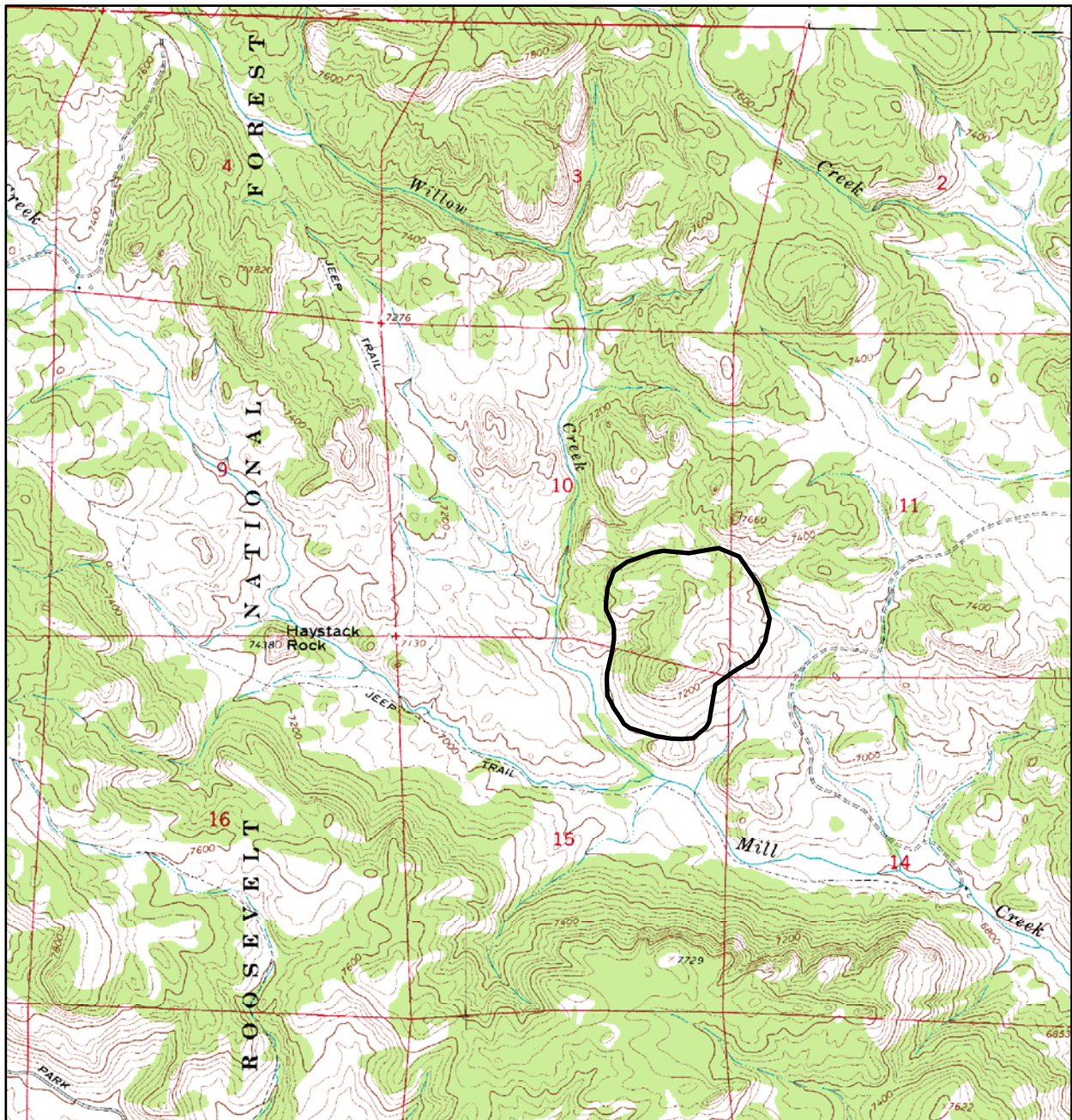
\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the rare plant occurrence and a buffer to protect from direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** US Forest Service and multiple private landowners own this site. Residential development is increasing in this area.

**Management Comments:** Management needs currently appear to be low, but could become more prominent in the future with increases in residential developments, recreational uses, and/or livestock grazing. Concerns include road building for right-of-way access and trespass grazing. These activities could decrease the overall quality and condition of this site by fragmenting the occurrence and/or introducing non-native plant species.






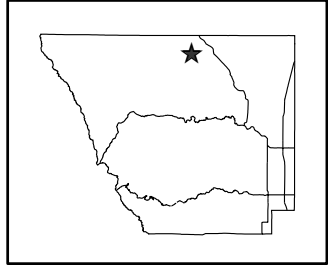
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 25. Haystack Rock Potential Conservation Area B2: Very High Biodiversity Significance

## Hermit Park

**Biodiversity Rank: B2 (High biodiversity significance)**

This PCA contains a good (B-ranked) occurrence of the globally imperiled (G2) Rocky Mountain cinquefoil (*Potentilla rupincola*).

**Protection Urgency Rank: P3 (Moderate urgency)**

Most of the site is owned by Agilent/Hewlett Packard as a recreation area for employees. Other portions are privately owned as large parcels.

**Management Urgency Rank: M4 (Low urgency)**

The primary management concerns is recreational access.

**Location:** This PCA is located along Highway 36 about 1 mile southeast of Lake Estes

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Panorama Peak  
T5N R72W Sections 28 and 33

**Size:** 236 acres (96 ha)

**Elevation:** 7800 – 8820 ft. (2377 – 2688 m)

**General Description:** This site contains granitic outcrops surrounded by heavily forested slopes. These forests range from ponderosa pine (*Pinus ponderosa*) at the lowest elevations up to ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*) and finally to lodgepole pine (*Pinus contorta*) at the highest elevations. These forests are broken up by small pockets of aspen (*Populus tremuloides*). The most common and widespread plant association is ponderosa pine-Douglas-fir/mountain muhly (*Muhlenbergia montana*). Big and Grizzly Gulches flow through the site. A wet meadow consisting of emergent vegetation and montane grasses occurs along Big Gulch. Tufted hairgrass (*Deschampsia cespitosa*) is the most common species in this wetland. Hay grasses such as timothy (*Phleum pratense*) also occur frequently here. Signs of fire from lightning strikes were observed. However, fire has been suppressed because the area has been managed as a recreation area for Hewlett Packard employees since the late 1960's.

**Biodiversity Comments:** This site contains a good occurrence of Rocky Mountain cinquefoil (*Potentilla rupincola*). Many of the plants at this particular location of Rocky Mountain cinquefoil may be more closely related to the common *Potentilla effusa* than the other locations in Larimer County.

Natural Heritage element occurrences at the Hermit Park PCA.

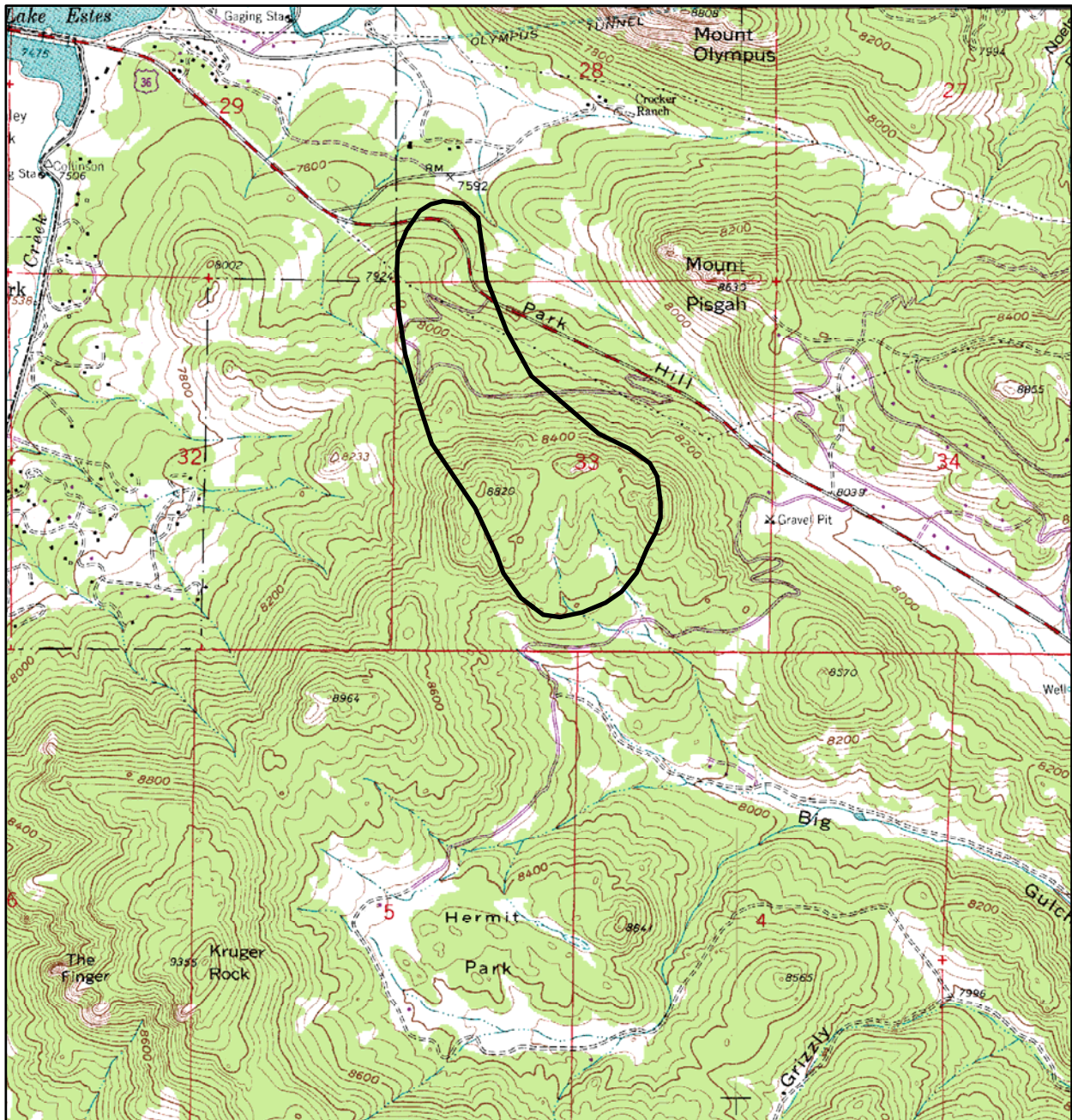
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Potentilla rupincola</i>	Rocky Mountain cinquefoil	G2	S2			FS	B	9/6/96

\*EO = Element Occurrence

**Boundary Justification:** The site includes the occurrence and a buffer to the top of the ridges to protect from erosion due to human disturbance. The site allows for the functioning of all ecological processes except for fire.

**Protection Comments:** Development pressures are high in the area. The southern portion of the site is owned by Agilent/Hewlett Packard who uses the area as a recreation area for employees. Though no formal protection exists, they are interested in maintaining the quality of the area. The northern portion is privately owned as large parcels.

**Management Comments:** Management of recreation may be needed in the future to maintain the current quality of the element occurrences. Hewlett Packard is interested in maintaining the overall natural quality of the area. Options for protection of the site such as management agreements or easements should be explored. Current management appears to be adequate. Hewlett Packard should be informed about the specific location of the plant population, and a management plan should be developed. Protect plants from direct disturbances from hiking and other recreational uses. Many hay meadow grasses are in the meadows and there are other non-natives plant species along the road, but the site is mostly weed free.




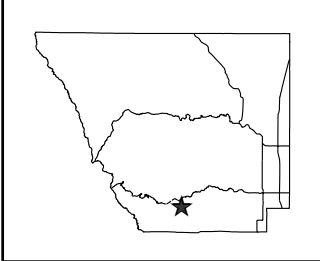
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Panorama Peak, 40105-C4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 26. Hermit Park Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Horsetooth Reservoir Hogbacks

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

This site includes a concentration of good to fair quality occurrences of globally imperiled (G2) to vulnerable (G3) plant communities and butterflies.

***Protection Urgency Rank: P4 (Low urgency)***

About 70 percent of the site has been protected by the state, Bureau of Reclamation, Larimer County, and cities of Fort Collins and Loveland as parks and open space. The privately owned portions have for the most part been subdivided into 35-acre and smaller parcels.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management concerns include invasive species, recreation, and fire management.

**Location:** This PCA is located west of Fort Collins and includes the area surrounding Horsetooth Reservoir, the hogbacks east and west of the reservoir, from the north end of the reservoir near Bellvue continuing south and terminating just north of the Devil's Backbone near Loveland.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Horsetooth Reservoir and Masonville  
T5N R69W Sections 5, 6, 8, and 17  
T6N R69W Sections 5, 7, 8, 16-19, 21, and 28-30  
T6N R70W Sections 1, 2, 24, and 25  
T7N R69W Sections 6, 7, 17-20, and 29-32  
T7N R70W Sections 1, 10-15, 22-27, and 35-36  
T8N R69W Section 31; T8N R70W Section 36

**Size:** 19,626 acres (7942 ha)      **Elevation:** 5430 – 7200 ft. (1655 – 2198 m)

**General Description:** This site includes the hogback ridges just east and west of Horsetooth Reservoir and south to Devil's Backbone Open Space. The key environmental factors in this area are precipitation, bedrock substrate, and fire return interval, as certain plant associations in this site are fire-dependent. Several geological formations are exposed on the hogbacks, most are sandstone, or sandstone/limestone formations, including Fountain, Ingleside, Dakota, and Lyons Formations. Lower slopes are composed of faulted sedimentary substrates which give way to granitic formations as elevation increases. In some areas, the sandstone forms a "pavement" and the vegetation is confined to cracks in the rock.

The vegetation is dominated by mountain mahogany (*Cercocarpus montanus*) and small grassland openings with ponderosa pine (*Pinus ponderosa*) woodlands higher on the slopes. Some parts of the valleys between the hogbacks have undergone agricultural conversion to

hay meadows or pastures, and are generally dominated by non-native grass species. Residential development has occurred at a rapid pace in the areas and houses are built or are being built within the site. Some past mining and quarrying is evident.

Horsetooth Mountain Park and Lory State Park are within the site and numerous picnic grounds and a network of recreational and social trails (hiking and cycling) exist both in the park and in the general area. The globally imperiled Bell's twinpod (*Physaria bellii*) occurs within this site, which also has historic records of prairie goldenrod (*Oligoneuron album*) and the forktip three-awn grass (*Aristida basiramea*).

The valley to the south of the reservoir is somewhat unique for the area. An old homestead is located in the area and nearby residential development is hidden from view. This allows one to imagine what the area was like in the times of the early European settlers.

**Biodiversity Comments:** This site was drawn for a concentration of good to fair quality occurrences of globally imperiled to vulnerable plant communities and butterflies. The ponderosa pine/mountain mahogany/big bluestem (*Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii*) foothills woodland is globally imperiled (G2) and only known from the northern Front Range of Colorado. Most occurrences of this plant association have been destroyed or degraded by development, overgrazing, or mining. This site has been impacted to some extent by these activities and the occurrences are degraded by them although still restorable. The big bluestem-little bluestem (*Andropogon gerardii-Schizachyrium scoparium*) xeric tallgrass prairie is also globally imperiled (G2) and has only been documented from the Front Range of Colorado, and most occurrences are also severely degraded. This occurrence of this natural community at this site is in fair condition and is relatively small, but is one of the best remaining in Larimer County. The mountain mahogany -- three-leaf sumac/big bluestem (*Cercocarpus montanus-Rhus trilobata/Andropogon gerardii*) foothills shrubland is globally imperiled (G2G3) and occurs in patches throughout the site near Horsetooth Reservoir and farther south. The globally imperiled (G2G3) mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) foothills shrubland is known only from Colorado and Wyoming. The occurrence at this site forms narrow bands along the length of the hogbacks.

The Ottoo skipper (G3G4) and Arogos skipper (G3G4) butterflies (*Hesperia ottoe*, *Atrytone arogos*) may be vulnerable and have declined throughout their range. These species rely on the tallgrass prairie remnants that occur along the hogbacks. This site supports a colony of the imperiled butterfly, hops feeding azure (*Celastrina humulus*; G2G3), a species only known to occur on the Colorado Front Range within canyon and ravine habitats. This is a good occurrence that has persisted since it was documented at the site in the 1980's. Additionally, Moss' elfin (*Callophrys mossii schryveri*; G4T3) occupies similar habitats as the hops feeding azure; it maintains a subspecific status and is considered globally uncommon. The site also supports a good occurrence of the mottled duskywing butterfly (*Erynnis martialis*; G3G4) which is common globally, but imperiled to vulnerable in Colorado. This species is found on hilltops with mountain mahogany or buckbrush (*Ceanothus* spp.). The dusted skipper butterfly (*Atrytonopsis hianna*; G4G5) is common

globally, but rare to imperiled in Colorado. This species prefers canyons or open pine woodlands and relies on big bluestem and little bluestem as host plants for the larvae.

Natural Heritage element occurrences at the Horsetooth Reservoir Hogbacks PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plant Communities</b>						
<b><i>Pinus ponderosa/ Cercocarpus montanus/ Andropogon gerardii</i></b>	<b>Ponderosa pine/ mountain mahogany/ big bluestem woodland</b>	<b>G2</b>	<b>S2?</b>		<b>AB</b>	<b>9/4/96</b>
<i>Pinus ponderosa/ Cercocarpus montanus/ Andropogon gerardii</i>	Ponderosa pine/ mountain mahogany/ big bluestem woodland	G2	S2?		C	9/2/04
<i>Pinus ponderosa/ Cercocarpus montanus/ Andropogon gerardii</i>	Ponderosa pine/ mountain mahogany/ big bluestem woodland	G2	S2?		C	11/13/91
<i>Cercocarpus montanus/ Stipa neomexicana</i>	Mountain mahogany/ New Mexico feathergrass shrubland	G2G3	S2S3		C	7/26/96
<i>Cercocarpus montanus- Rhus trilobata/ Andropogon gerardii</i>	Mountain mahogany- three-leaf sumac/ Big bluestem shrubland	G2G3	S2S3		BC	9/4/96
<i>Cercocarpus montanus- Rhus trilobata/ Andropogon gerardii</i>	Mountain mahogany- three-leaf sumac/ Big bluestem shrubland	G2G3	S2S3		C	7/19/96
<i>Andropogon gerardii- Schizachyrium scoparium</i>	Big bluestem –little bluestem xeric tallgrass prairie	G2?	S2		C	8/12/96
<i>Cercocarpus montanus/ Stipa scribneri</i>	Mtn mahog/ Scribner’s needlegrass shrubland	G3	S3		C	8/12/96
<b>Butterflies</b>						
<b><i>Celastrina humulus</i></b>	<b>Hops feeding azure</b>	<b>G2G3</b>	<b>S2</b>		<b>B</b>	<b>6/13/96</b>
<i>Celastrina humulus</i>	Hops feeding azure	G2G3	S2		E	6/23/85
<b><i>Erynnis martialis</i></b>	<b>Mottled duskywing</b>	<b>G3G4</b>	<b>S2S3</b>		<b>B</b>	<b>6/13/96</b>
<b><i>Erynnis martialis</i></b>	<b>Mottled duskywing</b>	<b>G3G4</b>	<b>S2S3</b>		<b>B</b>	<b>5/21/96</b>
<i>Atrytone arogos</i>	Arogos skipper	G3G4	S2		E	6/30/90
<i>Hesperia ottoe</i>	Ottoe skipper	G3G4	S2	FS	E	unknown
<i>Amblyscirtes simius</i>	Simius roadside skipper	G4	S3		E	6/23/96
<i>Callophrys mossii schryveri</i>	Moss’ elfin	G4T3	S2S3		E	4/18/96
<i>Callophrys mossii schryveri</i>	Moss’ elfin	G4T3	S2S3		E	5/6/95
<i>Atrytonopsis hianna</i>	Dusted skipper	G4G5	S2		B	5/26/98
<i>Polites origines</i>	Cross-line skipper	G5	S3		E	6/17/79

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site includes most of the hogback complex east and west of Horsetooth Reservoir continuing south to near the Devil's Backbone. The boundary is intended to protect the community occurrences and habitat for the butterflies, several of which are somewhat dependent on remnant tallgrass prairies containing big bluestem and little bluestem for their lifecycles. Those species of grass are present throughout the length of the hogbacks included in the site. Most of Spring Canyon is included for the hop-feeding azure along with much of the mountain mahogany dominated slopes to the south which provides habitat for the mottled duskywing butterfly. These species are known to have low dispersal rates.

**Protection Comments:** About 70 percent of the site has been protected as open space by either the Bureau of Reclamation, the state, Larimer County, and/or the cities of Fort Collins and Loveland. Protected areas include Lory State Park, Horsetooth Mountain Park, Devil's Backbone Open Space (recently expanded to include Indian Creek Open Space), Rimrock Open Space, and Reservoir Ridge Natural Area. Private lands within the site have, for the most part, been developed as 35-acre or smaller parcels. Most opportunities for land protection actions within the site have already occurred. Development pressures in the area are extremely high resulting in fragmentation. Protection of the small, privately owned parcels abutting the southern Horsetooth Mountain Park boundary would help insure the viability of the butterflies. .

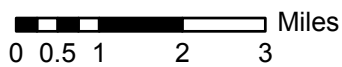
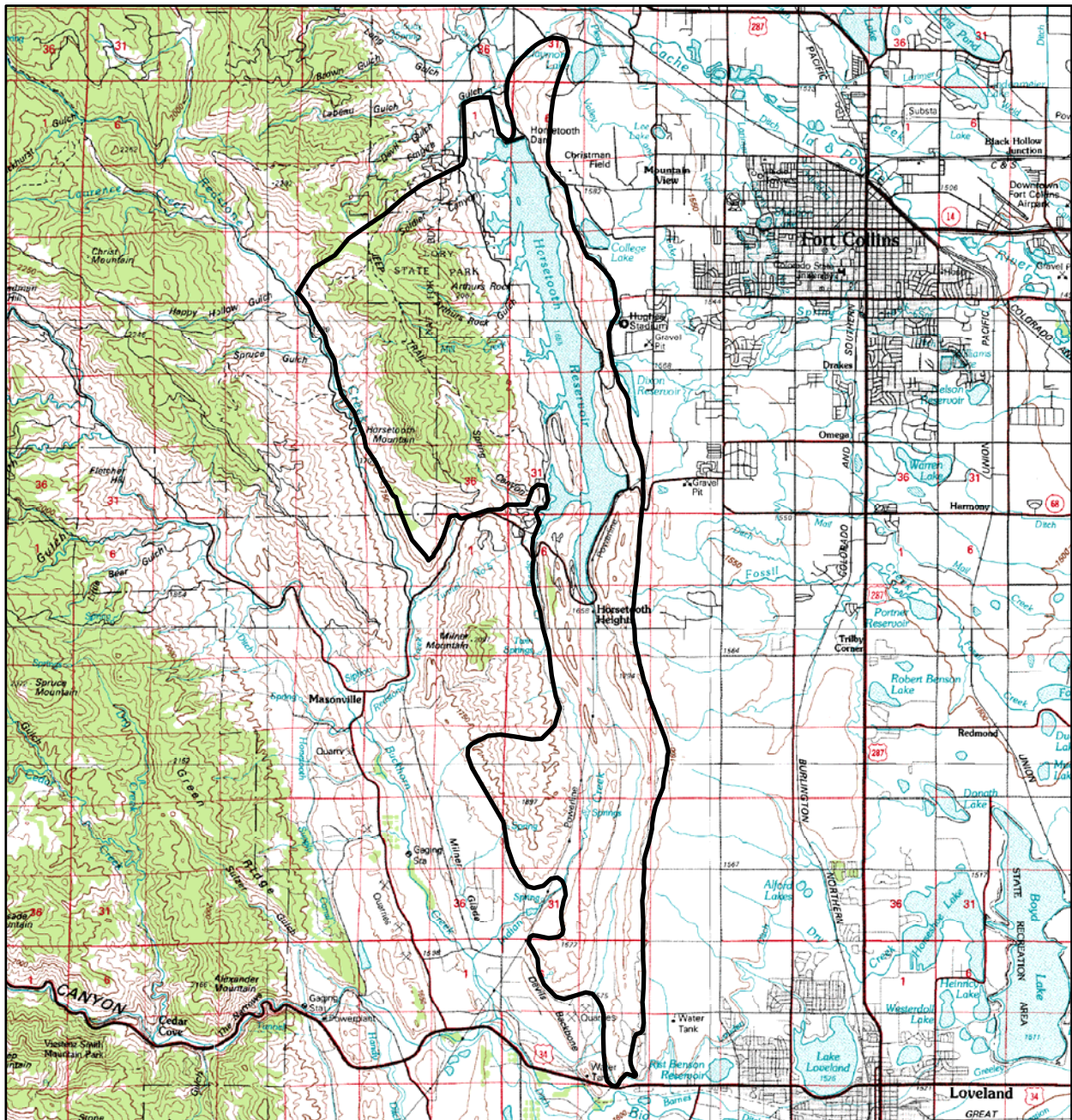
**Management Comments:** Management concerns include invasive species, recreation, and fire management (Kettler and Pineda 1999). Livestock grazing has been a prominent land use since European settlement. The valley bottoms in the site have an altered composition from years of heavy grazing or conversion to hay meadows with non-native species. Further, these have spread to adjacent areas. Non-native or native weedy species are very common and dominant in some places. These species include Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), cheatgrass (*Bromus tectorum*), Japanese brome (*B. japonicus*), smooth brome (*B. inermis*), crested wheatgrass (*Agropyron cristatum*), leafy spurge (*Euphorbia esula*), toadflax (*Linaria dalmatica*), and giant ragweed (*Ambrosia trifida*). Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988). Control of non-native species may also be necessary so that the hostplants for the butterflies are able to compete and remain as an important component of the plant communities.

Recreation activities are common at the site, impacting the land in many places, and may need to be managed in the future to avoid excessive disturbance of the habitat. Fire pits are common and many social trails have been created which contribute to soil erosion and the spread of non-native plant species.

Current and future development may preclude natural fires (which are an integral part of this ecosystem), fragment the landscape, and introduce domestic pets into the area which can impact native wildlife populations.



Grazing or fire management could be used as a tool to reduce the dominance of non-native species and increase the proportion of native species. With both of these tools, special attention would need to be given to the time of implementation. Goals for management, especially species-specific goals, should be developed before a fire management plan is implemented; for example, certain disturbance from fires may provide the opportunity for non-native species to increase in dominance. In addition, frequent fires in eastern tallgrass prairie have been shown to reduce the diversity of lepidoptera (Swengel and Swengel 1995). Burning all of the butterfly habitat in one year could potentially extirpate populations (Moffat and McPhillips 1993). Management goals that target a mosaic of vegetation types that remain as naturally connected as possible may maintain or improve the condition of the element occurrences at this site.




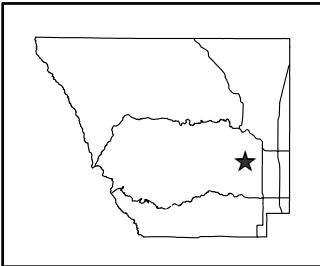
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 5/10/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 27. Horsetooth Reservoir Hogbacks Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Indian Creek Hogback

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

This PCA supports a good (B-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P5 (No urgency)**

The portion of the hogback supporting Bell's twinpod is almost entirely within City and County owned Open Space.

**Management Urgency Rank: M4 (Low urgency)**

Current management appears adequate to maintain the quality of the element occurrence. Invasion by non-native species and trail placement are the primary management issues.

**Location:** This PCA includes about six miles of hogback ridge from north of the Devil's Backbone to just north of Road 38 at Horsetooth Reservoir's Inlet Bay.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Masonville and Horsetooth Reservoir  
T5N R69W Section 6  
T6N R69W Sections 6, 7, 17-20, 29-32

**Size:** 838 acres (339 ha)

**Elevation:** 5400 – 5800 ft. (1650 – 1770 m)

**General Description:** Red sandstone hogback cliffs of Fountain Formation overlain by Ingleside Formation (Braddock *et al.* 1970 and 1989) are the dominant feature of this site. The cliffs extend at least six miles from Devil's Backbone to Horsetooth Reservoir. The dominant vegetation along the cliffs is mountain mahogany (*Cercocarpus montanus*) with a variety of native grasses. Bell's twinpod occurs patchily throughout the PCA; where it occurs it grows from the base of the cliff to the toe of the slope and is most abundant where vegetation is sparse such as in areas of active erosion.

The hogback is east of a wide valley drained by Indian Creek in the south and Spring Creek in the north. A recreational trail will be constructed along parts of the hogback as part of a regional trail system beginning in spring 2005.

**Biodiversity Comments:** This site contains a good occurrence of Bell's twinpod. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). Bell's twinpod has long been considered to be primarily restricted to Niobrara shale. The occurrence on Fountain and Ingleside formation sandstones such as within this PCA is little studied.

Natural Heritage element occurrences at the Indian Creek Hogback PCA.

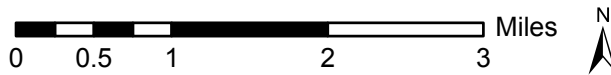
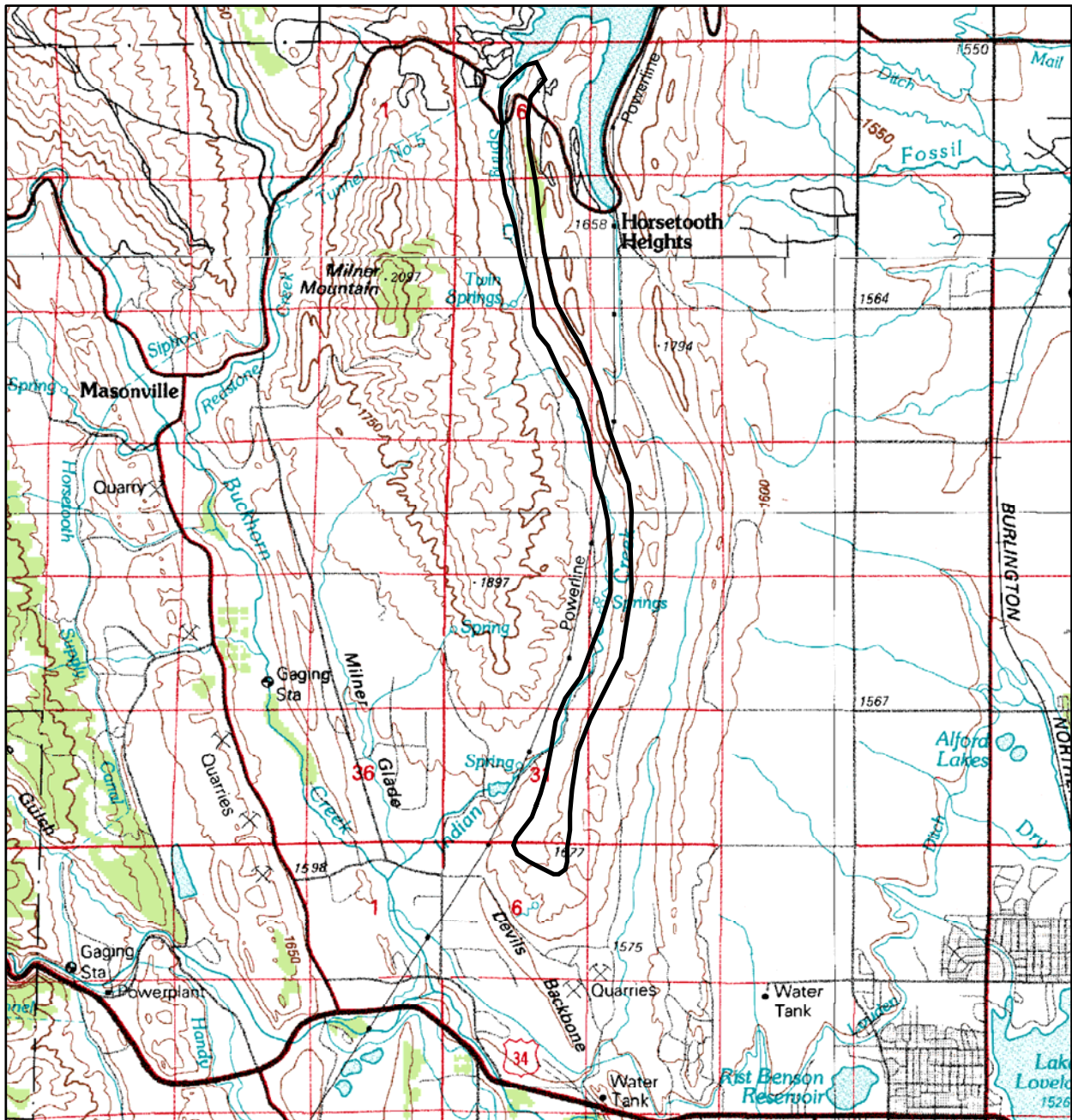
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				B	6/9/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the known occurrence of Bell's twinpod, a small buffer to protect from direct disturbance, and adjacent apparently suitable habitat.

**Protection Comments:** The cliffs are protected from development as they are within Devil's Backbone and Rimrock open spaces.

**Management Comments:** Existing management appears to be satisfactory for the maintenance of the Bell's twinpod. Management issues include non-native invasive plants and trail placement. Some areas within the PCA are invaded by cheatgrass (*Bromus tectorum*).




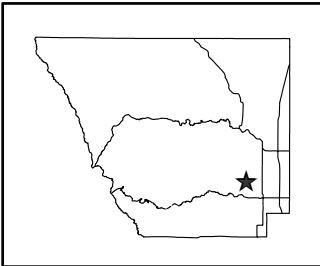
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 28. Indian Creek Hogback Potential Conservation Area B2: Very High Biodiversity Significance

## Lone Pine

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

This PCA supports a fair (C-ranked) occurrence of a plant community that is critically imperiled (G1G2) on a global scale.

**Protection Urgency Rank: P5 (Low urgency)**

The PCA is within the Lone Pine State Wildlife Area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrences. The primary management concerns are control of non-native invasive plants and simulation of a natural fire regime.

**Location:** This PCA is located within the Lone Pine State Wildlife Area about eight miles west of the town of Livermore.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Livermore Mountain  
T9N R71W Sections 4, 8, and 9

**Size:** 155 acres (63 ha)

**Elevation:** 6400 – 6640 ft. (1950 – 2025 m)

**General Description:** Dry rolling to steep slopes at the lower end of the ponderosa pine (*Pinus ponderosa*) zone. The slopes are primarily south facing and have rocky soils derived from granitic geology.

**Biodiversity Comments:** This site contains a fair (C-ranked) occurrence of a plant community that is critically imperiled on a global scale.

Natural Heritage element occurrences at the Lone Pine PCA.

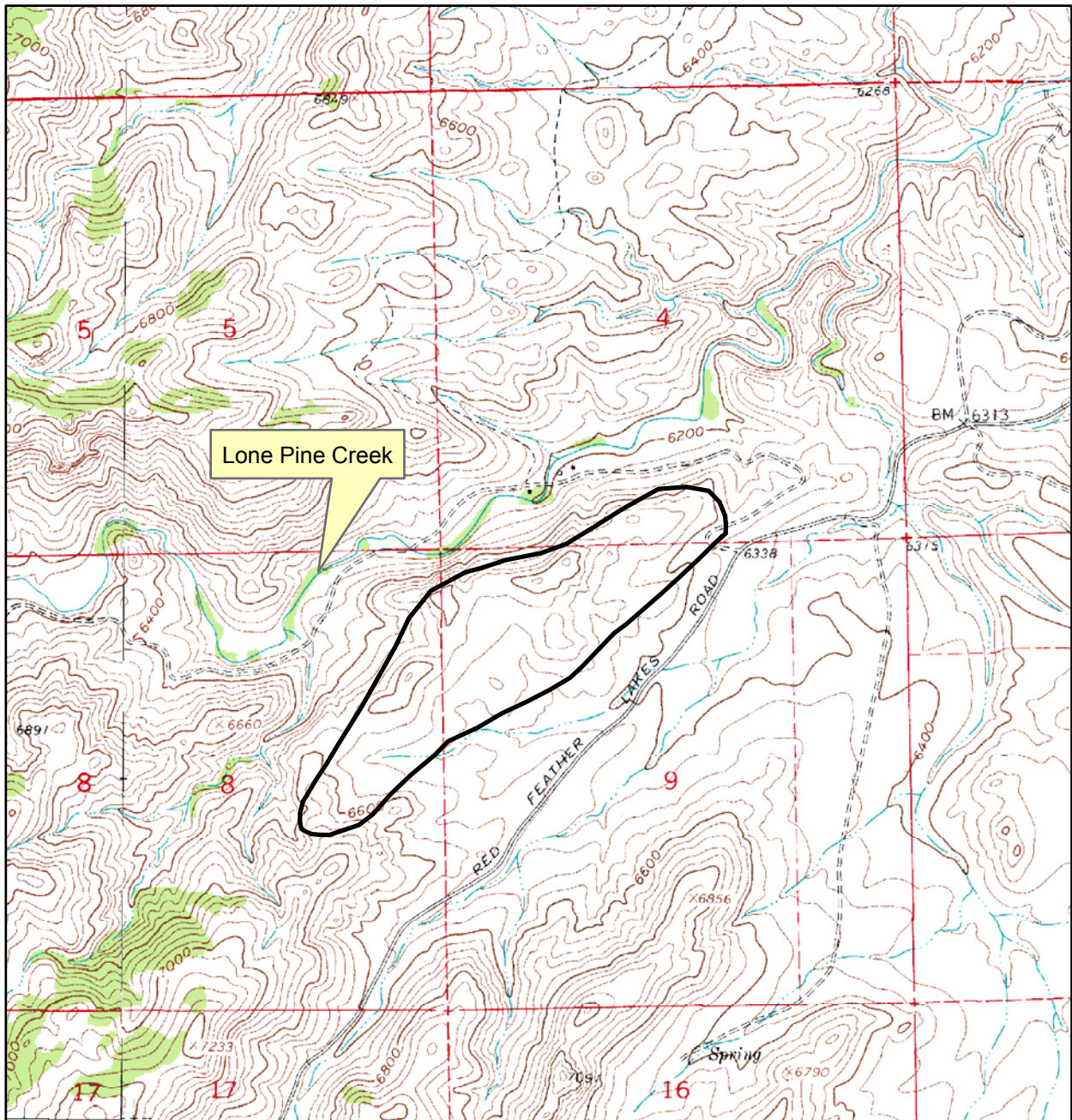
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<i>Purshia tridentata</i> / <i>Artemisia frigida</i> / <i>Stipa comata</i>	Mixed foothills shrubland	G1G2	S1S2				B	9/3/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the occurrence and a downslope buffer to incorporate a part of the area necessary for simulation of a natural fire regime. The lower part of the site near the Red Feather Lakes Road is highly disturbed and invaded by exotic species and has therefore been excluded from the site.

**Protection Comments:** The site is protected as part of the Lone Pine State Wildlife Area.

**Management Comments:** The primary management concerns within the PCA are invasion by non-native grasses including cheatgrass (*Bromus tectorum*) and the simulation of a natural fire regime.




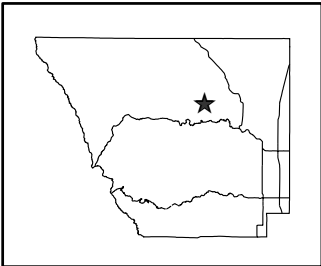
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Livermore Mountain, 40105-G3          Haystack Gulch, 40105-G4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 29. Lone Pine Potential Conservation Area  
 B2: Very High Biodiversity Significance



## Lone Pine Creek North

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

This PCA supports excellent (A-ranked) occurrences of the globally imperiled Larimer aletes (*Aletes humilis*) (G2G3) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (G2).

**Protection Urgency Rank: P5 (Low urgency)**

The US Forest Service and the State own almost the entire site. The eastern portion includes State Land Board and Lone Pine State Wildlife Area property.

**Management Urgency Rank: M4 (Low urgency)**

Current management appears adequate to maintain the quality of the element occurrences.

**Location:** The site is approximately 10 miles west of the town of Livermore. Lone Pine Creek forms the southern boundary of the site.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Haystack Gulch  
 T9N R71W Section 6  
 T9N R72W Sections 1 and 2  
 T10N R71W Section 31  
 T10N R72W Sections 14-16, 21-28, and 33-36

**Size:** 4976 acres (2014 ha)

**Elevation:** 6600 – 8053 ft. (2012 – 2455 m)

**General Description:** The site is characterized by large granitic outcrops within the ponderosa pine (*Pinus ponderosa*) dominated zone of the foothills.

**Biodiversity Comments:** This site contains two excellent occurrences of Larimer aletes and an excellent occurrence of Rocky Mountain cinquefoil. These plants are restricted to outcrops of Silver Plume granite within a small area of Colorado.

Natural Heritage element occurrences at the Lone Pine Creek North PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				A	7/23/94
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				A	6/30/97
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				E	5/29/94
<i>Potentilla rupincola</i>	Rocky Mountain cinquefoil	G2	S2			FS	A	5/25/97

Plant Communities								
<i>Pinus ponderosa/Leucopoa kingii</i>	Ponderosa pine/spike fescue woodland	G3	S3				AB	9/13/94

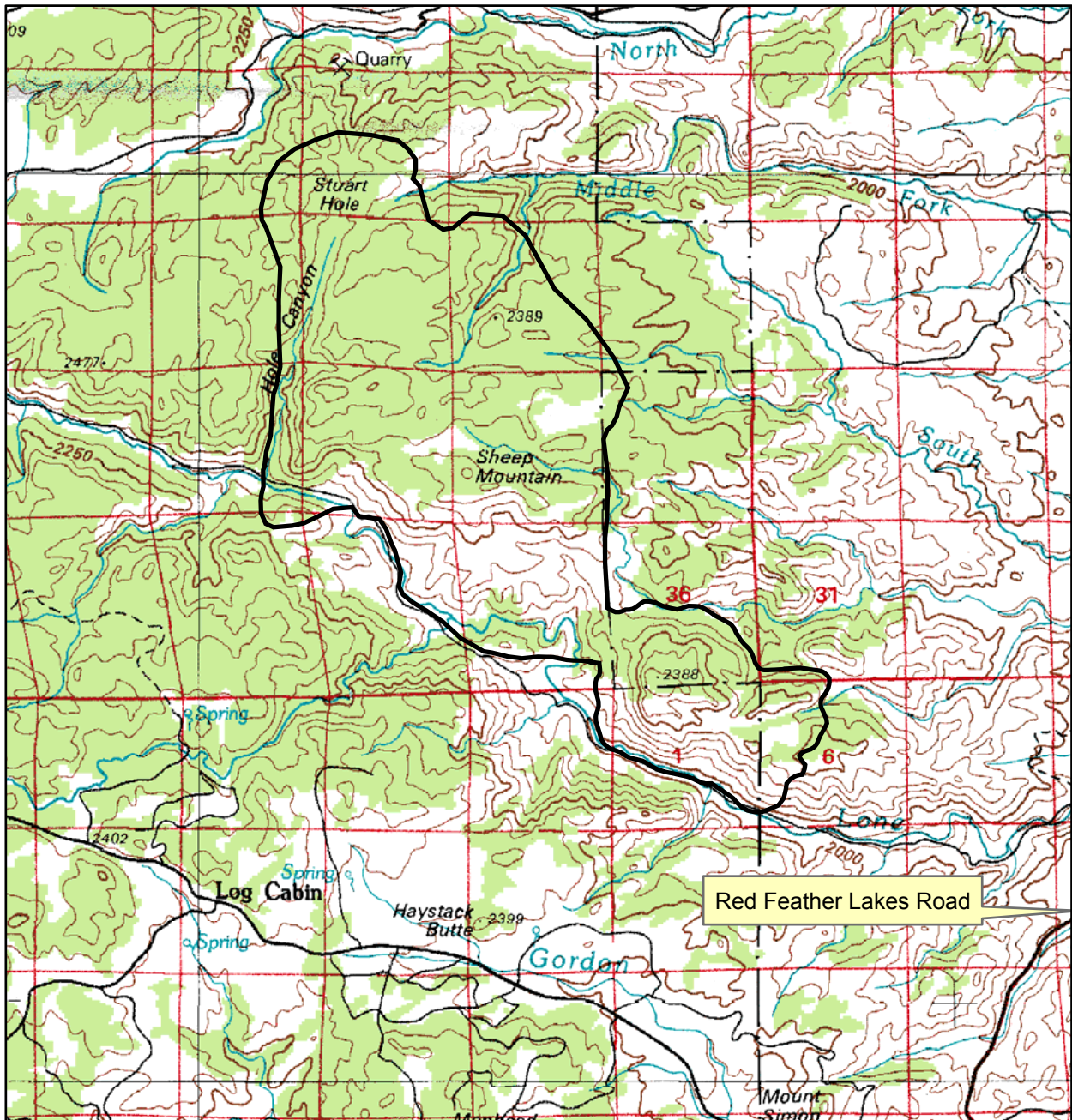
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the granite outcrops that support the rare plant occurrences and adjacent forested habitats. The site allows for the functioning of all ecological processes except for fire. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** The site is almost entirely owned by the U.S. Forest Service and the State of Colorado. The eastern edge of the site is within the Lone Pine State Wildlife Area.

**Management Comments:** No serious management needs are known or anticipated, but the site should be monitored for possible changes in status.




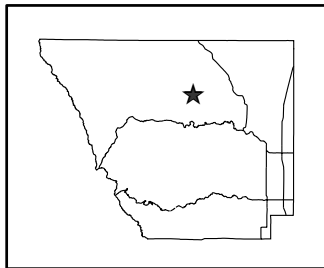
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 30. Lone Pine Creek North Potential Conservation Area B2: Very High Biodiversity Significance

## Lovers Leap

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

This PCA contains an excellent occurrence of globally imperiled (G2) Rocky Mountain cinquefoil (*Potentilla rupincola*) and an extant occurrence of globally imperiled (G2G3) Larimer aletes (*Aletes humilis*).

**Protection Urgency Rank: P2 (High urgency)**

The site is privately owned as a mixture of large ranches and 35-acre parcels. The large ranches are susceptible to the high development pressures in the area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management actions to control non-native plants may be needed to maintain the current quality of the element occurrences.

**Location:** Large granitic outcrops immediately west and northwest of Virginia Dale. Highway 287 bisects this PCA.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Virginia Dale and Cherokee Park

T11N R71W Sections 4-6

T12N R71W Sections 28-33

**Size:** 2073 acres (839 ha)

**Elevation:** 6800 – 7400 ft. (2073 – 2256 m)

**General Description:** This site is defined by large granitic outcrops surrounded by a grassland and shrubland mosaic. The granite outcrops and associated granitic soils support Larimer aletes and Rocky Mountain cinquefoil. Fish and Dale creeks run through the site. The dominant vegetation consists of ponderosa pine (*Pinus ponderosa*), waxflower (*Jamesia americana*), mountain mahogany (*Cercocarpus montanus*), wax currant (*Ribes cereum*), cinquefoil (*Potentilla* spp.), buckwheat (*Eriogonum* sp.), prickly pear cactus (*Opuntia* sp.), blue grama (*Bouteloua gracilis*) and other grasses, with about 40 percent cover composed of bare rock and gravel. Lichens are prevalent on the granite and *Selaginella* is a common ground cover. The Dale Creek riparian area is degraded from its natural condition but recoverable. It is dominated by alder (*Alnus incana*), river birch (*Betula occidentalis*), coyote willow (*Salix exigua*), mountain maple (*Acer glabrum*), golden currant (*Ribes aureum*), bluebell (*Campanula rotundifolia*), and mixed graminoids. The site includes various unpaved roads and incorporates a section of Highway 287.

**Biodiversity Comments:** This site includes an excellent (A-ranked) and a small (C-ranked) occurrence of the globally imperiled (G2) Rocky Mountain cinquefoil (*Potentilla rupincola*). The site also contains an extant but unranked occurrence of the globally imperiled (G2G3) Larimer aletes (*Aletes humilis*). Rocky Mountain cinquefoil and Larimer aletes are Colorado endemics and are restricted to outcrops of Silver Plume granite. The upland plant communities within the site are in good to excellent condition

Natural Heritage element occurrences at the Lovers Leap PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Aletes humilis</i>	Larimer aletes	G2G3	S2S3				E	7/31/96
<b><i>Potentilla rupincola</i></b>	<b>Rocky Mountain cinquefoil</b>	<b>G2</b>	<b>S2</b>			<b>FS</b>	<b>A</b>	<b>6/23/04</b>
<i>Potentilla rupincola</i>	Rocky Mountain cinquefoil	G2	S2			FS	C	8/3/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site boundary encompasses the granite outcrops that are known to support occurrences of two rare plant species, intervening potential habitat, as well as a portion of the surrounding high quality plant communities as a buffer to protect against direct disturbance. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

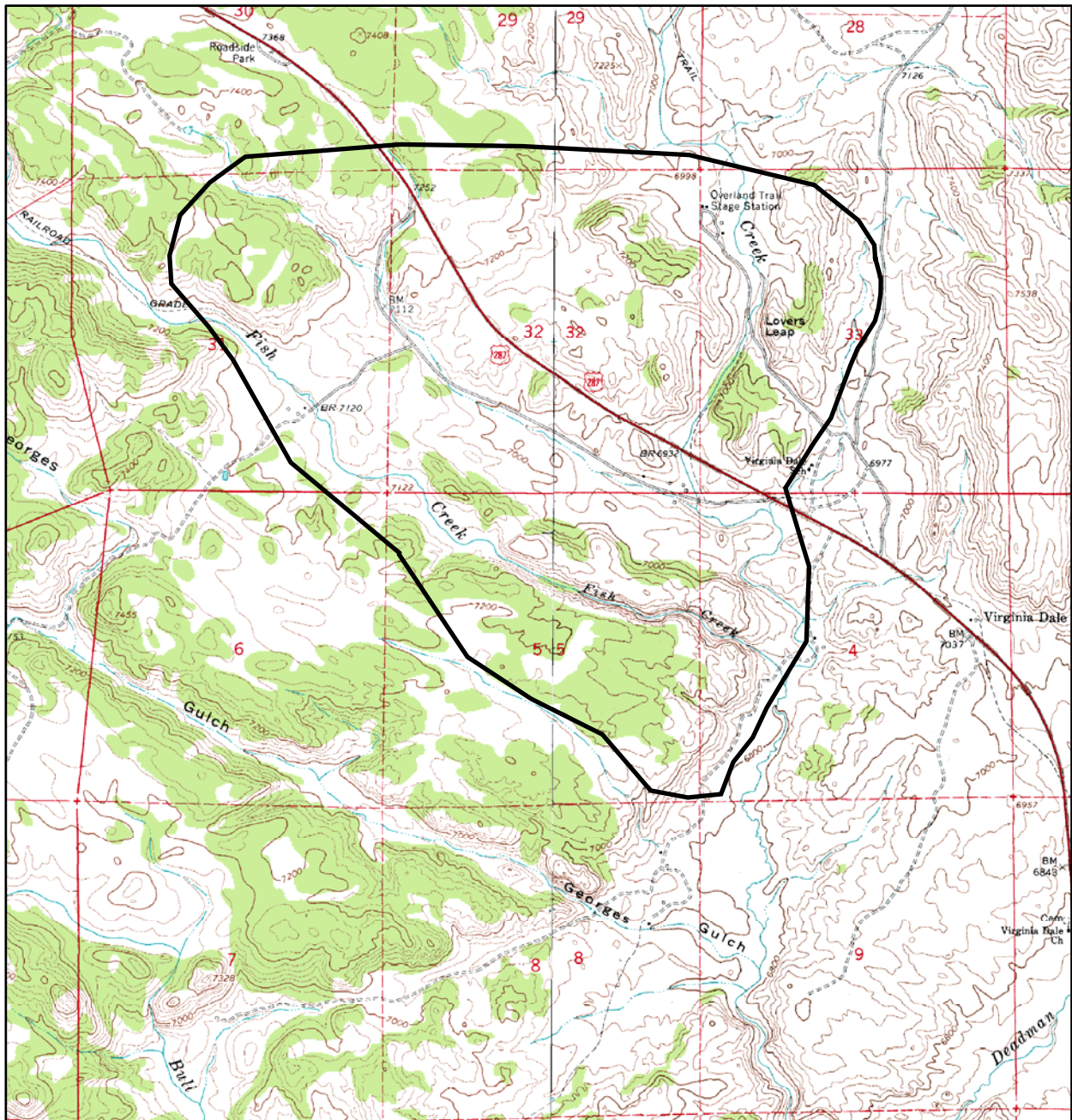
**Protection Comments:** Development pressures are very high in the Virginia Dale area; the remaining large ranches are susceptible to development as 35-acre parcels. Residential development could decrease the overall quality and condition of this site by fragmenting the occurrence and/or introducing non-native plant species.

**Management Comments:** Management actions to control non-native plants may be needed to maintain the current quality of the element occurrences. The spread of non-native plant species threatens to degrade the associated plant communities and could threaten the integrity of the rare plant occurrences, particularly where these species are found off of the large rock outcrops. Cheatgrass (*Bromus tectorum*) is very dense in scattered areas, and hound's tongue (*Cynoglossum officinale*) and mullein (*Verbascum thapsus*) occur along Dale Creek. Monitoring and controlling the spread of these and other non-native plant species would help prevent further degradation of the high quality plant communities. The state highway department should be contacted to secure a management agreement and assure protection for the plants on the roadside of Highway 287.



**Photo 4. Rocky Mountain cinquefoil habitat at the Lovers Leap PCA**

*photo by D.G. Anderson*




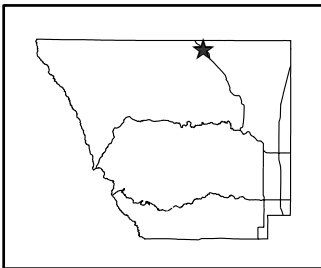
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Virginia Dale, 40105-H3          Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 31. Lovers Leap Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Masonville Hogbacks

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

This site is drawn for a good (B-ranked) occurrence of the globally imperiled (G2G3 S2S3) mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) shrubland.

**Protection Urgency Rank: P3 (Moderate urgency)**

Some of the site is within the City of Fort Collins Bobcat Ridge Natural Area, City of Loveland property, or a conservation easement. Development pressures are high in this area and most private property has been subdivided.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. The primary management issue at this PCA is invasive species.

**Location:** This PCA includes the hogback just west of Masonville from Masonville south to Highway 34. The hogback is just east of Loveland's Glade Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Masonville and Horsetooth Reservoir

T5N R70W Sections 2 and 11

T6N R70W Sections 9, 10, 15, 16, 22, 23, 26, 27, 34, and 35

**Size:** 1392 acres (563 ha)

**Elevation:** 5400 – 5700 ft. (1646 – 1737 m)

**General Description:** The site is comprised of the westernmost north-south trending hogback within the foothills on the Front Range. The sandstone hogback is comprised of Fountain Formation, Ingleside Formation, Lyons Sandstone, and Lykins Formation, which are sandstones with calcareous elements. Mountain mahogany (*Cercocarpus montanus*) shrublands occupy shallow soils on the slopes of the hogback with sporadic small patches of grassland occupying deeper soils. The series of hogbacks in the area are surrounded by mountains (e.g., Milner Mountain, Horsetooth Mountain, and Green Ridge) that support ponderosa pine (*Pinus ponderosa*) ecological systems. Significant portions of the valleys below the hogbacks have been converted to hayfield or pasture with localized remnants of foothills grassland ecological system vegetation on knolls that were too rocky to plow. The hogback is incised by several perennial streams that have carved small canyons through the red sandstone. Shallow soils over calcareous sandstone bedrock; conditions are too dry for extensive colonization by ponderosa pine.

Portion of the site was formerly occupied by the Pulliam Ranch. The Pulliams have leased their land in recent years for cattle grazing, irrigated and non-irrigated crop (alfalfa and wheat), hunting, and salvage logging (since the fire in 2000). Much of the grasslands have been converted to hay crop production. There is a historic cabin (circa 1896) and outbuildings in the valleys to the west of the hogback suggesting the valley has been in agriculture of some form for a long time. There are also teepee rings in the vicinity.

There are several quarries on this hogback, largely restricted to the eastern side. Additionally, land has been cleared for an airstrip on top of the ridge and there is residential as well as agricultural development on both sides of the site.

**Biodiversity Comments:** This site is drawn for a good (B-ranked) occurrence of the globally imperiled (G2G3 S2S3) mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) shrubland. The site also supports a good occurrence of the globally vulnerable (G3 S3) mountain mahogany/Scribner's needlegrass (*Cercocarpus montanus/Stipa scribneri*) shrubland.

Natural Heritage element occurrences at the Masonville Hogbacks PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plant Communities</b>								
<i>Cercocarpus montanus/ Stipa neomexicana</i>	<b>Mountain mahogany/ New Mexico feathergrass foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>				<b>B</b>	<b>8/10/04</b>
<i>Cercocarpus montanus/ Stipa scribneri</i>	Mountain mahogany/ Scribner's needlegrass foothills shrubland	G3	S3				B	8/25/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site comprises the hogback ridge between major roads (Highway 34 and 27 Road), although it bisects 29 Road in its extension south to Glade Reservoir. The site was drawn to eliminate residential, agricultural, and industrial (quarries) development on the east side of the hogback.

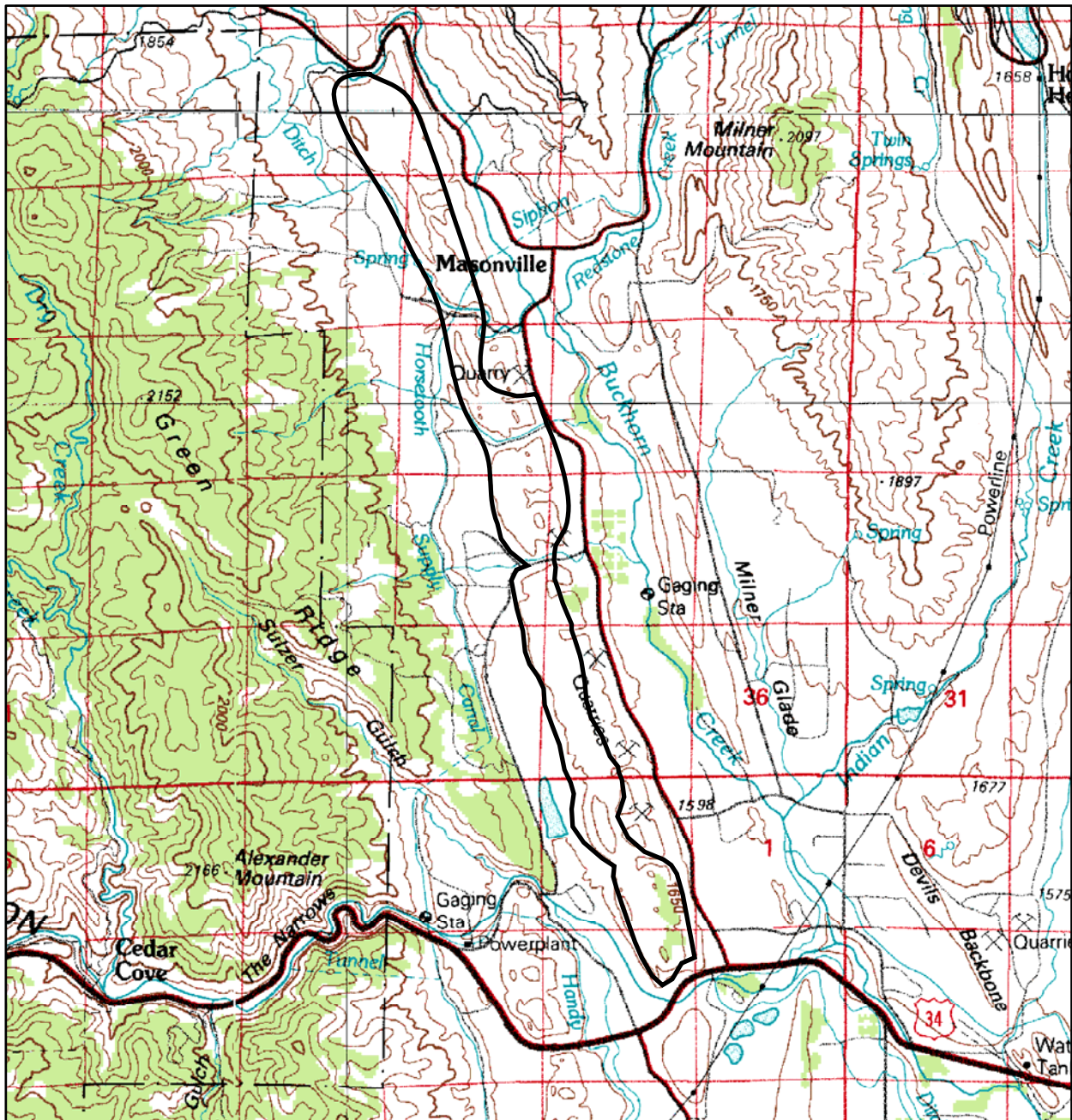
**Protection Comments:** Portions of the site are contained within the City of Fort Collins Bobcat Ridge Natural Area, City of Loveland property, and a conservation easement. However, adjacent land parcels have quarries, an air strip, residential development and other uses that decrease the quality of landscape context.

**Management Comments:** Although these mountain mahogany communities are somewhat resistant to invasive weeds, there are pockets of weedy infestation, especially by cheatgrass (*Bromus tectorum*), which has expanded from the pasture and hayfields below as well as colonizing patches at higher elevations just below the cliffs, likely where the rocks have fallen from the eroding bluffs causing localized disturbance. Control or eradication of these species would reduce this threat to the occurrences.





**Photo 5. Mountain mahogany shrublands at the Masonville Hogbacks PCA.**  
*photo by S. Neid*




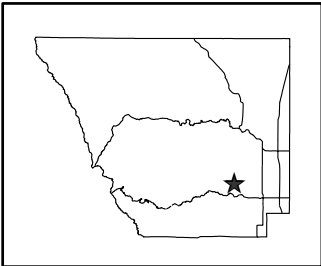
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 32. Masonville Hogbacks Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Park Creek Hogback

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

This PCA supports an excellent (A-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant. This is the most outstanding occurrence of this species range wide.

**Protection Urgency Rank: P1 (Very high urgency)**

Protection actions are needed immediately to ensure the high quality of this site is maintained. Currently, three landowners own the majority of the site. Development pressures are high in the area and most of the PCA has no protection status.

**Management Urgency Rank: M4 (Low urgency)**

Current management appears to be adequate to maintain the quality of the element occurrences. Management needs may increase if grazing, recreation, or road use increase.

**Location:** This PCA includes about seven miles of north-south trending hogback ridge located approximately two miles southwest of the town of Buckeye. Owl Canyon Road (72 Road) traverses the hogback approximately 3½ miles east of Highway 287.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Livermore, Buckeye, and Laporte

T10N R69W Sections 19-21, 28, 29, 32, and 33

T9N R69W Sections 4, 5, 9, 16, 17, 20, and 21

**Size:** 2010 acres (814 ha)

**Elevation:** 5400 – 5700 ft. (1650 – 1740 m)

**General Description:** The dominant feature of this site is a hogback composed of Niobrara shale. The calcareous shale is exposed for several miles and supports the largest documented occurrence of Bell's twinpod (*Physaria bellii*). Most of the outcrop is sparsely vegetated mountain mahogany (*Cercocarpus montanus*) shrublands. In some areas, the mountain mahogany with New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) (G2G3) community occurs.

Park Creek flows south along the west side of the hogback and then cuts through the hogback at Road 70, one mile south of Owl Canyon Road. The hogback and Bell's twinpod continue ½ mile south of Road 70. The hogback continues another five miles south beyond the PCA boundary; however, that reach has been strip-mined and the surface remains highly altered. Many Bell's twinpod plants occur on the tailings but not in the natural setting of the plants within the PCA.

North Poudre Reservoir No. 15 occurs immediately east. Access to North Poudre Reservoir No. 15 is through the site. An access road runs along the top of the hogback for over one mile but does not seem to impact the occurrences.

**Biodiversity Comments:** This site contains an excellent occurrence of the Bell's twinpod. This occurrence is exemplary for the species due to its large size and high quality condition. The extent, condition, and geographic position (the northernmost known extent of the species' range) of these occurrences indicate this site's biodiversity significance. This species is restricted to certain shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to this site. The proximity of the Bell's twinpod range to the rapidly developing Front Range has threatened or degraded many occurrences. The site also supports a good occurrence of the globally imperiled (G2G3) mountain mahogany-New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) plant association.

Natural Heritage element occurrences at the Park Creek Hogback PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Physaria bellii</i>	<b>Bell's twinpod</b>	<b>G2</b>	<b>S2</b>				<b>A</b>	<b>5/19/04</b>
<i>Physaria bellii</i>	<b>Bell's twinpod</b>	<b>G2</b>	<b>S2</b>				<b>B</b>	<b>5/4/04</b>
<b>Plant Communities</b>								
<i>Cercocarpus montanus/Stipa neomexicana</i>	<b>Mountain mahogany/ New Mexico feathergrass foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>				<b>B</b>	<b>6/11/96</b>

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site boundary includes all known occurrences and adjacent areas believed to be sufficient to provide the necessary ecological processes for continued survival of the elements. The PCA excludes the area to the south where the Niobrara has been mined and the surface is highly disturbed. This PCA is the northernmost known extent of Bell's twinpod.

**Protection Comments:** The majority of the hogback is privately owned. Holcim Inc. owns about 1-½ mile of the hogback; this portion has not been mined and remains in good condition. Two large privately owned ranches cover about 2 miles and 2-½ mile of the hogback, respectively. About ¾ mile of the hogback is protected as State Land Board Stewardship Trust land. The privately owned portions have no protection status. Development pressures are high in the area and many surrounding properties have become 35-acre parcels. Limestone mining of the Niobrara Formation is another potential protection issue.

**Management Comments:** Existing management appears to be satisfactory for the maintenance of the Bell's twinpod and the natural community; therefore, there appears to be no urgency as long as grazing intensity is not significantly increased. Management issues may arise in the future if recreation or road use increases.



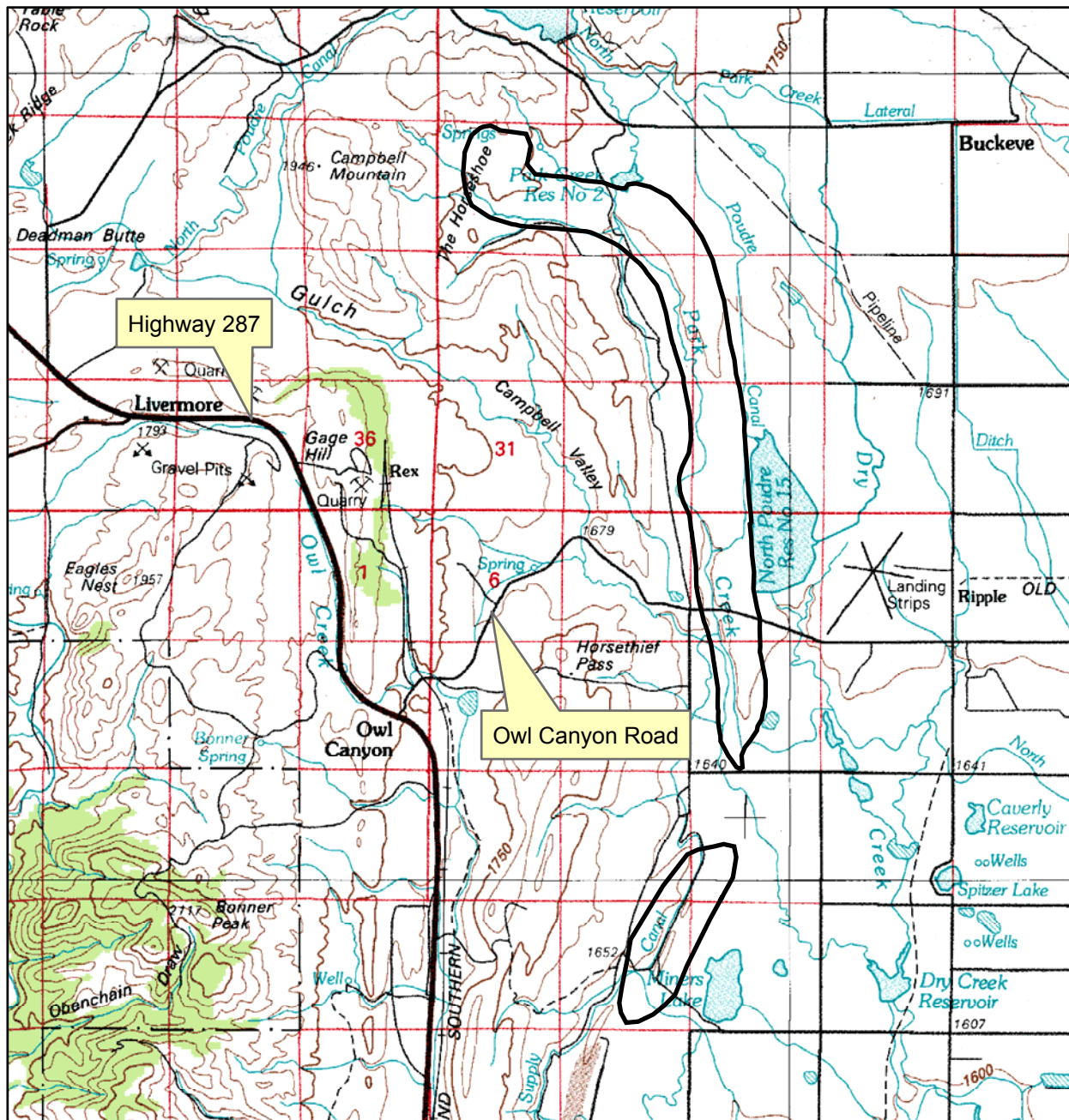
**Photo 6. Niobrara Formation hogbacks at the Park Creek Hogbacks PCA.**

*photo by G. Doyle*



**Photo 7. Bell's twinpod at the Park Creek Hogbacks PCA.**

*photo by G.. Doyle*




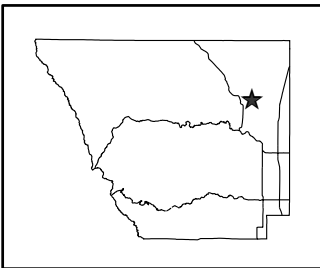
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 33. Park Creek Hogback Potential Conservation Area B2: Very High Biodiversity Significance

## Phantom Canyon

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

This site supports an excellent (A-ranked) occurrence of the globally imperiled (G2G3) Larimer aletes (*Aletes humilis*) and a good (B-ranked) occurrence of the globally imperiled Rocky Mountain cinquefoil (*Potentilla rupincola*).

**Protection Urgency Rank: P4 (Low urgency)**

Most of the PCA is within The Nature Conservancy's Phantom Canyon Preserve.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrences. The primary management issues is non-native invasive species.

**Location:** This PCA is approximately 7.5 air miles northwest of the town of Livermore. The preserve includes most of the Phantom Canyon proper, below Halligan Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Virginia Dale and Livermore Mountain  
T10N R70W Sections 7 and 18  
T10N R71W Sections 1-4, 10-14, and 34

**Size:** 2578 acres (1043 ha)

**Elevation:** 6000 – 6600 ft. (1829 – 2012 m)

**General Description:** Phantom Canyon is one of the few roadless canyons on the Front Range of Colorado. The canyon is a spectacular geological feature within igneous and metamorphic substrates. Extensive cliffs and adjacent shrub and grassland habitat are included in the area. Carved by the North Fork Cache la Poudre River, the canyon is nearly invisible to approaches through the surrounding prairie. The steep, gravelly slopes of the canyon walls are punctuated by granitic rock outcrops that support rare, endemic plant species (*Aletes humilis* and *Potentilla rupincola*). Cliff-dwelling animals are common in the vicinity, e.g. White-throated swifts, Violet-green Swallows, and Canyon Wrens. Several Golden Eagles and Prairie Falcons use the area for breeding and hunting. Townsend's Big-eared bats are also historically known to have used the canyon.

The river flows all year to provide for a non-native trout fishery. Flow is maintained by agreement with upstream providers. The riparian zone is a composite of grasslands, shrublands, and woodland natural communities. Although the hydrological regime is altered, it is expected that large flood events will still occur and therefore maintain some of the natural community dynamics known for these riparian systems. Many exotic grasses dominate the riparian understory, but the overstory remains in native vegetation. Moss' elfin utilize the rock outcrops adjacent to the riparian area. Relative isolation of the canyon is indicated by the large numbers of American Dippers breeding along the river course.

North-facing canyon slopes are dominated by shrubs and coniferous trees, including mountain mahogany (*Cercocarpus montanus*), three-leaf sumac (*Rhus trilobata*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*). This vegetation occurs in pockets. These woodlands support a diverse array of birds from the montane forest zone and the shrubland zone. It is not uncommon to find Pygmy Nuthatches, Steller's Jays, Rufous-sided Towhees, and Lazuli Buntings throughout the area. South-facing slopes are more grassy and shrubby. Grasses are mostly native species with the exception of Japanese brome (*Bromus japonicus*). The dominant shrub of these slopes is the mountain mahogany, with some bitterbrush (*Purshia tridentata*) and Rocky Mountain juniper (*Juniperus scopulorum*). These shrubs are largely contained within the canyon; their numbers decline sharply a short distance from the canyon. Surrounding grasslands are classified as midgrass prairie in their present condition. These grasslands are rather rich in composition and dominated by native species. Much of the area can be described as needle-and-thread/blue grama grassland (*Stipa comata-Bouteloua gracilis*), which dominates a mosaic of other associations on the rolling hills to the east of the Phantom Canyon Preserve. Within the preserve boundaries, grazing has been managed with conservation in mind and the grassland structure is maintained as midgrass prairie. Grasslands birds are common in this habitat, particularly Vesper Sparrows, Lark Sparrows, Horned Larks, and Common Nighthawks. Ground squirrels, mule deer, and pronghorn are also common.

**Biodiversity Comments:** This site includes an excellent (A-ranked) and a good (B-ranked) occurrence of the globally imperiled Larimer aletes (*Aletes humilis*) and Rocky Mountain cinquefoil (*Potentilla rupincola*). The site also supports a fair (C-ranked) occurrence of the globally imperiled (G2 S2) mountain mahogany/ needle-and-thread (*Cercocarpus montanus/Stipa comata*) shrubland as well as a good (B-ranked) occurrence of the state rare (GU S2) mountain mahogany/mountain muhly (*Cercocarpus montanus/Muhlenbergia montana*) shrubland. The ponderosa pine woodlands form a mosaic with mountain mahogany shrublands on the canyon rim.

Additional values include an excellent fisheries program for exotic trout, neotropical migratory bird habitat, grasslands habitat, and numerous large game animal populations, particularly in the winter. The scenery in the canyon is difficult to match.

Natural Heritage element occurrences at the Phantom Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plants</b>						
<i>Potentilla rupincola</i>	<b>Rocky Mountain cinquefoil</b>	<b>G2</b>	<b>S2</b>	<b>FS</b>	<b>B</b>	<b>7/31/94</b>
<i>Aletes humilis</i>	<b>Larimer aletes</b>	<b>G2G3</b>	<b>S2S3</b>		<b>A</b>	<b>5/1/95</b>
<i>Besseya wyomingensis</i>	Wyoming kittentails	G5	S1		A	6/8/01
<b>Plant Communities</b>						
<i>Cercocarpus montanus/Stipa comata</i>	Mountain mahogany/ needle-and-thread foothills shrubland	G2	S2		C	5/18/94



<i>Cercocarpus montanus/ Muhlenbergia montana</i>	Mountain mahogany/ mountain muhly foothills shrubland	GU	S2		A	8/17/04
<i>Pinus ponderosa/ Leucopoa kingii</i>	Ponderosa pine/ spike fescue woodland	G3	S3		B	8/17/04
<b>Butterflies</b>						
<i>Callophrys mossii schryveri</i>	Moss' elfin	G4T3	S2S3		C	5/1/95
<b>Mammals</b>						
<i>Corynorhinus townsendii pallescens</i>	Townsend's big-eared bat	G4T4	S2		H	6/93

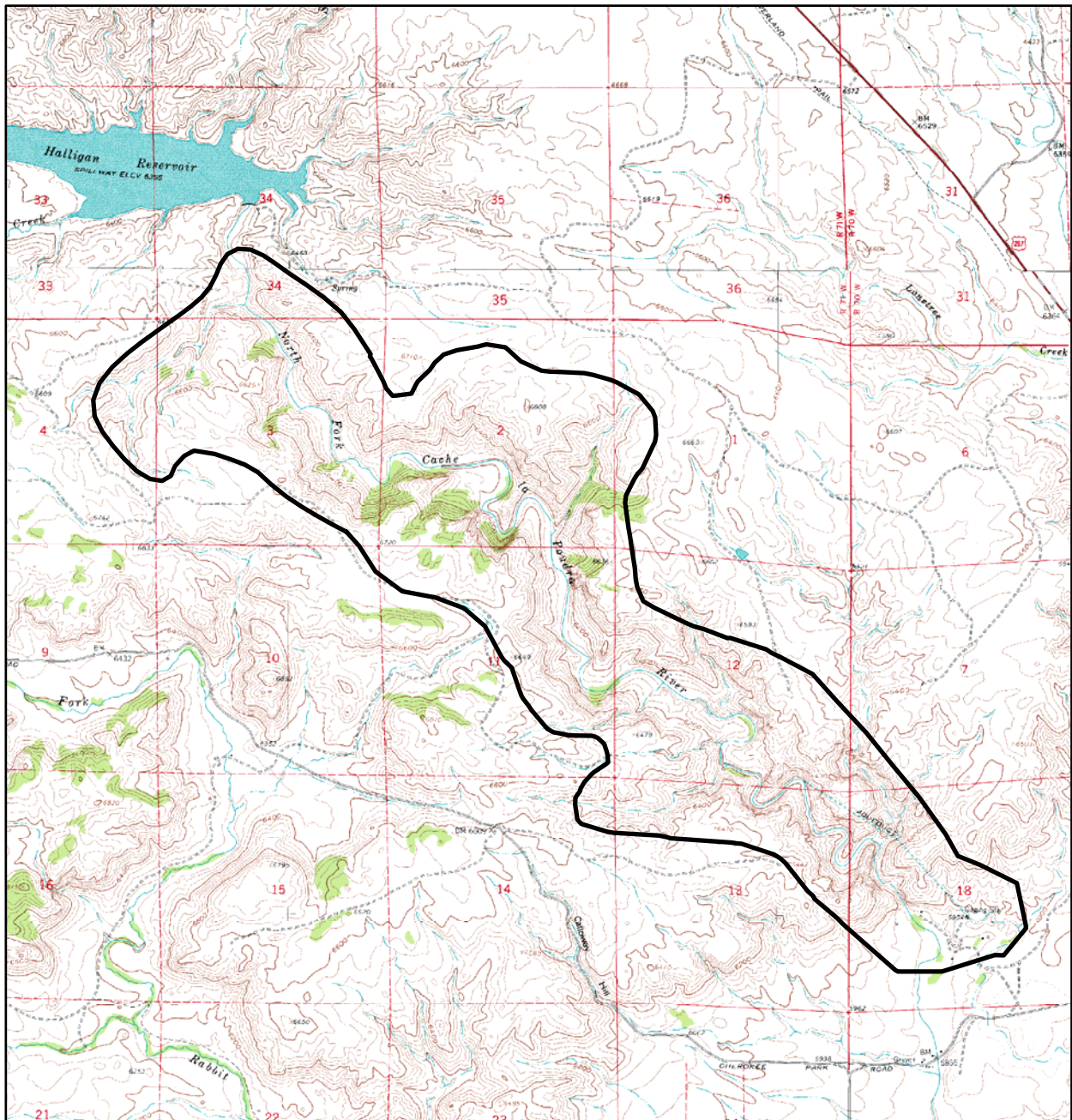
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary incorporates all known occurrences of rare or imperiled species. Buffers to the canyon habitats include significant areas on and adjacent to the canyon rims. The boundary is drawn to protect the known occurrences and includes a buffer to protect against indirect disturbance.

**Protection Comments:** The Phantom Canyon site is largely owned by The Nature Conservancy. Several conservation easements are held on portions of the preserve and its buffer. Rapid growth of subdivisions occurs largely on the south side of the canyon. Much of the Phantom Canyon Site is owned or under conservation easement by The Nature Conservancy. The preserve is used for education, donor programs, and fishing in addition to its more significant conservation values. The ichthyofauna is heavily altered and supported through a water lease agreement for winter water.

**Management Comments:** The largest threat to the ecology of the preserve is the invasive exotic vegetation. This is particularly troublesome in the canyon bottom, but extends onto the canyon slopes in many places; these are targeted by TNC's active weed management program. Cheatgrass (*Bromus tectorum*) occurs along the canyon rim in localized patches, some of which are dense. Canada thistle (*Cirsium arvense*) grows along the riparian corridor through the canyon. To maintain the present condition of the site, weed invasions must be controlled. Special care should be taken to take the path of least disturbance to the nesting Golden Eagles of the canyon. Consideration should be given to the possibility of restocking greenback cutthroat trout to this reach of the North Fork of the Cache la Poudre. Fire management will be beneficial to much of the vegetation, but caution should be used so that the butterfly community is not lost from the ecosystem or severely altered.




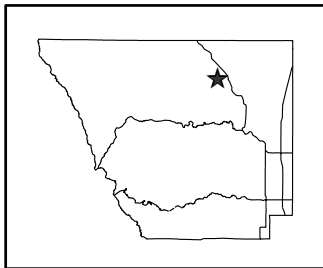
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Livermore Mountain, 40105-G3          Virginia Dale, 40105-H3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 34. Phantom Canyon Potential Conservation Area  
 B2: Very High Biodiversity Significance

## Rawhide Flats

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

This PCA supports many declining grassland species including five fair (C-ranked) occurrences of the globally imperiled (G2) Mountain Plover (*Charadrius montanus*).

**Protection Urgency Rank: P3 (Moderate urgency)**

Over half of the PCA is owned by the City of Fort Collins Utilities (Meadow Springs Ranch), City of Fort Collins (Soapstone), State Land Board, or Platte River Power Authority. The remainder of the PCA is privately owned either as large ranches or 35-acre mostly undeveloped parcels.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrences. Management issues within the PCA include livestock grazing, future recreational use, land application of biosolids, and non-native invasive plants.

**Location:** This PCA is in northwest Larimer County south of the Wyoming border, west of Interstate 25, north of Buckeye Road, and east of the interface with foothills shrublands. The PCA includes portions of Meadow Springs Ranch, Soapstone Ranch, Platte River Power Authority lands, and private property.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Carr West, Carr SW, Round Butte, Buckeye, Borie WY, and Emkay WY

T10N R68W, T10N R69W, T11N R67W, T11N R68W, T11N R69W, T12N R67W, T12N R68W, T12N R69W.

**Size:** 52,723 acres (21,336 ha)      **Elevation:** 5550 – 6400 ft. (1690 – 1950 m)

**General Description:** A large expanse of ecologically intact native shortgrass prairie covers much of northeastern Larimer County. The wide flat expanses and low rolling hills are interspersed with numerous swales and small drainages, and occasional bluffs or buttes. Much of the grassland is dominated by blue grama and buffalograss (*Bouteloua gracilis*-*Buchloe dactyloides*) (G4 S2?) with the taller western wheatgrass (*Pascopyrum smithii*) and needle-and-thread (*Stipa comata*) interspersed. The grasslands are more similar to the mixed grass prairie to the north than the shortgrass prairie found to the east on Pawnee National Grassland. Shrubs are generally sparse throughout the PCA. Low hills within the shortgrass prairie generally include stands of yucca (*Yucca glauca*) and the small bluffs or buttes that rise above the landscape are often covered with mountain mahogany (*Cercocarpus montanus*) shrublands. In the southern half of the PCA, intermittent drainages, or swales between hills, often support large patches of fourwing saltbush shrublands (*Atriplex canescens*/*Bouteloua gracilis*) (G3 S3).

This intact grassland supports many declining grassland species including abundant pronghorn and ground-nesting birds such as Lark Bunting, and McCown's Longspur.

Colorado Partners in Flight (2000) recognizes 14 grassland birds as conservation priorities due to declining populations. Eight of the 14 species (Swainson's Hawk, Ferruginous Hawk, Prairie Falcon, Mountain Plover, Burrowing Owl, Lark Bunting, Grasshopper Sparrow, and McCown's Longspur) have been documented within the PCA (T. VerCauteren, pers. comm. 2005). Similarly, The Nature Conservancy's Prairie Wings program has identified the "Unlucky 13" highest priority bird species of the Great Plains, selected according to conservation status and their role as indicators of overall prairie health (The Nature Conservancy 2004). Six of the "Unlucky 13" have been documented within the PCA (Ferruginous Hawk, Mountain Plover, Burrowing Owl, Lark Bunting, McCown's Longspur, and Chestnut-collared Longspur). Surveyors counted over 75 McCown's Longspurs within the PCA during 2004; most of these birds were males performing territorial displays. Habitat loss is the greatest threat to grassland bird species as land is converted to cropland or residential development.

Swift fox (*Vulpes velox*), another declining shortgrass prairie species (G3) has been documented within the PCA. Small prairie dog towns are present within the site, several of which support burrowing owl populations.

The grasslands within the PCA are used primarily for livestock grazing and have little human habitation. Numerous stock ponds and windmills and an occasional old homestead site can be found on the landscape. Numerous dirt and gravel roads and a railroad exist within the site. Bison currently graze on the Platte River Power Authority property.

The Rawhide Flats PCA represent a rare opportunity where imperiled species and significant natural communities can be protected in a landscape which still has the capability of having relatively natural, functional ecological processes (e.g., grazing and fire). Numerous threats to the natural heritage resources exist. The most serious threats include habitat fragmentation, physical destruction of habitat, invasion by non-native species, and alteration of natural disturbance regimes.

**Biodiversity Comments:** This PCA includes five fair (C-ranked) or extant occurrences of the globally imperiled (G2) Mountain Plover (*Charadrius montanus*). Twelve nests were located in 1992 and 7 nests were located in 1993. In 1996, nesting Mountain Plovers were observed at the site (R. Ryder - pers. comm.). Although this area is thought to be marginal habitat for the species, localized habitat or grazing patterns may allow for good nesting conditions. Also included within the PCA are other declining shortgrass prairie species including McCown's Longspur, Chestnut-collared Longspur, Ferruginous Hawk, swift fox, and black-tailed prairie dog.

This site, and its surroundings encompass large tracts of relatively natural prairie. Although this habitat is not uncommon regionally a large percentage in Larimer County has been destroyed by urban development or heavily altered by agricultural conversion. This site would protect not only several species imperiled at a global or state level, but would also protect many common species and a valuable part of Larimer County's natural heritage.

Natural Heritage element occurrences at the Rawhide Flats PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Birds</b>								
<b>Mountain Plover</b>	<b><i>Charadrius montanus</i></b>	<b>G2</b>	<b>S2B</b>		<b>SC</b>	<b>FS, BLM</b>	<b>C</b>	<b>1996</b>
Mountain Plover	<i>Charadrius montanus</i>	G2	S2B		SC	FS, BLM	E	6/96
<b>Mountain Plover</b>	<b><i>Charadrius montanus</i></b>	<b>G2</b>	<b>S2B</b>		<b>SC</b>	<b>FS, BLM</b>	<b>E</b>	<b>6/96</b>
Mountain Plover	<i>Charadrius montanus</i>	G2	S2B		SC	FS, BLM	D	6/12/96
<b>Mountain Plover</b>	<b><i>Charadrius montanus</i></b>	<b>G2</b>	<b>S2B</b>		<b>SC</b>	<b>FS, BLM</b>	<b>E</b>	<b>6/93</b>
<b>Mountain Plover</b>	<b><i>Charadrius montanus</i></b>	<b>G2</b>	<b>S2B</b>		<b>SC</b>	<b>FS, BLM</b>	<b>E</b>	<b>6/93</b>
Mountain Plover	<i>Charadrius montanus</i>	G2	S2B		SC	FS, BLM	H	6/2/92
Mountain Plover	<i>Charadrius montanus</i>	G2	S2B		SC	FS, BLM	H	6/78
Ferruginous Hawk	<i>Buteo regalis</i>	G4	S3B, S4N		SC	FS, BLM	BC	06/15/04
McCown's Longspur	<i>Calcarius mccownii</i>	G4	S2B			FS	A	07/03/04
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	G5	S1B			FS	E	05/1602
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	G5	S1B			FS	E	05/31/96
<b>Mammals</b>								
Swift fox	<i>Vulpes velox</i>	G3	S3		SC	FS	E	8/5/04
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	G3G4			SC	FS	E	8/24/04
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	G3G4			SC	FS	E	7/3/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary is intended to protect the grassland habitats necessary for the survival of the mountain plover. It is thought that this boundary will also protected viable populations of the numerous state rare bird species documented within this site. This boundary would protect a variety of habitats; bluffs for raptors, hill tops for larkspurs, mesic swales for savanna and grasshoppers sparrows, fence lines for loggerhead shrikes, windmills and trees around old home sites and bluffs for the ferruginous hawk, and open prairie for the mountain plovers. The boundary includes large intact shortgrass prairie parcels owned and managed as units as well as adjacent subdivided (35 acre) parcels. The northern boundary extends into Wyoming where the intact shortgrass prairie ecosystem continues beyond the boundary. Interstate 25 forms the eastern boundary of the PCA as the

highway likely forms a barrier for some of the species of interest in the PCA (especially pronghorn). Buckeye Road forms the southern boundary as lands south of Buckeye Road are more often cultivated, subdivided, or generally altered from their native condition. The boundary to the west includes unsurveyed private lands within the Rawhide Flats area that likely support the species of interest. These lands have been divided into 35-acre parcels but are generally undeveloped. Some cultivated lands are excluded on the edges, but some cultivated lands where they are surrounded by intact prairie are included. Roadside surveys by RMBO indicate the birds occur south of the boundary, however, the habitat there is fragmented with housing and tilled agricultural development. The boundary will also permit ecological processes to occur, on a scale that has biological significance.

**Protection Comments:** Over 30,000 acres of the PCA are large, adjacent parcels owned by City of Fort Collins Utilities, City of Fort Collins (Soapstone Natural Area), the State Land Board, or the Platte River Power Authority. The remaining portions are privately owned.

The Meadow Springs Ranch, occupying the eastern portion of the PCA, is owned by City of Fort Collins Utilities. Meadow Springs Ranch is managed for land disposal of biosolids and as well as leased for cattle grazing. The Soapstone Ranch in the northern portion of the PCA was purchased by the City of Fort Collins in 2004 and will become part of the City of Fort Collins Natural Areas Program. The State Land Board owns about 2300 acres leased for livestock grazing within the PCA. The southernmost portion of the PCA is owned by Platte River Power Authority and includes the Rawhide Power Plant. Platte River Power Authority Lands adjacent to Rawhide are used for livestock grazing. The privately owned portions include some larger private ranches (~2000 acres) but also include many small (35 acre) parcels. The large privately owned portions of the PCA have no formal protection status and are vulnerable to development as 35-acre parcels in the long term.

**Management Comments:** Management considerations within the PCA include livestock grazing, recreational uses, and weed management. Grazing regimes that maintain the natural mosaic nature of the shortgrass prairie are encouraged. The native landscape of the shortgrass prairie was a mosaic ranging from areas of excessive disturbance/grazing to areas barely grazed (Knopf 1996b). The shortgrass prairie birds depend on this natural variability (Colorado Partners in Flight 2000, Knopf 1996b). For example, Mountain Plovers and McCown's Longspur prefer areas of short and sparse grass while other birds such as Chestnut-collared Longspur prefer a short to medium height grasses (Knopf 1996b). Another issue associated with grazing is the type and amount of fencing between pastures and their impacts on wildlife movement (e.g., pronghorn). Pronghorn friendly fencing is an advantage. Encouraging a mosaic of natural ecosystems - short and mixed grass prairie, shrublands, riparian areas, and small patches of cottonwood trees - will benefit the range of species at the site.

Development of recreational uses is a critical management issue within the Soapstone Ranch portion of the PCA. Recreation will likely be introduced into an area with historically little human visitation. The trails that will be designed in the coming years should consider the range of potential impacts on the ecosystem. Considerations include

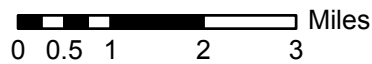
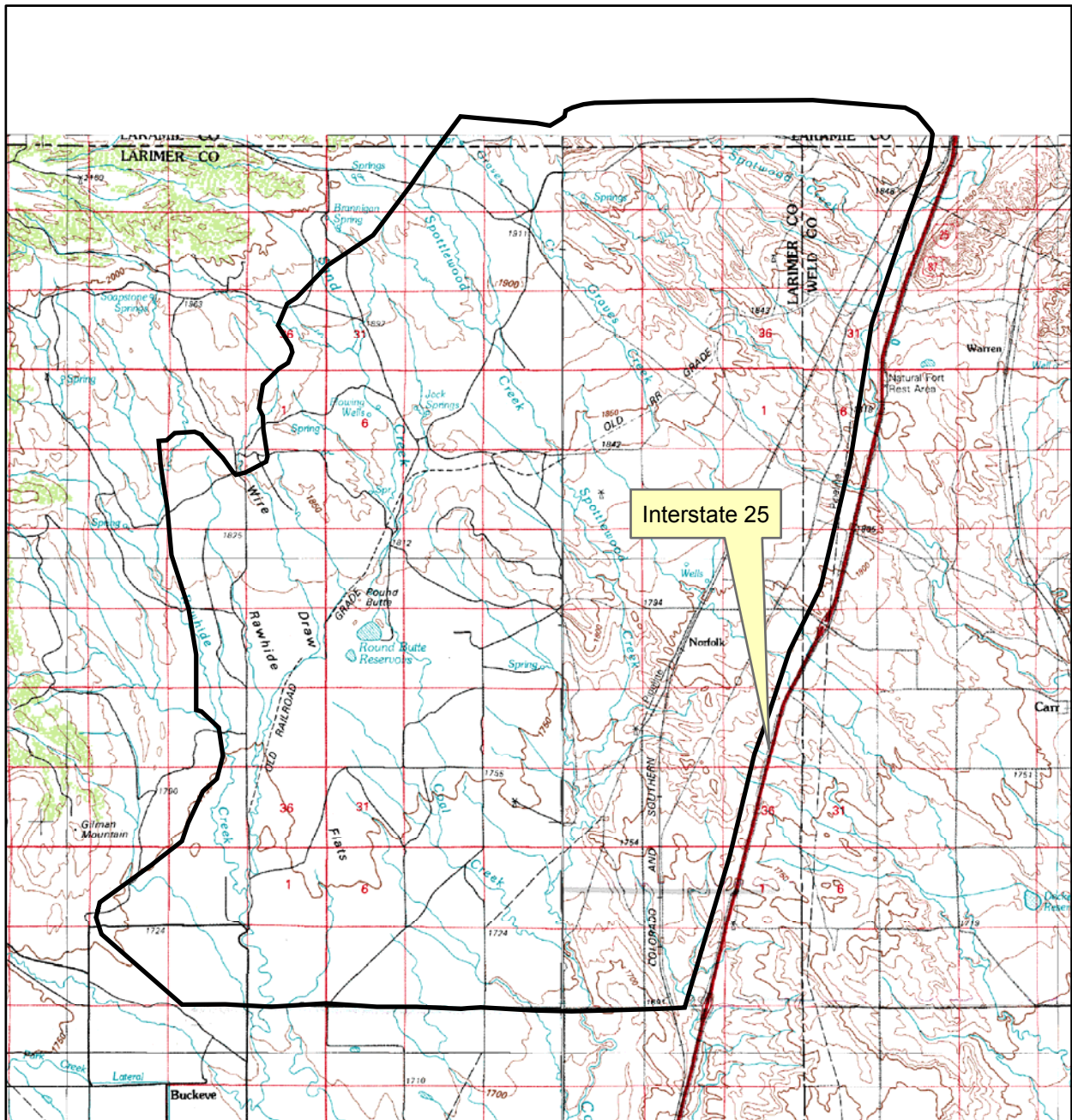
minimizing fragmentation by leaving large undisturbed areas of wildlife habitat where possible (Colorado Department of Natural Resources 1998). Miller *et al.* (1998) found lower nest survival for grassland birds adjacent to trails. They also found that grassland birds were more likely to nest away from trails with a zone of influence approximating 250 feet (75 meters). Assuming a zone of influence of 75 meters, one mile of trail through the shortgrass prairie affects about 60 acres of habitat. Ferruginous Hawk are especially prone to nest abandonment during incubation if disturbed and restriction of human encroachment within ½ mile of nest sites is recommended on at least a seasonal basis (Craig 1998).

The City of Fort Collins Utilities owns the Meadow Springs Ranch primarily for land disposal of biosolids. Additionally, the City leases livestock grazing rights to the Natural Fort Grazing Association. Long-term monitoring of plant species and percent cover within the shortgrass prairie is recommended to document the long-term effects of biosolids application on the native plant species. The shortgrass prairie evolved with low nitrogen availability; increased soil nitrogen may create conditions favorable for a shift in native species and increase in non-natives.

The PCA is generally relatively free of weeds. The primary current concern is the noxious weed dalmation toadflax (*Linaria dalmatica*). The weed issue will likely increase in importance in the future due to increases in human visitation and development.



**Photo 8. Shortgrass prairie on the Soapstone Ranch at the Rawhide Flats PCA.**  
*photo by S. Neid*




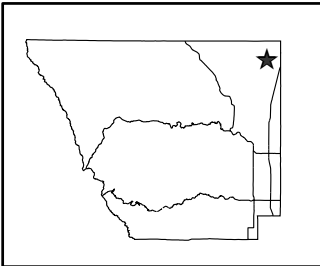
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1          Eaton, 40104-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 35. Rawhide Flats Potential Conservation Area  
 B2: Very High Biodiversity Significance



## Table Mountain Hogbacks

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

This site supports excellent (A-ranked) and good (B-ranked) occurrences of a globally imperiled (G2G3) foothills shrubland, mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*).

***Protection Urgency Rank: P2 (High urgency)***

Larimer County, City of Fort Collins, and their partners have recently purchased northern portions of this site for protection as open space. Other privately owned large ranches currently have no formal protection status and the area continues to be under heavy development pressure.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management issues at this PCA include invasive species and grazing.

**Location:** This site is north of the town of Livermore and extends to the Wyoming border.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Buckeye, Livermore, Livermore Mountain, Round Butte, Table Mountain, and Virginia Dale. Wyoming quadrangles Emkay and Granite  
T10N R69W Sections , 4, 6, 7, 9, 10, 18, 19, and 29-32  
T10N R70W Sections 1-5, 8-16, and 20-28  
T11N R69W Sections 4-9, 15-23, 26-30, and 32-35  
T11N R70W Sections 1-3, 10-17, 19-30, and 32-36  
T12N R68W Section 19  
T12N R69W Sections 19-36  
T12N R70W Sections 22-27, 35, and 36

**Size:** 51,018 acres (20,646 ha)      **Elevation:** 5900 – 7200 ft. (1798 – 2195 m)

**General Description:** This site is characterized by mountain mahogany (*Cercocarpus montanus*) shrublands that form a mosaic with rolling grasslands across a series of hogbacks and foothills at the transition zone with the Great Plains to the east. Elevations range from approximately 7200 feet at the northern end down to 5900 feet at the southern end of the site. The site is primarily comprised of a series of low, north-south trending, hogbacks with diverse bedrock geology, including sandstones, siltstones, and shales, that underwent folding during the Laramide Orogeny. Prominent geologic types include Fountain Formation, Ingleside Formation, Lyons Sandstone, and Lykins Formation on the west side and Sundance and Jelm Formation, Morrison Formation, several members of the Dakota Sandstone Group, Carlile Shale-Greenhorn Limestone-Graneros Shale-Mowry Shale Complex, Niobrara Formation, and Mitten Black Shale on the east side. The Soapstone Hills in the northeast corner of the site are capped by Ogallala Formation conglomerates and sandstones overlying the sedimentary layers listed above, which are exposed on steeper cliffs. Several prominent landmarks occur on the site and are formed

from sedimentary outcrops, including Table Mountain, Red Mountain, Red Nose, Steamboat Rock, and Grayback Ridge. Several perennial streams and intermittent drainages have carved out the Big Hole, a large bowl-shaped valley at the north end of the site, and the valley between the two primary hogback ridges. On east-facing slopes the sandstone bedrock is broadly exposed and mildly dissected. West-facing slopes are steep and erosion has exposed many layers of sedimentary bedrock in a strikingly colorful fashion. Sand Creek and Boxelder Creek have incised deep canyons through the western hogback and converge just south of Table Mountain, an isolated butte, as a broad, gravel wash. Within the canyons, cottonwoods (*Populus* spp.) and willows (*Salix* spp.) create a multi-layered structure of trees and shrubs over a diverse, mesic herbaceous layer adjacent to the perennial stream channels (see Boxelder Creek Headwaters PCA).

At least five different mountain mahogany natural communities occur within the site, their location strongly correlated with the different bedrock geology exposed within the site. Scattered ponderosa pine (*Pinus ponderosa*) or Rocky Mountain juniper (*Juniperus scopulorum*) occur sporadically on the eastern hogbacks, but form more dense stands comprised of ponderosa pine/spike fescue (*Pinus ponderosa/Leucopoa kingii*) woodland, an old growth indicator, on the west side of the site. Grasslands occur on deeper soils, especially in the valleys and swales. Characteristic species include needle-and-thread grass (*Stipa comata*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), and many forbs.

In the northeast corner of the site are the Soapstone Hills, an east-west trending series of steep hills and finely tessellated valleys. Steep ridges and cliffs occur on the southern edge overlooking the plains; these are commonly used as nest sites by raptors. The ridgetops and steep hills are dominated by mountain mahogany shrublands while the valleys below are occupied by grassland vegetation. Several of the grassland valleys have broad, gravel washes. Drainages descending from these slopes are dominated by scattered mesic shrubs, especially three-leaf sumac (*Rhus trilobata*). At the southern end of the site, complex folding and faulting has changed the orientation of the hogbacks. Grayback Ridge in the southwest corner is a low, sandstone ridge trending northeast to southwest. Shale hogbacks on the southeast side of the site are northwest to southeast trending. This shale barren is occupied by an as yet unclassified mountain mahogany barrens shrubland. Adjacent to the shale barrens are broad, flat plains to the east, this area grades into a saltbush (*Atriplex canescens*) shrubland that forms a mosaic with mid- and shortgrass prairie. Several two-track roads cross the site as the primary land use on the site is cattle ranching. The site is very scenic, surrounded in all directions by landscapes generally dominated by natural plant communities, and wildlife are abundant.

Ecological factors that support these occurrences include climate (largely rainfall), fire, and herbivory. Fire and herbivory are largely intact or restorable processes. The landscape lends itself to prescribed burning and herbivory can be adequately managed.

The area has been occupied by indigenous peoples for more than 5,000 years. Evidence of teepee rings, points, and buffalo wallows are readily observed and reported by local residents. Today, grazing and haying remain the major landuses.

**Biodiversity Comments:** This site supports excellent (A-ranked) and good (B-ranked) occurrences of the globally imperiled (G2G3 S2S3) mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) shrubland natural community. These include the largest occurrence known in Colorado and extend into Wyoming. The site also supports good (B-ranked) occurrences of the globally imperiled (G2 S2) mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*) shrubland, state imperiled (GU S2) mountain mahogany/mountain muhly (*Cercocarpus montanus/Muhlenbergia montana*) shrubland, and state vulnerable (GU S3) mountain mahogany/Griffith's wheatgrass (*Cercocarpus montanus/Elymus lanceolatus x Pseudoroegneria spicata*) shrubland. Almost all known occurrences of mountain mahogany/needle-and-thread grass and mountain mahogany/Griffith's wheatgrass shrublands are highly degraded by invasion of the non-native cheatgrass (*Bromus tectorum*). There are localized infestations in the occurrences on this site that have degraded their condition. Although some of the occurrences on this site are somewhat degraded, the fact that these plant communities occur in very large patches within a relatively natural landscape allow ecological processes (wildlife migration, fire, etc.) to function more naturally and increase their ecological value.

The area has very high values for wildlife and open space. There is abundant local interest in seeing that the ranching values remain in the area. There is also interest in the historical aspects of the site, especially the ranching history as well as prehistoric human history.

Natural Heritage element occurrences at the Table Mountain Hogbacks PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plants</b>						
<i>Cercocarpus montanus/ Stipa neomexicana</i>	<b>Mountain mahogany/ New Mexico feathergrass foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>		<b>A</b>	<b>9/19/96</b>
<i>Cercocarpus montanus/ Stipa neomexicana</i>	<b>Mountain mahogany/ New Mexico feathergrass foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>		<b>B</b>	<b>7/16/96</b>
<i>Cercocarpus montanus/ Stipa comata</i>	Mountain mahogany/ Needle-and-thread foothills shrubland	G2	S2		CD	8/12/04
<i>Cercocarpus montanus/ Stipa comata</i>	Mountain mahogany/ Needle-and-thread foothills shrubland	G2	S2		C	7/11/96
<i>Cercocarpus montanus/ Stipa scribneri</i>	Mountain mahogany/ Scribner's needlegrass foothills shrubland	G3	S3		B	6/25/96
<i>Cercocarpus montanus/ Muhlenbergia montana</i>	Mountain mahogany/ mountain muhly foothills shrubland	GU	S2		B	9/28/04

<i>Cercocarpus montanus/ Elymus lanceolata x Pseudoroegneria spicata</i>	Mountain mahogany/ Griffith's wheatgrass foothills shrubland	GU	S3		C	7/1/96
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\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes several extensive occurrences of the mountain mahogany shrublands on diverse bedrock types. The boundary uses steep slopes and drainage lines to include ecological processes or natural boundaries that could provide for manageable grazing, fire, and wildlife migration.

**Protection Comments:** Larimer County, City of Fort Collins, and their partners have recently purchased northern portions of this site for protection as open space. Other privately owned large ranches currently have no formal protection status and the area continues to be under heavy development pressure. Several landowners within the site are resisting pressures to convert the lands and interest has been expressed by landowners at the southern end of the site to see the land protected in some fashion. Existing landuse is compatible with the continued viability of the site.

**Management Comments:** Management actions may be needed within 5 years to maintain the current quality of the element occurrences. Management issues within the site include livestock grazing, future recreational use, and non-native invasive plants. Existing grazing management is generally compatible with maintaining the quality of the element occurrences. A significant increase in grazing intensity may increase pressure on the shrublands and have deleterious effects. Development of recreational uses is a critical management issue within the areas recently purchased as open space. Recreation will likely be introduced into an area with historically little human visitation. The trails that will be designed in the coming years should consider the range of potential impacts on the ecosystem. Considerations include minimizing fragmentation by leaving large undisturbed areas of wildlife habitat where possible (Colorado Department of Natural Resources 1998). Miller *et al.* (1998) found lower nest survival for grassland birds adjacent to trails. Some weedy problems exist in areas of deeper soils, in areas around springs and seeps, and in the vicinity of the radio towers. Control measures would benefit the occurrences and prevent further degradation.

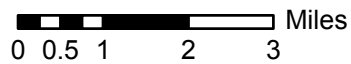
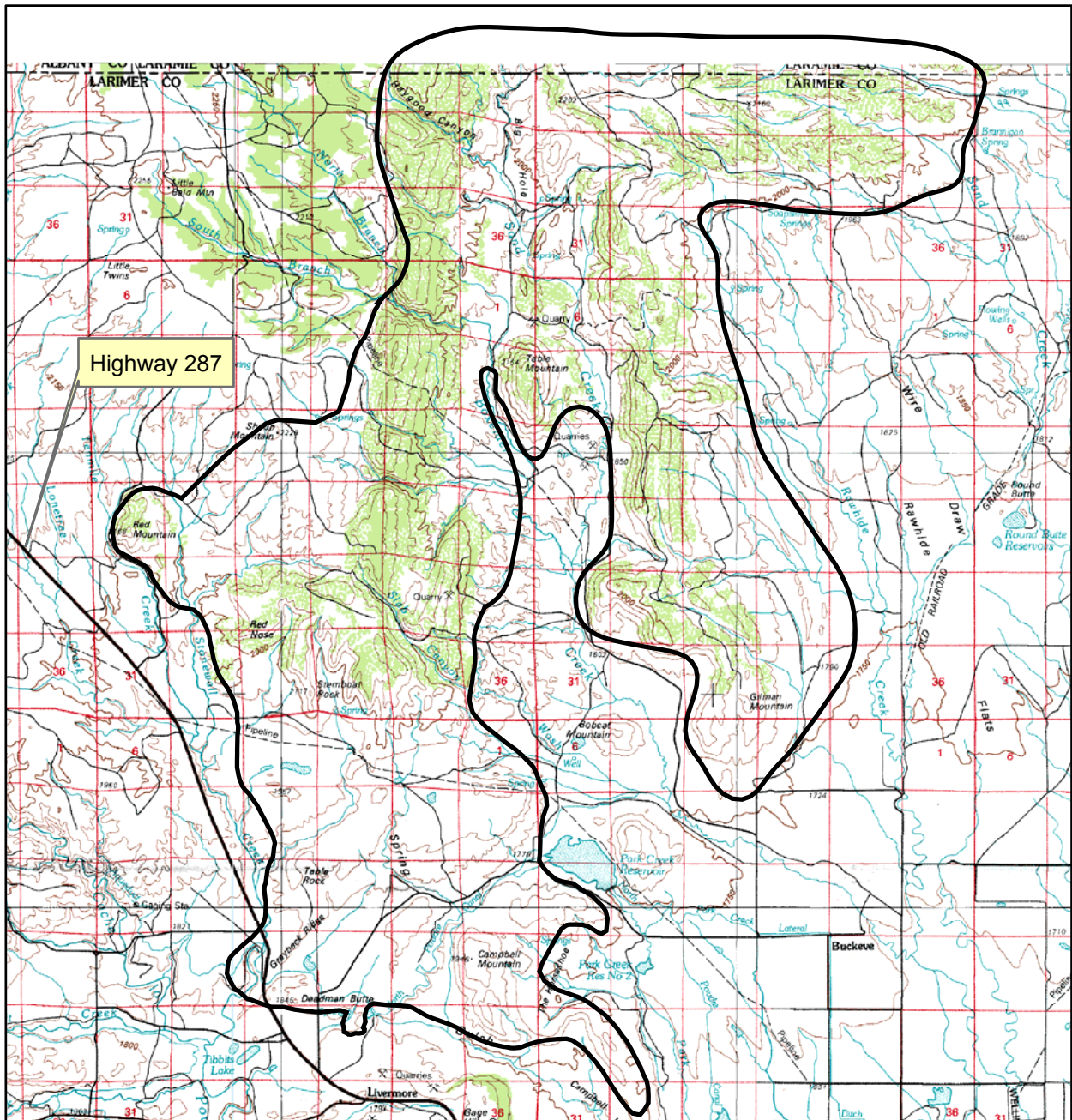
Exotic species were not common throughout much of the site; however, some do occur in local infestations. Most of these are restricted to wet areas or areas with deeper soils. Such infestations are largely restricted and controllable. The rigorous environmental conditions of the mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) natural community that is abundant at this site does not lend to weedy invasions by existing exotic species known on this site. However, other mountain mahogany natural communities are more susceptible to weedy invasions. Near the Soapstone Hills, cheatgrass and Japanese brome (*Bromus tectorum* and *B. japonicus*) are common on some of the ridges among the mountain mahogany shrublands and in certain swales on the grasslands. Further increase of exotic species may decrease the biodiversity

significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988). Grazing or fire management may be a useful tool to reduce the dominance of these species and increase the proportion of native species.

Most offsite land uses do not appear to threaten this site directly. However, disturbance from construction of radio towers on both hogback ridges has led to land clearing and exotic species invasion. Further, should the adjacent tracts develop into subdivisions with a greatly increased number of humans, the invasion of additional invasive exotics (e.g., knapweed, toadflax) could present an even larger problem. In addition, such development would undoubtedly increase the domestic cat and dog populations with the former known to have serious impacts on the native small mammal, reptile, and bird faunas.



**Photo 9. Mountain mahogany shrublands at Big Hole in the Table Mountain Hogbacks PCA.**  
*photo by S. Neid*




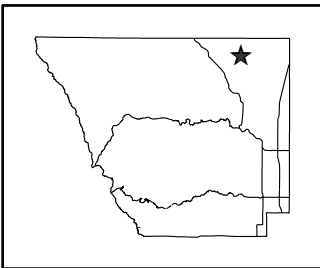
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 36. Table Mountain Hogbacks Potential Conservation Area B2: Very High Biodiversity Significance

## Turkey Roost

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

This PCA contains good to excellent occurrences of globally imperiled Larimer aletes (*Aletes humilis*) (G2G3) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (G2).

**Protection Urgency Rank: P4 (Low urgency)**

This PCA is within the Cherokee Park State Wildlife Area and US Forest Service land.

**Management Urgency Rank: M4 (Low urgency)**

Current management appears adequate to maintain the quality of the element occurrences.

**Location:** Large granitic outcrops north of Cherokee Park Road (80C) about 2.5 miles northwest of Halligan Reservoir. The site continues on the north side of Cherokee Park road for approximately two miles between the Middle Cherokee Park State Wildlife Area and Prairie Divide Road.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Cherokee Park; T11N R72W Sections 22-27

**Size:** 1508 acres (610 ha)

**Elevation:** 6600 – 7814 ft. (2012 – 2382 m)

**General Description:** This site contains hillslopes of ponderosa pine (*Pinus ponderosa*) woodlands with large cliffs and outcrops of Silver Plume granite. The woodlands include limber pine (*Pinus flexilis*), Douglas-fir (*Pseudotsuga menziesii*), wax flower (*Jamesia americana*), currants (*Ribes* spp.), fringed sage (*Artemisia frigida*), and a mix of native grasses. The granite outcrops support Larimer aletes (*Aletes humilis*) and Rocky Mountain cinquefoil (*Potentilla rupincola*). There are a few dirt roads and a portion of Cherokee Park Road included within the site.

**Biodiversity Comments:** This site includes an excellent occurrence of Larimer aletes (*Aletes humilis*) and good and fair occurrences of Rocky Mountain cinquefoil (*Potentilla rupincola*). Both of these species are Colorado endemics that occur only on Silver Plume granite outcrops. This site is in good condition and the threats are low.

Natural Heritage element occurrences at the Turkey Roost PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Aletes humilis</i>	<b>Larimer aletes</b>	<b>G2G3</b>	<b>S2S3</b>				<b>A</b>	<b>6/8/01</b>
<i>Potentilla rupincola</i>	<b>Rocky Mtn cinquefoil</b>	<b>G2</b>	<b>S2</b>			<b>FS</b>	<b>B</b>	<b>8/20/94</b>
<i>Potentilla rupincola</i>	Rocky Mtn cinquefoil	G2	S2			FS	C	8/14/91

\*EO = Element Occurrence

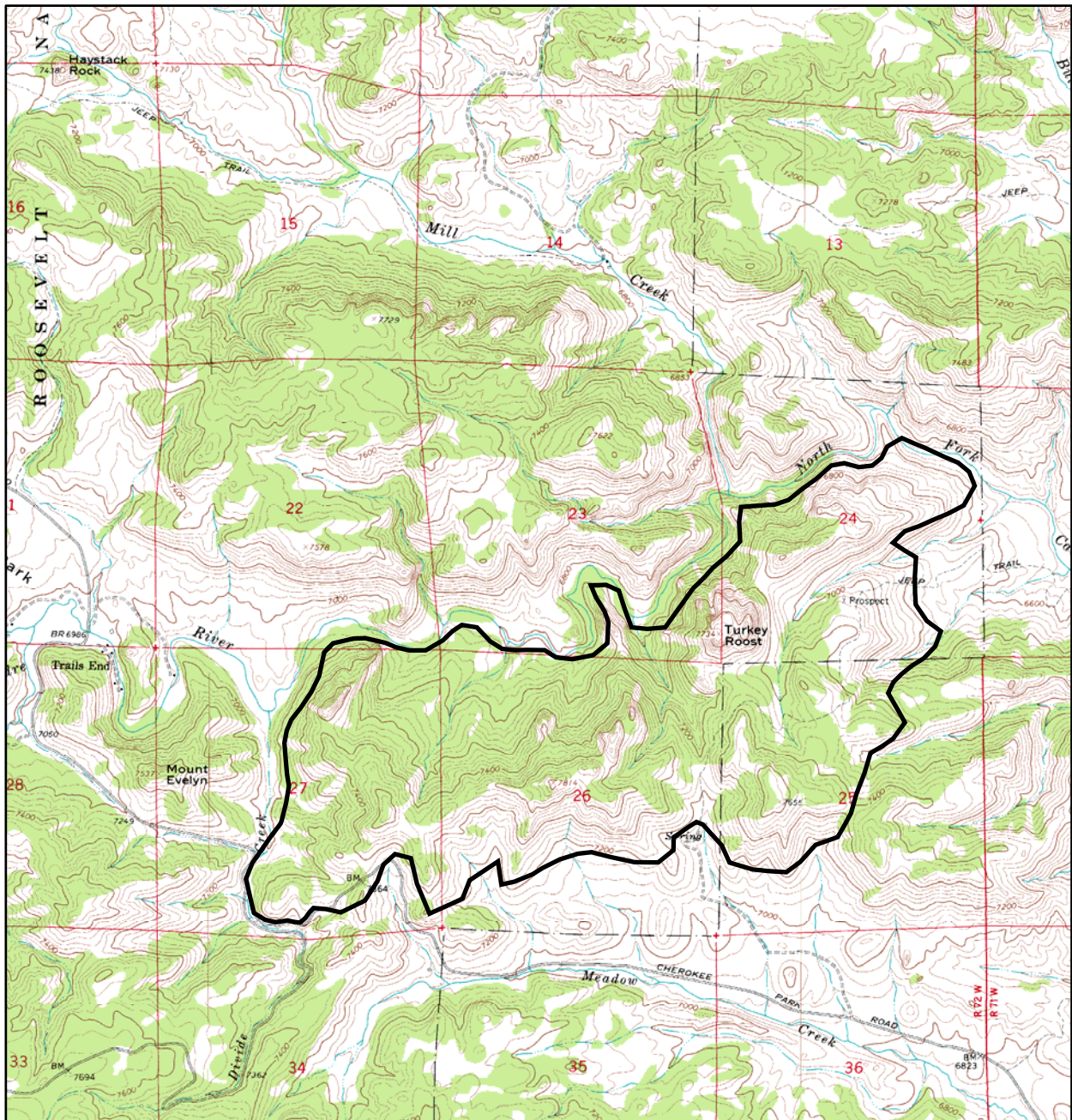
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the occurrences and adjacent natural habitat to form a buffer. The site boundary incorporates area allowing for the functioning of all ecological processes except for fire. Unsurveyed potential habitat occurs outside of the site boundary; future surveys will likely lead to revisions of the boundary.

**Protection Comments:** There are no known threats for foreseeable future. Part of the site is owned and managed by the Colorado Division of Wildlife as Cherokee Park State Wildlife Area. The US Forest Service owns the remainder of the site. Adjacent lands are privately owned. There is a lot of residential development occurring along Cherokee Park Road, and residential development pressures in this area are generally high.

**Management Comments:** Management of recreational activities may be needed in the future to maintain the current quality of the element occurrences. The rare plants grow on steep, inaccessible cliffs. Recreational climbing activity has not been observed at this location, though this site could become popular with climbers in the future, and management would need to address the threats posed by this use. The dirt road through the site has been closed. There is no grazing on the Colorado Division of Wildlife land, although there is some grazing on the adjacent private lands that could threaten the rare plants that occur off of the rock outcrops as well as the overall condition of the associated plant communities. Currently the site is mostly free of non-native plant species. Work with the Colorado Division of Wildlife to reach a management agreement to assure long-term protection for Larimer aletes and Rocky Mountain cinquefoil at this site.






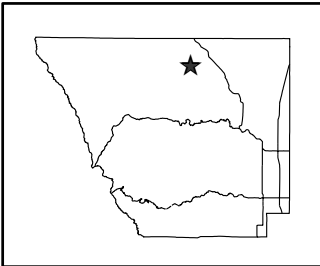
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 37. Turkey Roost Potential Conservation Area  
 B2: Very High Biodiversity Significance

**B3 Potential Conservation Areas**  
**Big Thompson Canyon South**

**Biodiversity Rank: B3 (High biodiversity significance)**  
 This PCA supports a fair (C-ranked) occurrence of a globally imperiled (G2) plant community.

**Protection Urgency Rank: P2 (High urgency)**  
 Threat from development and fragmentation expected within five years.

**Management Urgency Rank: M3 (Moderate urgency)**  
 Management of non-native species may be needed within five years to maintain the current quality of the element occurrence.

**Location:** This PCA is south of the Big Thompson River approximately four miles west of Lake Loveland.

**Legal Description:**  
 U.S.G.S. 7.5-minute quadrangle: Masonville  
 T5N R70W Section 9, 10, and 15

**Size:** 401 acres (162 ha)                      **Elevation:** 5400 – 6200 ft. (1646 – 1890 m)

**General Description:** The site is the northern rim of a hogback bounded to the north by the Big Thompson River. This is a small site generally surrounded by residential development.

**Biodiversity Comments:** This site contains a fair quality occurrence of a globally imperiled (G2) plant community, mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*). Most occurrences have been destroyed or degraded by development, overgrazing, or mining. This site has only been viewed from nearby roads and the condition is unknown although expected to be somewhat degraded.

Natural Heritage element occurrences at the Big Thompson Canyon South PCA.

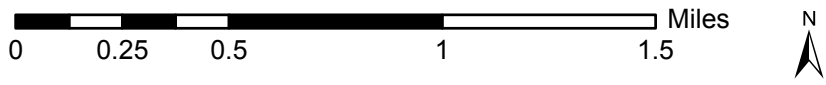
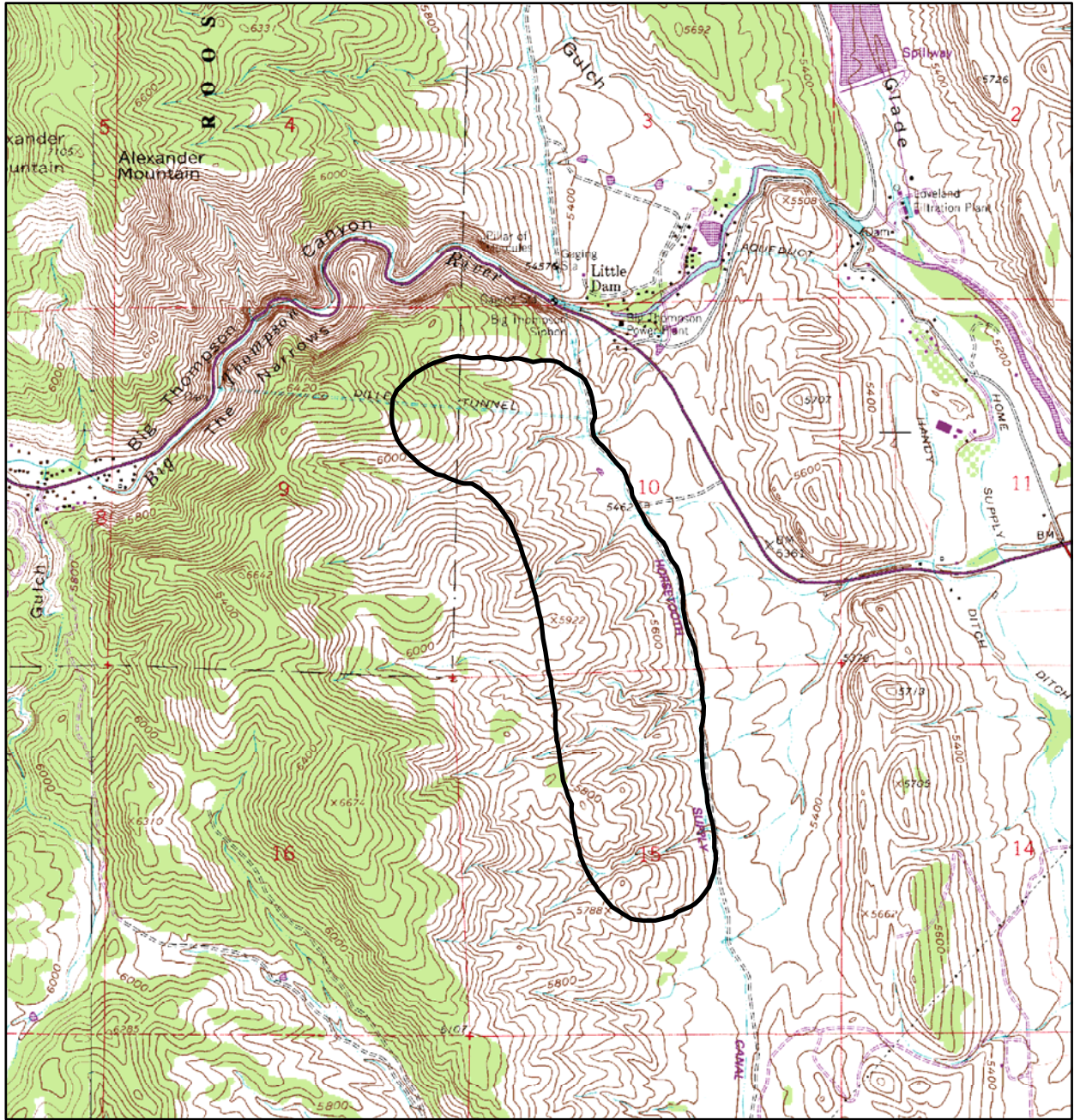
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plant Communities</b>								
<i>Cercocarpus montanus/ Stipa comata</i>	Foothills shrubland	G2	S2				C	11/20/94

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the occurrence and very narrow buffer on the slopes. Fire is thought to be important but not naturally contained within the boundary.

**Protection Comments:** Threat from development and fragmentation is expected within five years. The site is privately owned. Dense residential development has occurred in the nearby area. Further development and fragmentation will impact the element at the site.

**Management Comments:** Management of non-native species may be needed within five years to maintain the current quality of the element occurrences. Sites surrounded by non-natural landscapes such as residential subdivisions often are impacted by invasion of non-native species. This should be monitored at the site and control measures taken if the non-native plant species begin to dominate.




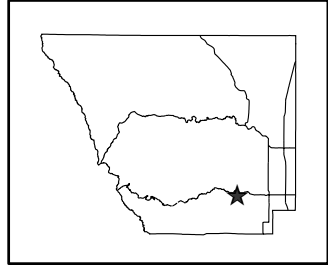
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Masonville, 40105-D2          Drake, 40105-D3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 38. Big Thompson Canyon South Potential Conservation Area B3: High Biodiversity Significance

## Big Thompson River

***Biodiversity Rank: B3 (High biodiversity significance)***

This site supports good (B-ranked) to poor (D-ranked) occurrences of the globally imperiled (G5T2 S1) Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a subspecies designated as threatened under the federal Endangered Species Act and by the Colorado Division of Wildlife.

***Protection Urgency Rank: P2 (High urgency)***

It is estimated that stresses may reduce the viability of the Preble's meadow jumping mice if protection action is not taken. Overall, about 70 percent of the site is privately owned while the remaining 30 percent is public lands (primarily U.S. Forest Service).

***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. Management concerns include maintenance of natural hydrologic regimes and riparian vegetation.

**Location:** This site is located along the Big Thompson River and Buckhorn Creek in southeastern Larimer County. This site can be accessed via Colorado Highway 34 west along the Big Thompson River Canyon or County Road 27 along Buckhorn Creek.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Horsetooth Reservoir, Masonville, Buckhorn Mountain, Drake, Crystal Mountain, and Glen Haven

T005N R069W 6,7

T005N R070W 1-12, 16-20

T005N R071W 1-3,7-9, 12, 15-19

T005N R072W 12-14, 23-24

T006N R070W 3-10, 14-20, 22, 23, 26, 27, 29, 30-32, 35, 36

T006N R071W 1-3, 10-14, 23-27, 29-35

T006N R072W 23-27

T007N R070W 19, 30, 31-33

T007N R071W 3, 4, 7-10, 13-18, 23-26

**Size:** 21,760 acres (8805 ha)

**Elevation:** 5410 – 7550 ft. (1650 - 2300 m)

**General Description:** The Big Thompson River flows from west to east in southern Larimer County. This site includes much of the Big Thompson River and Buckhorn Creek, plus the following major tributaries: Bear Gulch, North Fork of the Big Thompson River, and Dry Creek.

The floodplain of the Big Thompson River and its tributaries is composed of gravel and silts and is defined by steep cliffs and gentle terraces. Willows, cottonwood galleries, and dense herbaceous cover dominate the riparian communities. Surrounding uplands are

generally open grasslands or mountain mahogany shrublands, with ponderosa pine woodlands at higher elevations.

**Biodiversity Comments:** This PCA supports one good, one fair, and four poor occurrences of the Preble’s meadow jumping mouse (PMJM) (*Zapus hudsonius preblei*), a globally imperiled (G5T2 S1) subspecies. Because the riparian systems appear contiguous and more expansive than in other areas within PMJM’s range, and PMJM have been found at various locations along these systems, this PCA is considered of high biodiversity significance. Much of the area remains unsurveyed and it is probable that PMJM is more widespread and numerous than documented.

Natural Heritage element occurrences at the Big Thompson River PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Mammals</b>								
<i>Zapus hudsonius preblei</i>	<b>Preble's meadow jumping mouse</b>	<b>G5T2</b>	<b>S1</b>	<b>LT, PDL</b>	<b>T</b>		<b>B</b>	<b>8/22/98</b>
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		C	8/5/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/22/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/11/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/8/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/8/98

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

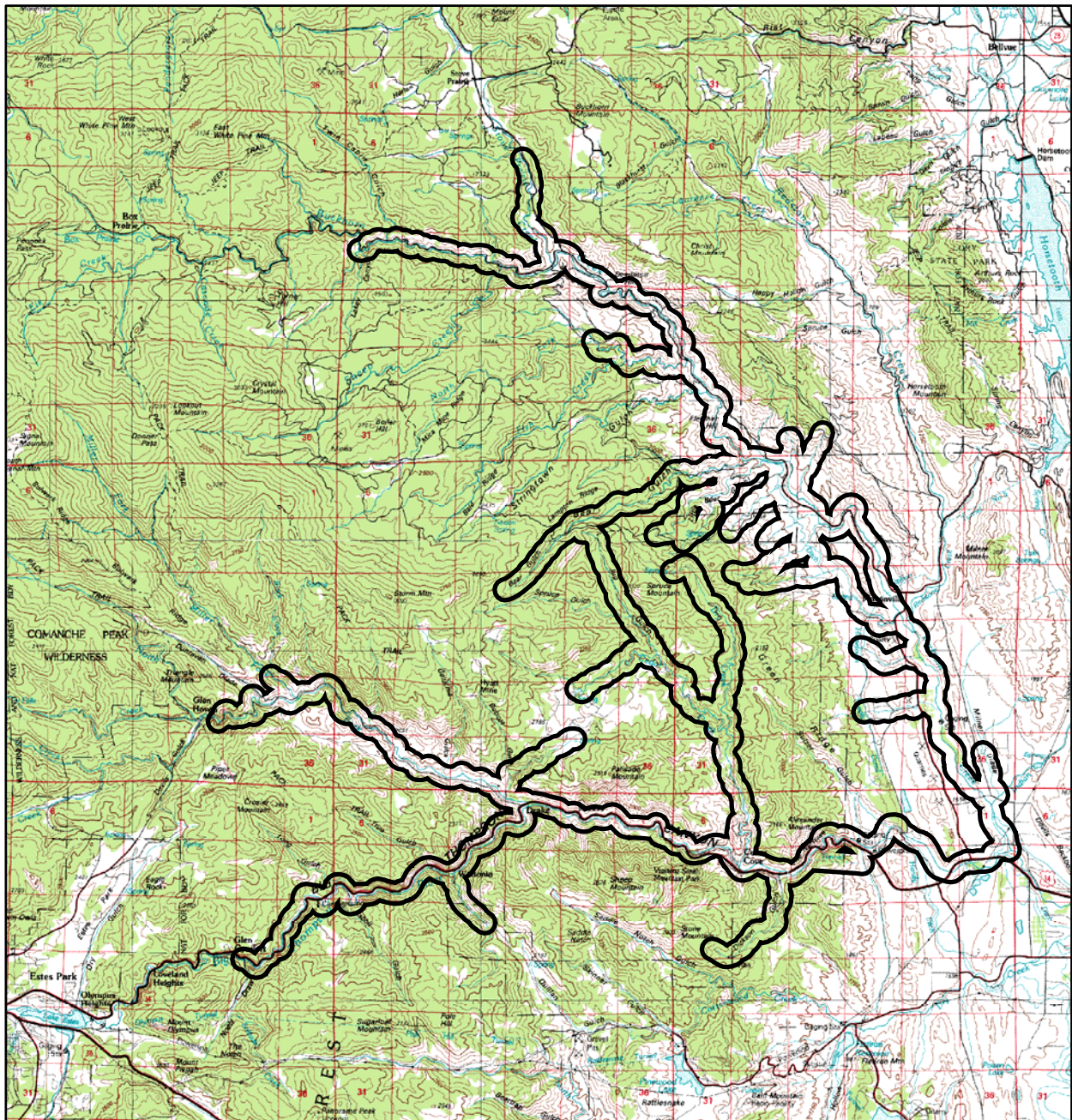
**Boundary Justification:** This PCA includes the riparian and upland grassland habitat components used by the PMJM. Included within the boundary are dense herbaceous and shrub riparian communities and upland grassland communities free from urban impacts. The site includes the riparian area and a 1000-foot (300-meter) buffer. Based on telemetry studies and trapping results in other areas where PMJM are found, these boundaries should provide the necessary habitat components for long-term stability of the population found there. It includes all known PMJM captures in this drainage, plus additional habitat upstream and downstream of these capture locations.

The buffer distance of 300 meters is 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 more refined boundary for this site

would include the 100-year floodplain and an additional 100 meters of adjacent upland habitat. Until these data layers are available for all areas within the site, the present boundary should provide for the persistence of the PMJM in this area. The largeness of this site provides a degree of protection from stochastic and site-specific events that may affect portions of the population.

**Protection Comments:** About 70 percent of the site is privately owned with the remainder primarily U.S. Forest Service land. Although this area currently has relatively little urbanization, residential development continues to grow. It is important to understand the impact residential development may have on reducing the amount of riparian and upland habitat available to PMJM. In areas of Colorado that have intensive urban development PMJM are no longer found.

**Management Comments:** It is likely that the PMJM populations along the Big Thompson River and its tributaries have always been small to moderate in number because the riparian systems are narrower and more confined than in other parts of the mouse's range. However, some habitat has been lost due to residential development, agricultural uses (livestock grazing and hay meadows), recreational activity, and management of water resources. Thus, management effort is needed to maintain the habitat quality; attempts to maintain or expand the density and extent of riparian shrublands may increase the PMJM population size.




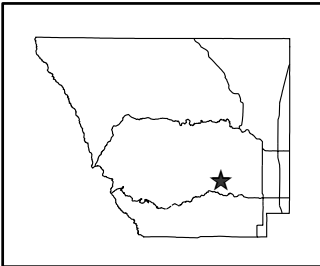
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1          Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 39. Big Thompson River Potential Conservation Area B3: High Biodiversity Significance



## Cache la Poudre River

***Biodiversity Rank: B3 (High biodiversity significance)***

This site supports a good (B-ranked) and several poor (D-ranked) occurrences of the globally imperiled (G5T2 S1) Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a subspecies designated as threatened under the federal Endangered Species Act and by the Colorado Division of Wildlife.

***Protection Urgency Rank: P2 (High urgency)***

It is estimated that stresses may reduce the viability of the Preble's meadow jumping mice if protection action is not taken. Overall, about 60 percent of the site consists of public lands (primarily USFS and State) and about 40 percent is privately owned.

***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. Management concerns include maintenance of natural hydrologic regimes and riparian vegetation.

**Location:** The eastern boundary of this site is along the Cache la Poudre River at the town of Laporte. It extends westward along the Cache la Poudre River to the Kelly Flats Campground near the Big Narrows. This site can be accessed from Colorado Highway 14 along the Cache la Poudre River Canyon via campgrounds, pullouts and public roads.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Horsetooth Reservoir, Laporte, Big Narrows, and Poudre Park

T008N R069W 17-19, 29-31

T008N R070W 3-17, 20-25, 36

T008N R071W 1-18

T008N R072W 01-04, 08-13, 15-16

T009N R070W 30-34

T009N R071W 25, 26,28, 30-36

T009N R072W 25, 32-36

**Size:** 17,820 acres (7210 ha)      **Elevation:** 5085 – 7400 ft. (1550 - 2250 m)

**General Description:** The Cache la Poudre River (Poudre River) flows from west to east across central Larimer County. This site includes over 20 miles of the Poudre River and the following major tributaries: Young Gulch, Hewlett Gulch, and Lewstone Creek.

The floodplain of the Poudre River and its tributaries is composed of gravel and silts and is defined by steep cliffs and gentle terraces. Willows, cottonwood galleries, and dense herbaceous cover dominate the riparian communities. Surrounding uplands are generally open grasslands or mountain mahogany shrublands, with ponderosa pine woodlands at higher elevations.

**Biodiversity Comments:** This PCA supports a good (B-ranked) and several poor (D-ranked) occurrences of the Preble’s meadow jumping mouse (PMJM) (*Zapus hudsonius prebleii*), a globally imperiled (G5T2 S1) subspecies. Because the riparian systems appear contiguous and more expansive than in other areas within PMJM’s range, and PMJM have been found at various locations along these systems, this PCA is considered of high biodiversity significance. Much of the area remains unsurveyed and it is probable that PMJM is more widespread and numerous than documented.

Natural Heritage element occurrences at the Cache la Poudre River PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Mammals</b>								
<b><i>Zapus hudsonius prebleii</i></b>	<b>Preble's meadow jumping mouse</b>	<b>G5T2</b>	<b>S1</b>	<b>LT, PDL</b>	<b>T</b>		<b>B</b>	<b>7/9/98</b>
<i>Zapus hudsonius prebleii</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/5/98
<i>Zapus hudsonius prebleii</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	7/15/98
<i>Zapus hudsonius prebleii</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	7/10/98
<i>Zapus hudsonius prebleii</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		E	7/29/98

\*EO = Element Occurrence

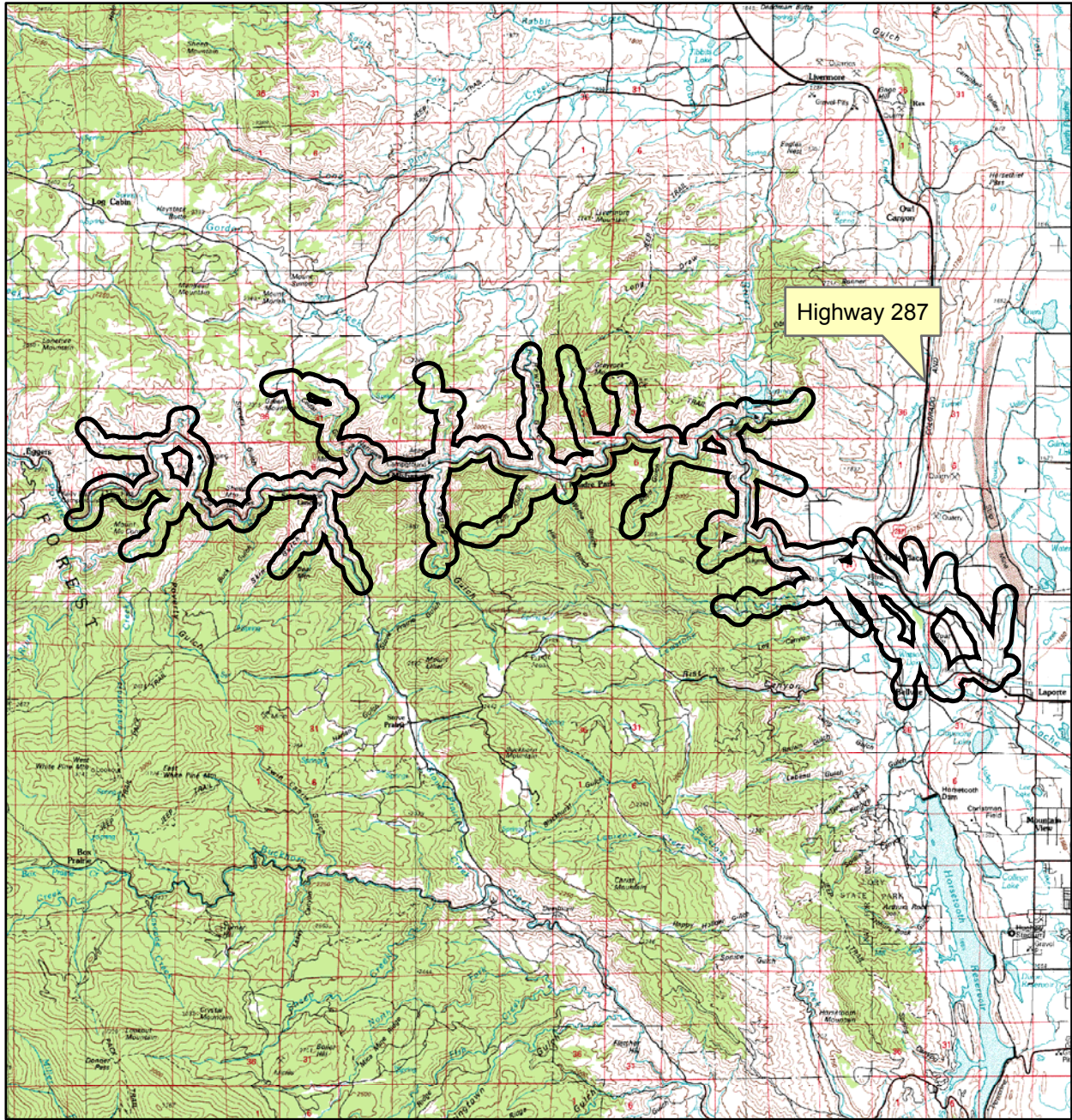
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** This PCA includes the riparian and upland grassland habitat components used by the PMJM. Included within the boundary are dense herbaceous and shrub riparian communities and upland grassland communities free from urban impacts. The site includes the riparian area and a 1000-foot (300-meter) buffer. Based on telemetry studies and trapping results in other areas where PMJM are found, these boundaries should provide the necessary habitat components for long-term stability of the population found there. It includes all known PMJM captures in this drainage, plus additional habitat upstream and downstream of these capture locations.

The buffer distance of 300 meters is 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 more refined boundary for this site would include the 100-year floodplain and an additional 100 meters of adjacent upland habitat. Until these data layers are available for all areas within the site, the present boundary should provide for the persistence of the PMJM in this area. The largeness of this site provides a degree of protection from stochastic and site-specific events that may affect portions of the population.

**Protection Comments:** About 60 percent of the site is U.S. Forest Service and State land with most of the remainder privately owned. The privately owned portions are concentrated at the lower elevations of the site. Although this area currently has relatively little urbanization, residential development continues to grow. It is important to understand the impact residential development may have on reducing the amount of riparian and upland habitat available to PMJM. In areas of Colorado that have intensive urban development PMJM are no longer found.

**Management Comments:** It is likely that the PMJM populations along the Poudre River and its tributaries have always been small to moderate in number because the riparian systems are narrower and more confined than in other parts of the mouse's range. However, some habitat has been lost due to residential development, agricultural uses (livestock grazing and hay meadows), recreational activity, and management of water resources. Thus, management effort is needed to maintain the habitat quality; attempts to maintain or expand the density and extent of riparian shrublands may increase the PMJM population size.




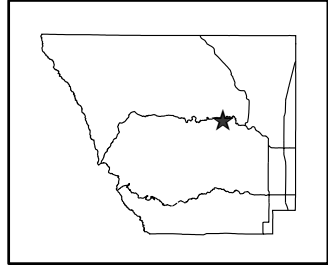
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 40. Cache la Poudre River Potential Conservation Area B3: High Biodiversity Significance

## Carter Lake Reservoir Hogbacks

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports fair (C-ranked) occurrences of two globally imperiled (G2) foothills plant communities.

**Protection Urgency Rank: P2 (High urgency)**

Most of the PCA is privately owned with no protection status. Development pressure is very high in the area.

**Management Urgency Rank: M4 (Low urgency)**

Management concerns include recreation issues and control of non-native species.

**Location:** The hogback immediately west of Carter Lake Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Carter Lane Reservoir  
T4N R70W Sections 3, 4, 9, 10, 15, 16, 21, and 22  
T5N R70W Sections 33 and 34

**Size:** 1517 acres (614 ha)

**Elevation:** 5670 – 6230 ft. (1730 – 1900 m)

**General Description:** The site occurs on a hogback ridge just west of Carter Lake Reservoir. Several different sandstone formations are exposed on the hogback. In some areas the sandstone forms a "pavement" and vegetation is confined to the cracks in the rock. The elevation at the site ranges from 5760 feet at the level of Carter Lake Reservoir to 6227 feet at the highest point on the hogback. The vegetation is characterized by a mosaic of ponderosa pine (*Pinus ponderosa*) woodlands, mountain mahogany (*Cercocarpus montanus*) shrublands, and small grassland openings. There is evidence of past fire in the area. Residential development has occurred at a rapid pace in the area and houses are built or being built at the northern end. Extensive mining has also taken place, especially to the south where many quarries exist. Numerous picnic grounds and recreational trails (hiking, equestrian, and mountain biking) exist in the general area.

**Biodiversity Comments:** This PCA contains fair occurrences of two globally imperiled (G2) plant communities. This ponderosa pine/mountain mahogany/big bluestem (*Pinus ponderosa/Cercocarpus montanus/Andropogon gerardii*) foothills woodland is only known from the northern Front Range of Colorado. Most occurrences have been destroyed or degraded by development, overgrazing, or mining. This site has been impacted to some extent by these activities and the occurrence is degraded. The mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) foothills shrubland was first documented from this area in 1994. The occurrence at this site is of moderate size but somewhat degraded.

Natural Heritage element occurrences at the Carter Lake Reservoir Hogback PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plant Communities</b>								
<i>Pinus ponderosa/ Cercocarpus montanus/ Andropogon gerardii</i>	<b>Foothills ponderosa pine scrub woodlands</b>	<b>G2</b>	<b>S2?</b>				<b>C</b>	<b>8/26/96</b>
<i>Cercocarpus montanus/ Stipa neomexicana</i>	<b>Foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>				<b>C</b>	<b>8/26/96</b>

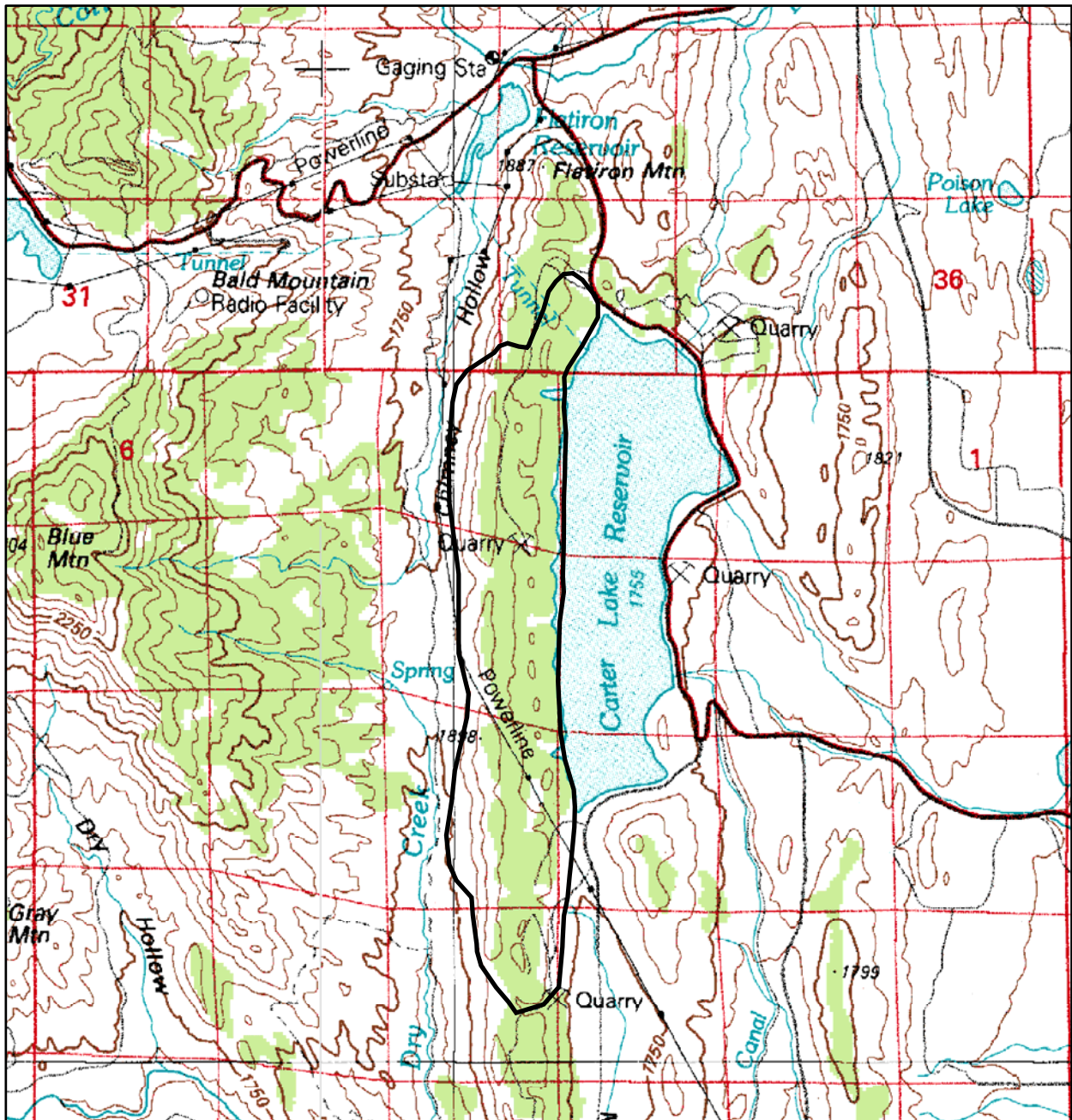
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary is intended to protect the occurrences from direct disturbance and provide some buffer. The boundary to the north excludes an area already under residential development. The boundary to the south excludes lands disturbed by quarrying. The lower valley to the west of the site (Chimney Hollow) will be inundated by a Northern Colorado Water Conservancy District (NCWCD) reservoir by 2010.

**Protection Comments:** There is ongoing degradation due to fragmentation resulting from increased residential development. The site is owned by numerous private landowners and also includes one section of State Land Board land and some lands previously owned by Hewlett-Packard and recently purchased by the NCWCD. Land west of Carter Lake on the east side of the hogback is primarily owned by the Bureau of Reclamation and managed by the Larimer County Parks Program. The site encompasses land that has very high value for residential development and much has already occurred. The State Land Board parcel should be considered for management for conservation purposes.

**Management Comments:** Management of recreation and non-native plant species may be needed within 5 years to prevent loss of element occurrences. Recreation use is heavy in the area and would need to be managed (e.g. close social trails) to protect the quality of the elements. Cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) are common. Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988). Grazing or fire management could be a useful tool to reduce the dominance of these species and increase the proportion of native species.




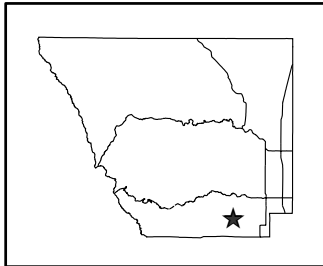
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 41. Carter Lake Reservoir Hogbacks Potential Conservation Area B3: High Biodiversity Significance

## Chimney Rock

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports an excellent (A-ranked) occurrence of a larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*), a globally imperiled subspecies (G4T2).

**Protection Urgency Rank: P4 (Low urgency)**

The PCA is under private and public ownership. Large parcels are under USFS, BLM, and State Land Board ownership. The private property is generally 35-acre parcels.

**Management Urgency Rank: M4 (Low urgency)**

The current land uses appear to be compatible with the persistence of the rare plant species. The likelihood of persistence of the plant is higher on the public rather than the private land.

**Location:** This PCA is in northwestern Larimer County west of Bull Mountain and east of Boulder Ridge. Sand Creek, Bull Creek, and the headwaters of Jimmy Creek are included within the PCA.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Sand Creek, Eaton Reservoir, and Deadman

T11N R75W Sections 1-4, 9-11, 14-17, 20, 21, 28-31

T11N R76W Sections 25, 36

T12N R74W Sections 30, 31

T12N R75W Sections 20, 22-29, 32-36

**Size:** 12,520 acres (5067 ha)      **Elevation:** 7620 – 9020 ft. (2323 – 2750 m)

**General Description:** The Sand Creek Basin south of Chimney Rock forms a wide-open valley of rolling hills supporting grasslands of native grasses, sagebrush shrublands, and mountain mahogany shrublands. Dominant grasses are Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and needle-and-thread (*Stipa comata*). The privately owned portions of this "mountain park" have been plated for subdivision with construction of homes on many 35-acre lots. Sand and Bull creeks flow north into Wyoming and Jimmy Creek flows southwest to the Laramie River. The geology is red sandstone with sandy-gravelly soil.

**Biodiversity Comments:** This PCA supports an excellent (A-ranked) occurrence of a globally imperiled (G4T2) white flowered subspecies of larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*). The subspecies is known primarily from the Laramie River Valley, the Chimney Rock area, and southern Wyoming.



Natural Heritage element occurrences at the Chimney Rock PCA.

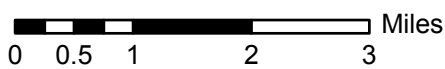
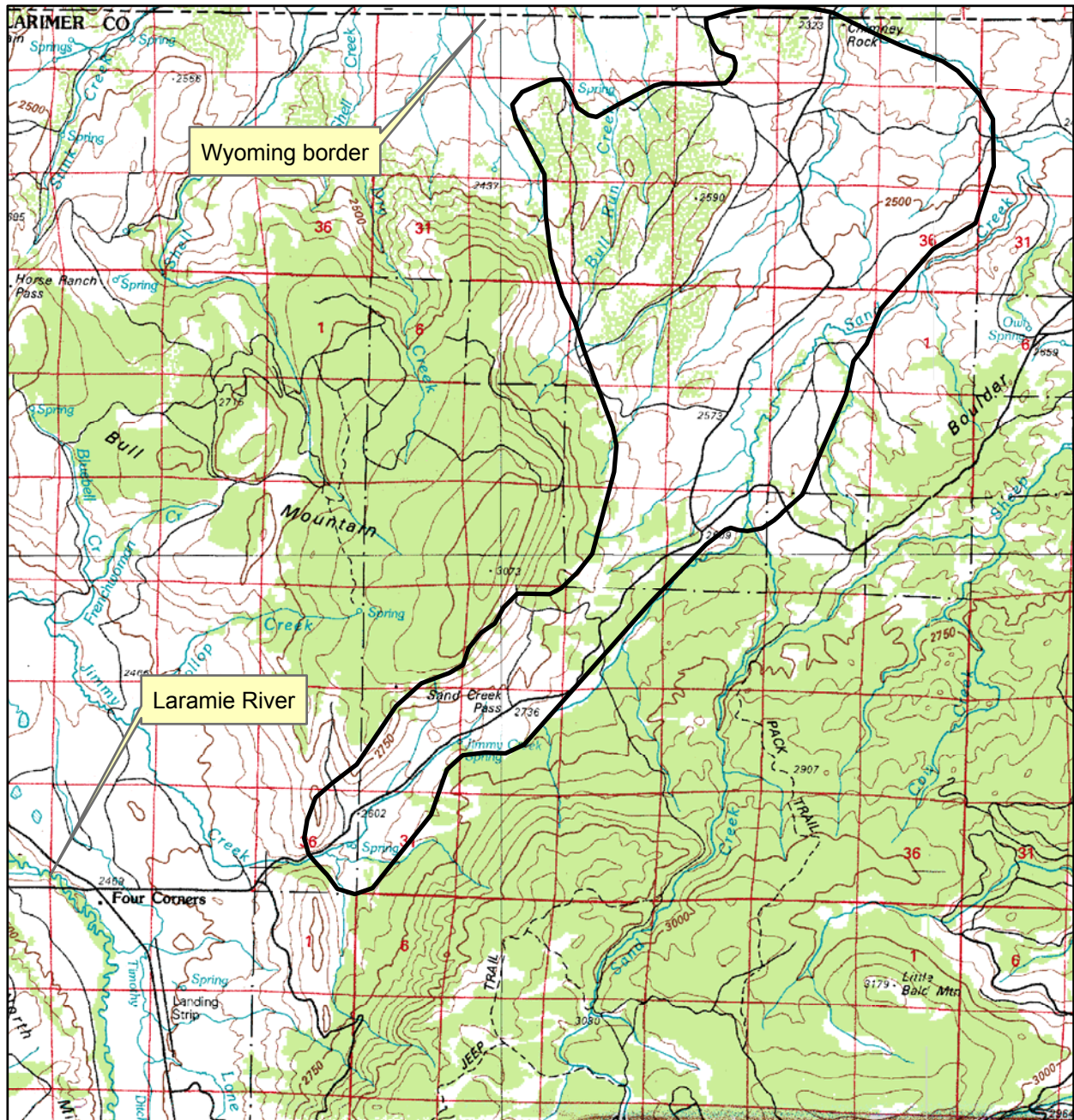
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf beardtongue	G4T2	S2			FS	A	7/17/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the grassland and shrubland habitat for *Penstemon laricifolius* ssp. *exilifolius*. The northern portion of the site is primarily private property subdivided as 35-acre parcels. The private parcels still likely support the species but are not considered a priority for conservation action for this species.

**Protection Comments:** Portions of the site are protected as public land (USFS, BLM, State Land Board). The northern portion of the site is primarily private land that has undergone development as 35-acre parcels.

**Management Comments:** Current management appears adequate to support the subspecies. Management concerns include invasion by non-native species and direct displacement of habitat by human habitation.




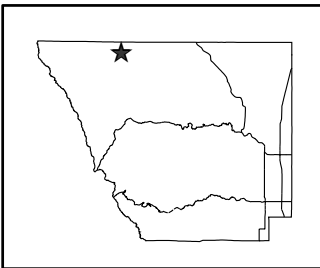
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/23/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 42. Chimney Rock Potential Conservation Area  
 B3: High Biodiversity Significance

## Claymore Lake South

**Biodiversity Rank: B3 (High biodiversity significance)**

This site includes a fair (C-ranked) occurrence of a globally imperiled (G2) Ute ladies' tresses orchid (*Spiranthes diluvialis*). This plant is listed as threatened under the federal Endangered Species Act and is known from fewer than 20 other locations in Colorado. This is the only known location for this species in Larimer County.

**Protection Urgency Rank: P4 (Low urgency)**

The City of Fort Collins recently purchased this site to provide protection for the orchid.

**Management Urgency Rank: M2 (High urgency)**

New management of hydrology and livestock grazing may be needed to prevent loss of the element occurrence.

**Location:** West of Fort Collins, about ½ mile south of Claymore Lake, extending east from the irrigation canal.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Horsetooth Reservoir  
T7N R69W Sections 5 and 6

**Size:** 1050 acres (425 ha)

**Elevation:** 5120 – 5140 ft. (1561 – 1567 m)

**General Description:** The Claymore Lake South site is a wet meadow containing both alien and native plant species, including Baltic rush (*Juncus balticus*), Nebraska sedge (*Carex nebrascensis*), reedtop (*Agrostis stolonifera*), and great blue lobelia (*Lobelia siphilitica* var. *ludoviciana*). There are no woody species in the wetland where the orchid occurs, although a few cottonwoods and willows occur within the site buffer. Most of the area surrounding the wet meadow is dry pasture land, except at the east end of the meadow where there is a small stock pond. The pond edges provide habitat for stands of cattail (*Typha* spp.) and threesquare (*Scirpus pungens*).

The source of water on the site, which is probably critical to the element, is not entirely clear. It is clear that the wet meadow area receives some water from the irrigation canal, but the degree to which the hydrology may also have a natural component is uncertain. Factors suggesting natural hydrology include both landform--the wet meadow is adjacent to an obvious drainage--and the small reservoir on the east end of the site. Such reservoirs are often built where there is natural spring discharge.

Ute ladies' tresses was not found within the site during 2004 survey. The plant does not necessarily flower every year (Fertig 2001, U.S. Fish and Wildlife Service 2003). Though not found in 2004, the orchid is most likely still present within the site.

**Biodiversity Comments:** The site contains a fair (C-ranked) occurrence of a globally imperiled (G2) plant species. This site contains a relatively large population of the Ute

ladies' tresses orchid, a species listed as threatened under the federal Endangered Species Act. This plant is not known to occur anywhere else in Larimer County, and it is known in fewer than twenty other locations in Colorado.

Natural Heritage element occurrences at the Claymore Lake South PCA.

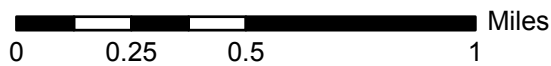
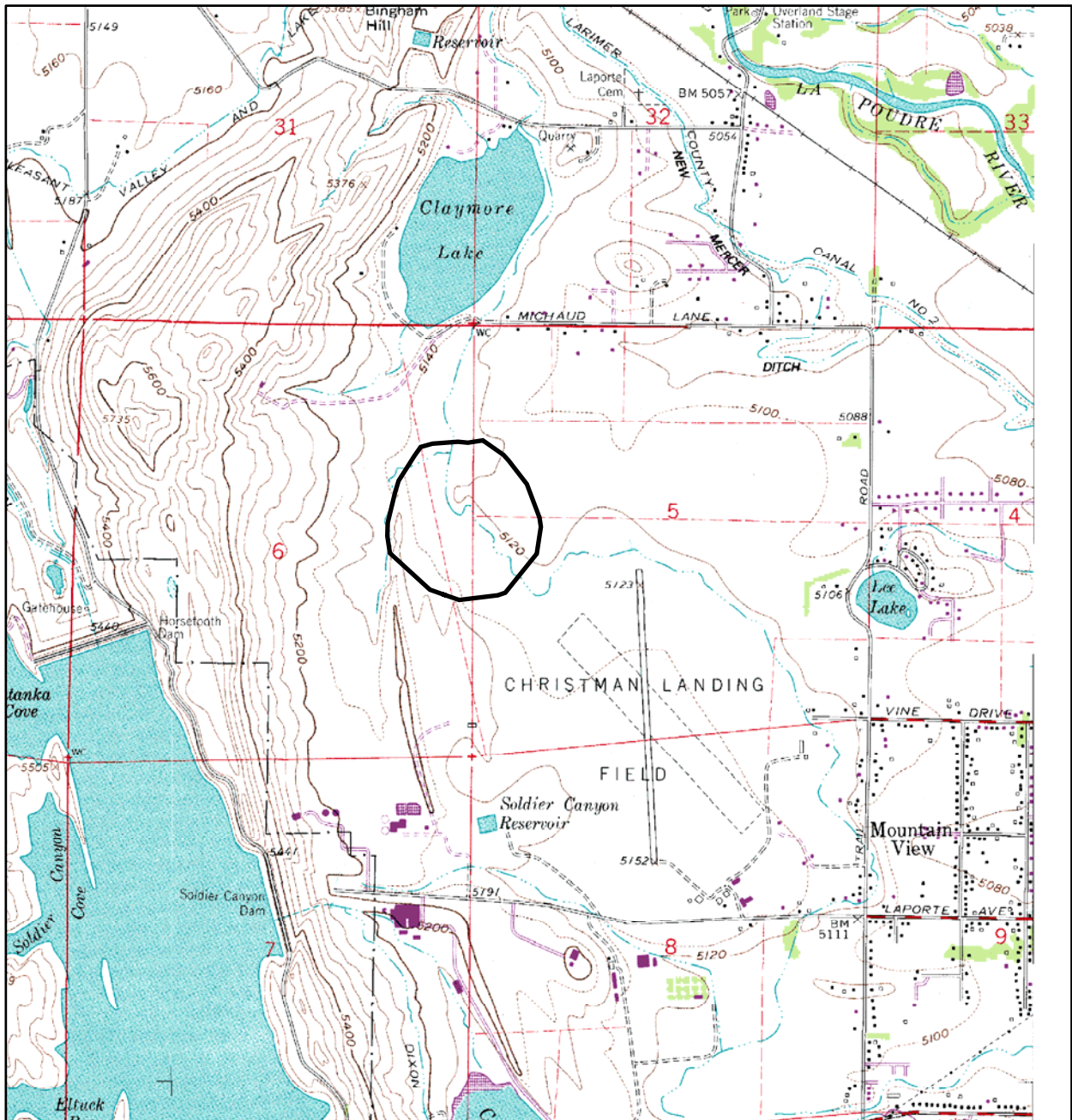
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i>Spiranthes diluvialis</i>	Ute ladies' tresses	G2	S2	LT			C	8/11/96

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the contiguous wetland habitat containing the orchid, suitable nearby habitat, plus a 100-foot buffer to protect from direct impacts. This boundary may have to be extended below the reservoir if it is later determined that the area near Overland Trail Road is suitable orchid habitat.

**Protection Comments:** City of Fort Collins recently purchased this site to provide protection for the orchid.

**Management Comments:** Changes in the management of hydrology and grazing may be needed in future to maintain the element occurrence. A portion of the site, with about 20 percent of the total orchid population, was previously owned by Colorado State University and grazed throughout the summer. In 1995 CSU fenced off a small piece of the orchid habitat to exclude cattle. The remainder of the site was privately owned; for most of the summer this area was winter grazed. Changes in cattle management were recommended for the CSU owned portion of the site, whereas the private land use seemed to not hinder the orchid population. Cattle should be excluded from the site while the orchid is growing, flowering, and developing fruit (from approximately early May to mid September). During fall, winter, and early spring, the plant may benefit from intensive grazing to reduce litter build up. Because the wetland may derive much of its water from the irrigation ditch, there may be a relationship between the status of the orchid population and the use of the ditch. This relationship is currently unknown, but should be investigated.




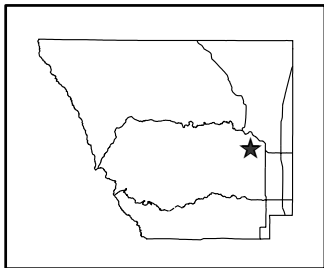
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Horsetooth Reservoir, 40105-E2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 43. Claymore Lake South Potential Conservation Area B3: High Biodiversity Significance

## Eagles Nest

**Biodiversity Rank: B3 (High biodiversity significance)**

This site contains fair (C-ranked) occurrences of two globally imperiled (G2) riparian plant communities.

**Protection Urgency Rank: P5 (Low urgency)**

The site is owned by Larimer County and will eventually be opened for public access.

**Management Urgency Rank: M2 (High urgency)**

The site is infested with several noxious and invasive weeds. The North Fork of the Poudre River would benefit from restoration work including bank stabilization.

**Location:** This site is two air miles south of the town of Livermore

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Livermore

T9N R70W Sections 2-4, 9, 10

T10N R70W Sections 33-35

**Size:** 648 acres (262 ha)

**Elevation:** 5700 – 6300 ft. (1737 – 1920 m)

**General Description:** The Eagles Nest site is located within the Laramie Foothills in Larimer County, Colorado. The area is located within the North Fork of the Poudre River watershed. Steep, rocky outcrops are located on the western portion. A Golden Eagle (*Aquila chrysaetos*) and two Prairie Falcons (*Falco mexicanus*) were observed utilizing these outcrops. The Colorado Division of Wildlife has documented a Golden Eagle nest, estimated to be at least 100 years old, within the crags. The vegetated portions of the outcrops are dominated by ponderosa pine (*Pinus ponderosa*), Rocky Mountain juniper (*Juniperus scopulorum*) and Douglas-fir (*Pseudotsuga menziesii*) with mountain mahogany (*Cercocarpus montanus*), waxflower (*Jamesia americana*), and bluebunch wheatgrass (*Pseudoroegneria spicata*). The outcrops are potential habitat for the globally rare Larimer aletes (*Aletes humilis*) and the state rare Rocky Mountain cinquefoil (*Potentilla rupincola*); however, searches for these rare plants in 2001 and 2004 were negative

The foothills below the outcrops are dominated by mountain mahogany. The herbaceous understory was once dominated by needle-and-thread grass (*Stipa comata*), but has now been invaded by cheatgrass (*Bromus tectorum*). The gulleys or drainages throughout the area support stands of three-leaf sumac (*Rhus trilobata*) with rabbitbrush (*Chrysothamnus nauseosus*) and chokecherry (*Prunus virginiana*). These drainages experienced a flash flood on August 10, 2001. Large debris and sediment deposits were observed during the evaluation. The foothills are interspersed with 'fingers' of grasslands that are dominated by needle-and-thread grass (*Stipa comata*) with blue grama (*Bouteloua gracilis*). These areas did not have a high cover of weeds (cover was typically less than 20 percent on the average).

The valley floor or grassland is dominated by cheatgrass (up to 100% cover in places) with western wheatgrass (*Pascopyrum smithii*). The following forbs (1-10% cover) were also documented: snakeweed (*Gutierrezia sarothrae*), fringed sage (*Artemisia frigida*), beeplant (*Cleome serrulata*), native thistle (*Cirsium canescens*), blazing star (*Nuttalia multiflora*), buckwheat (*Eriogonum effusum*), scurf pea (*Psoraleidum tenuiflorum*), dalea (*Dalea purpurea*), prickly pear cactus (*Opuntia polyacantha*), ball cactus (*Pediocactus simpsonii*), and wild tarragon (*Oligosporus dracunculus*).

The North Fork of the Poudre River has remnant stands of narrowleaf and plains cottonwood (*Populus angustifolia* and *Populus deltoides* ssp. *monilifera*) with peachleaf willow (*Salix amygdaloides*) and sandbar willow (*Salix exigua*). The hydrology has been altered by the operation of Halligan Reservoir located upstream. Additionally, there has been grazing pressure on the riparian area for the past 100 years that has resulted in low cover of woody vegetation and bank destabilization.

Intermittent drainages tributary to the North Fork of the Poudre support globally rare riparian plant communities.

**Biodiversity Comments:** The Eagles Nest site supports a fair (C-ranked) occurrence of a globally imperiled (G2) three-leaf sumac riparian shrubland (*Rhus trilobata*). This is the only documented occurrence of this riparian shrubland on Colorado’s Front Range. The site also supports a very small, fair (C-ranked) occurrence of a globally imperiled (G2) narrowleaf cottonwood/bluestem willow riparian forest.

Natural Heritage element occurrences at the Eagles Nest PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
Plant communities						
<i>Populus angustifolia/ Salix irrorata</i>	<b>Narrowleaf cottonwood/ bluestem willow foothills riparian forest</b>	<b>G2</b>	<b>S2</b>		<b>C</b>	<b>8/15/01</b>
<i>Rhus trilobata</i>	<b>Three-leaf sumac riparian shrubland</b>	<b>G2</b>	<b>S2</b>		<b>C</b>	<b>8/15/01</b>

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the element occurrences and a buffer to protect from direct disturbance.

**Protection Comments:** This site is within Larimer County Parks and Open Land’s Eagles Nest Open Space.

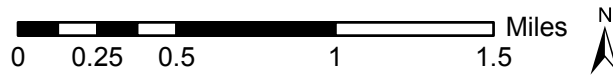
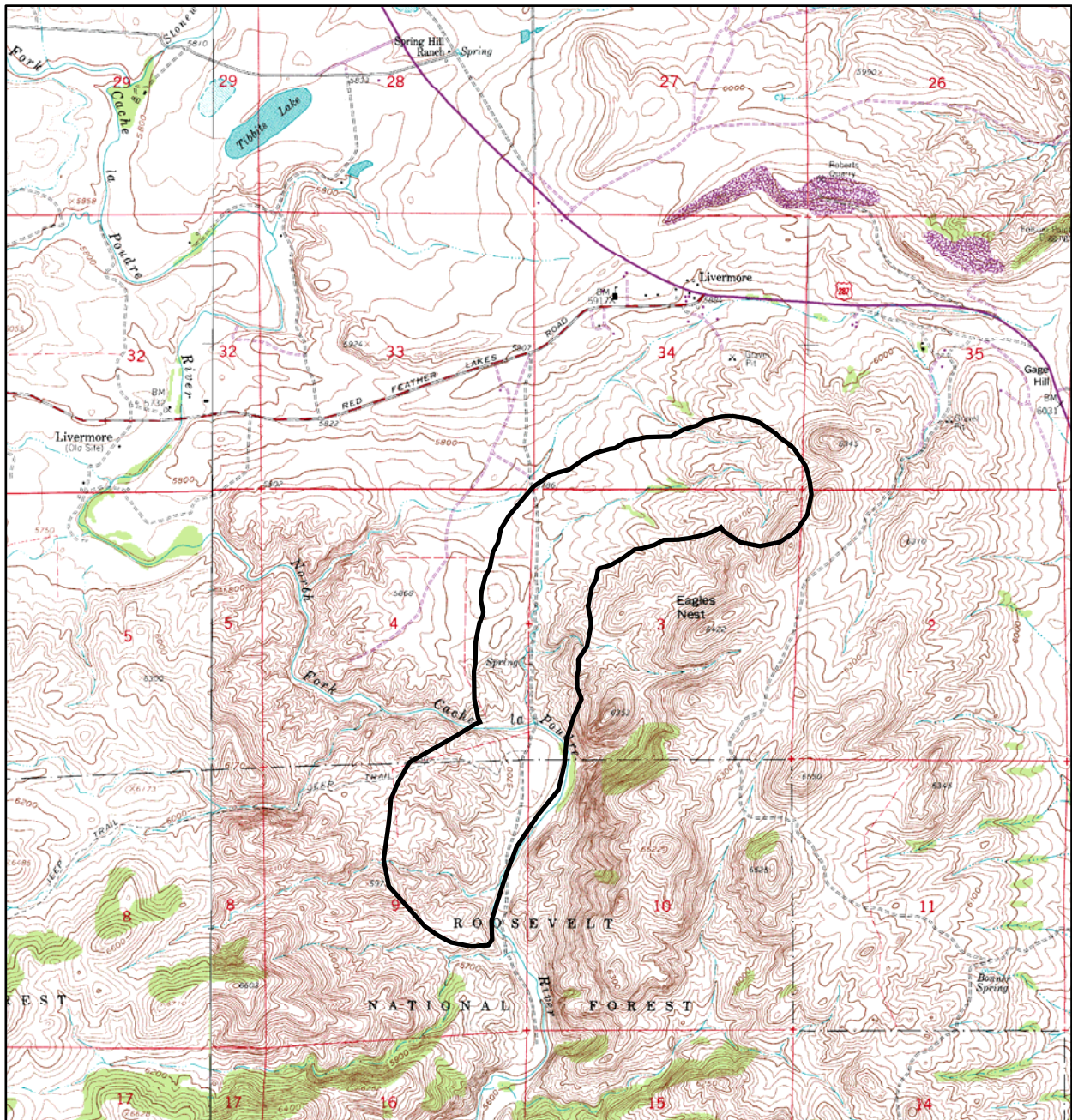
**Management Comments:** Control of non-native species is the primary management concern within this PCA. Weeds documented within this site include: dalmation toadflax (*Linaria dalmatica*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia*

*esula*), mullein (*Verbascum thapsus*), musk thistle (*Cardus nutans*) and cheatgrass (*Bromus tectorum*).

The narrowleaf cottonwood/bluestem willow riparian community relies on natural disturbance events from flooding. Narrowleaf cottonwood can regenerate from offshoots, but reproduction from seed requires a spring-summer flooding event.

In 2004, Larimer County completely fenced off the riparian area along the North Fork of the Poudre in order to allow recovery from past grazing and limited managed grazing in the future.






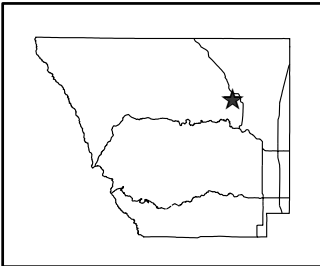
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Livermore, 40105-G2          Livermore Mountain, 40105-G3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 44. Eagles Nest Potential Conservation Area  
 B3: High Biodiversity Significance

## Hidden Valley Hogback

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a fair (C-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P2 (High urgency)**

Development pressures are high in the area. The cliffs are privately owned and may be slated for residential development. .

**Management Urgency Rank: M4 (Low urgency)**

Existing management appears to be satisfactory for the maintenance of the Bell's twinpod. Primary management concerns are the potential for development and invasion by non-native species from the valley below.

**Location:** This PCA is immediately north of Highway 34, west of Loveland, and east of Devil's Backbone.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Masonville; T5N R69W Sections 8 and 17

**Size:** 100 acres (41 ha)

**Elevation:** 5120 – 5280 ft. (1560 – 1610 m)

**General Description:** The site is comprised of a north-south trending hogback within the foothills on the Front Range. The sandstone hogback is comprised of Lykins Formation overlain by Entrada Sandstone/Jelm Formation, and Morrison Formation sandstones with calcareous elements (Braddock *et al.* 1970). Mountain mahogany (*Cercocarpus montanus*) shrublands occupy shallow soils on the slopes of the hogback. Bell's twinpod grows on Lykins sandstone (Braddock *et al.* 1970) outcrops and on the steep sparsely vegetated talus slopes below. Development of residential housing is underway in the valley below and is established on the mesa top above.

**Biodiversity Comments:** This site contains a fair occurrence of the Bell's twinpod. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). This occurrence is one of very few documented occurrences on Lykins Formation sandstone. Other occurrences are known from Niobrara Formation shale and Fountain Formation/Ingleside Formation sandstone.

Natural Heritage element occurrences at the Hidden Valley Hogback PCA.

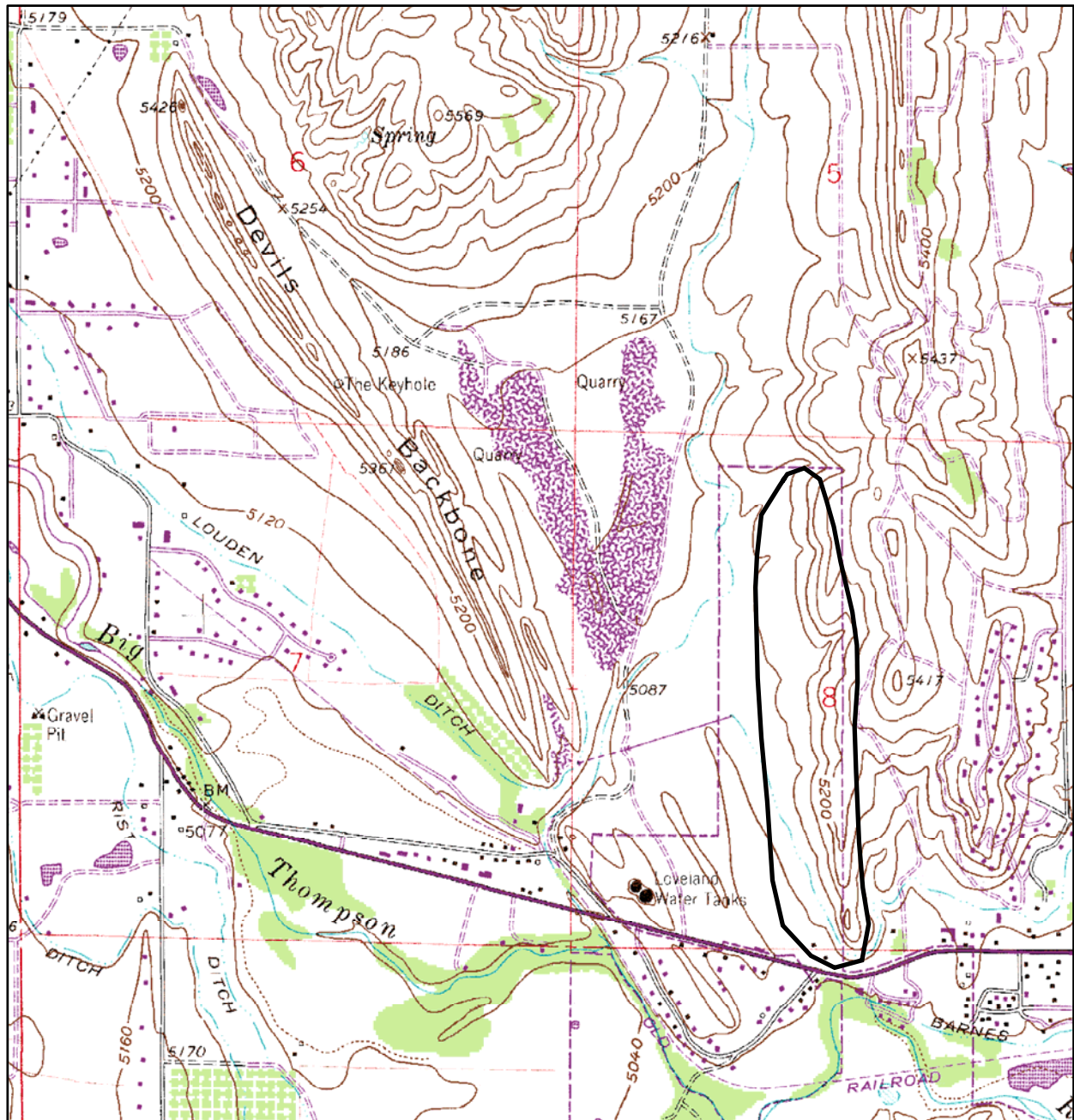
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	5/17/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the known occurrence of Bell's twinpod and a small buffer to protect from direct disturbance. The occurrence of Bell's twinpod may extend north of the PCA onto unsurveyed private property.

**Protection Comments:** The hogback is privately owned. Property immediately west and east of the hogback are either developed or under development as residential housing.

**Management Comments:** Existing management appears to be satisfactory for the maintenance of the Bell's twinpod. The primary management concerns are protection from development and invasion of non-native plants from adjacent residential construction areas.




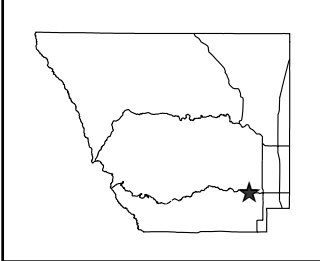
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Masonville, 40105-D2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 45. Hidden Valley Hogback Potential Conservation Area B3: High Biodiversity Significance

## Hook and Moore Glade

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a fair (C-ranked) occurrence of a globally imperiled (G2G3) plant community.

**Protection Urgency Rank: P1 (Very high urgency)**

This site is owned by the Northern Colorado Water District and the State Land Board and is a proposed site for a reservoir, with water diversion from the Poudre River. An Environmental Impact Statement is currently in process for the proposed Glade Reservoir.

**Management Urgency Rank: M3 (Moderate urgency)**

Control of non-native plant species may be needed within five years to maintain the current quality of the element occurrence.

**Location:** This PCA is located about one mile north of the intersection of Highways 14 and 287 to the east of Highway 287.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Laporte  
T8N R70W Sections 1 and 12  
T9N R70W Sections 25 and 36

**Size:** 799 acres (323 ha)

**Elevation:** 5380 – 5665 ft. (1640 – 1727 m)

**General Description:** The site is characterized by a large sandstone hogback that parallels Highway 287. The vegetation is characterized by mountain mahogany (*Cercocarpus montanus*) shrublands on the steep slopes with scattered ponderosa pine (*Pinus ponderosa*) and Rocky Mountain juniper (*Juniperus scopulorum*). The valley between the hogbacks is dominated by grasslands that are somewhat degraded by the invasion of non-native species. The North Poudre Supply Canal runs through the site and in a tunnel under the hogback. Many weedy plant species have become established around this canal probably because of recent disturbance. Much of the hogback north of this site has been either heavily mined or disturbed by residential development.

**Biodiversity Comments:** The site supports an occurrence of the mountain mahogany/new Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) foothills shrubland. This occurrence is fairly small and although in good condition, considered lower quality because of the impacts to the adjacent grasslands and the hogback further north.

Natural Heritage element occurrences at the Hook and Moore Glade PCA.

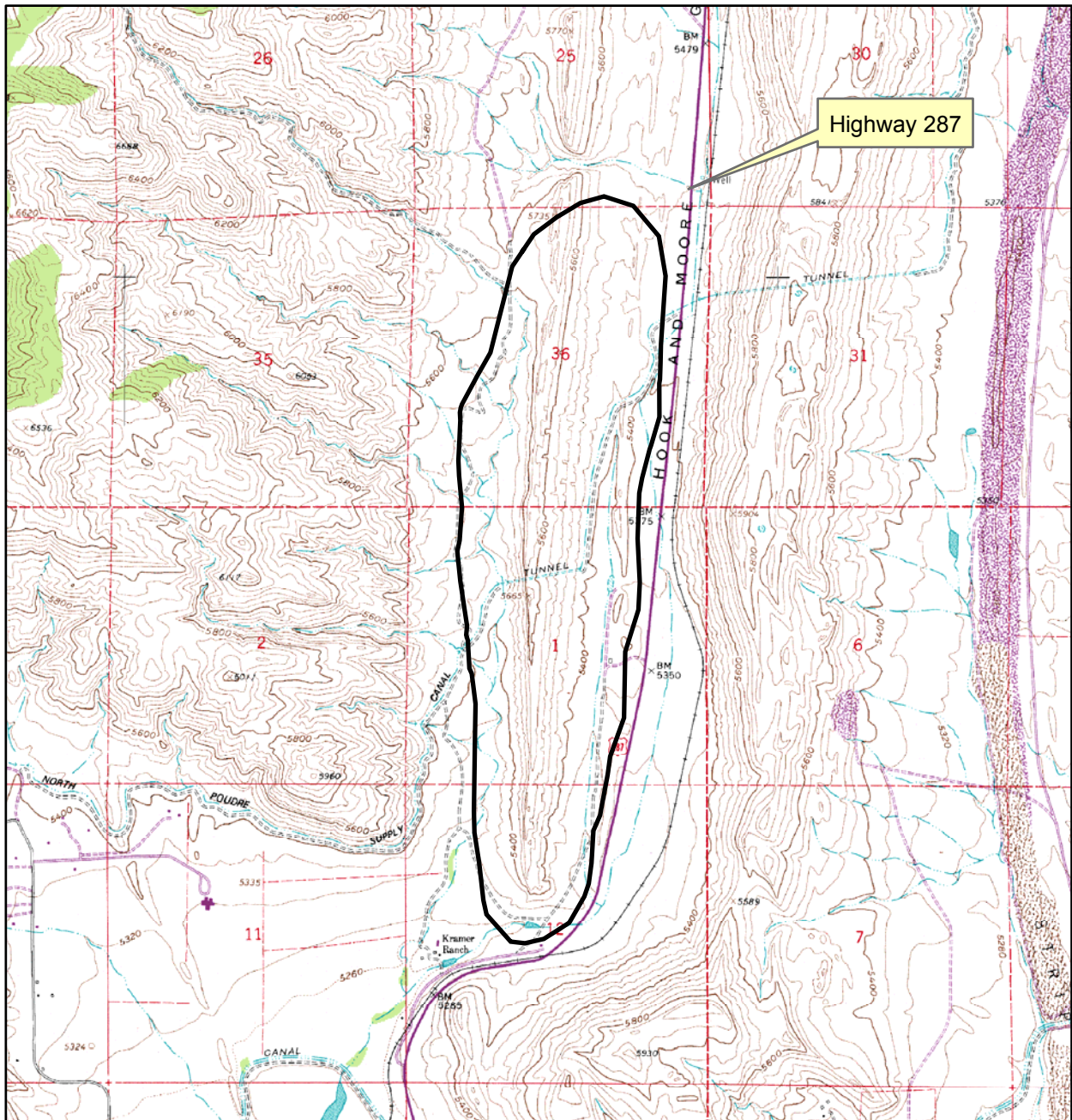
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<i>Cercocarpus montanus/ Stipa neomexicana</i>	Foothills shrubland	G2G3	S2S3				C	6/28/96

\*EO = Element Occurrence

**Boundary Justification:** The boundary is intended to protect the occurrence from direct disturbance and provide some buffer. The boundary to the north excludes the area heavily disturbed by quarrying. The lower valleys to the west and east of the hogback have been degraded by livestock operations and the building of the highway, but still may provide corridors for animal migration from the mountains to the plains.

**Protection Comments:** The site is owned by the Northern Colorado Water Conservancy District and the State Land Board. No formal protection is provided. The most immediate protection issue is the proposed Glade Reservoir project that would flood this area. If the proposed reservoir project is not carried out, other protection issues include further mining and residential development. These could destroy the remaining part of the community, which at one time probably extended several miles to the north. Protection efforts would need to consider limiting further fragmentation of the landscape by mining or development.

**Management Comments:** Weed control may be needed especially in the valleys between hogbacks that have been invaded to some extent by toadflax (*Linaria dalmatica*), leafy spurge (*Euphorbia esula*), and cheatgrass (*Bromus tectorum*). Grazing or fire management could be used as a tool to reduce the dominance of the cheatgrass and increase the proportion of native species but more intensive management may be necessary to decrease the dominance of the toadflax and the leafy spurge. Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988).




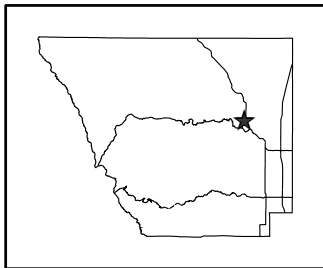
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Laporte, 40105-F2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 46. Hook and Moore Glade Potential Conservation Area  
 B3: High Biodiversity Significance

## Horsethief Pass

**Biodiversity Rank: B3 (High biodiversity significance)**

This site contains a fair occurrence of a plant community that is imperiled on a global scale (G2).

**Protection Urgency Rank: P2 (High urgency)**

Most of the site is owned by a private landowner but one small parcel (300 acres) is owned by a local mining company and another by a rod and gun club. Development pressures are high in the area and many nearby areas have been subdivided into 35-acre parcels.

**Management Urgency Rank: M4 (Low urgency)**

New management actions may be needed within five years to prevent loss of element occurrences.

**Location:** This PCA is immediately east of Highway 287 south of the Owl Canyon Road.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Livermore and Laporte  
T9N R69W Sections 5-7 and 17-20

**Size:** 2516 acres (1018 ha)

**Elevation:** 5440 – 6250 ft. (1658 – 1905 m)

**General Description:** The steep slopes and ridges are mainly composed of Dakota Group, and Morrison and Sundance Formation sandstones, siltstones, shales and mudstones. The vegetation is dominated by mountain mahogany (*Cercocarpus montanus*) shrublands on steep rocky slopes and grasslands on level areas and at the base of the slopes. An inactive mine and associated access road are located within the site and a shooting range is present at the north end of the site. The views from Horsethief Pass are exceptional; to the east the vast expanses of the Great Plains and to the west the high peaks of the Rocky Mountains.

**Biodiversity Comments:** The mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*) foothills shrubland is globally imperiled. Almost all known occurrences are highly degraded by invasion of the non-native cheatgrass (*Bromus tectorum*). The occurrence at this site is small and has been invaded by an abundance of cheatgrass and toadflax (*Linaria dalmatica*). The mountain mahogany/Griffith's wheatgrass (*Cercocarpus montanus/Elymus lanceolata x Pseudoroegneria spicata*) foothills shrubland has only been documented along the northern Front Range of Colorado and apparently occurs in southeastern Wyoming. This occurrence has been degraded by invasion of cheatgrass and toadflax. The degree of imperilment of the mountain mahogany/mountain muhly (*Cercocarpus montanus/Muhlenbergia montana*) foothills shrubland is unknown at this time. Few occurrences have been documented suggesting that it may be somewhat rare. The occurrence has been invaded by the non-native toadflax. The mountain mahogany-three-leaf sumac/big bluestem (*Cercocarpus montanus-Rhus trilobata/Andropogon gerardii*) foothills shrubland has been documented from few



locations. The occurrence at this site is small and has been invaded by toadflax and crested wheatgrass (*Agropyron cristatum*).

Natural Heritage element occurrences at the Horsethief Pass PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plant Communities</b>						
<b><i>Cercocarpus montanus- Rhus trilobata/ Andropogon gerardii</i></b>	<b>Foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>		<b>C</b>	<b>8/5/96</b>
<i>Cercocarpus montanus/ Stipa comata</i>	Foothills shrubland	G2	S2		D	8/5/96
<i>Cercocarpus montanus/ Muhlenbergia montana</i>	Foothills shrubland	GU	S2		C	8/5/96
<i>Cercocarpus montanus/ Elymus lanceolata x Pseudoroegneria spicata</i>	Foothills shrubland	GU	S3		D	8/1/96

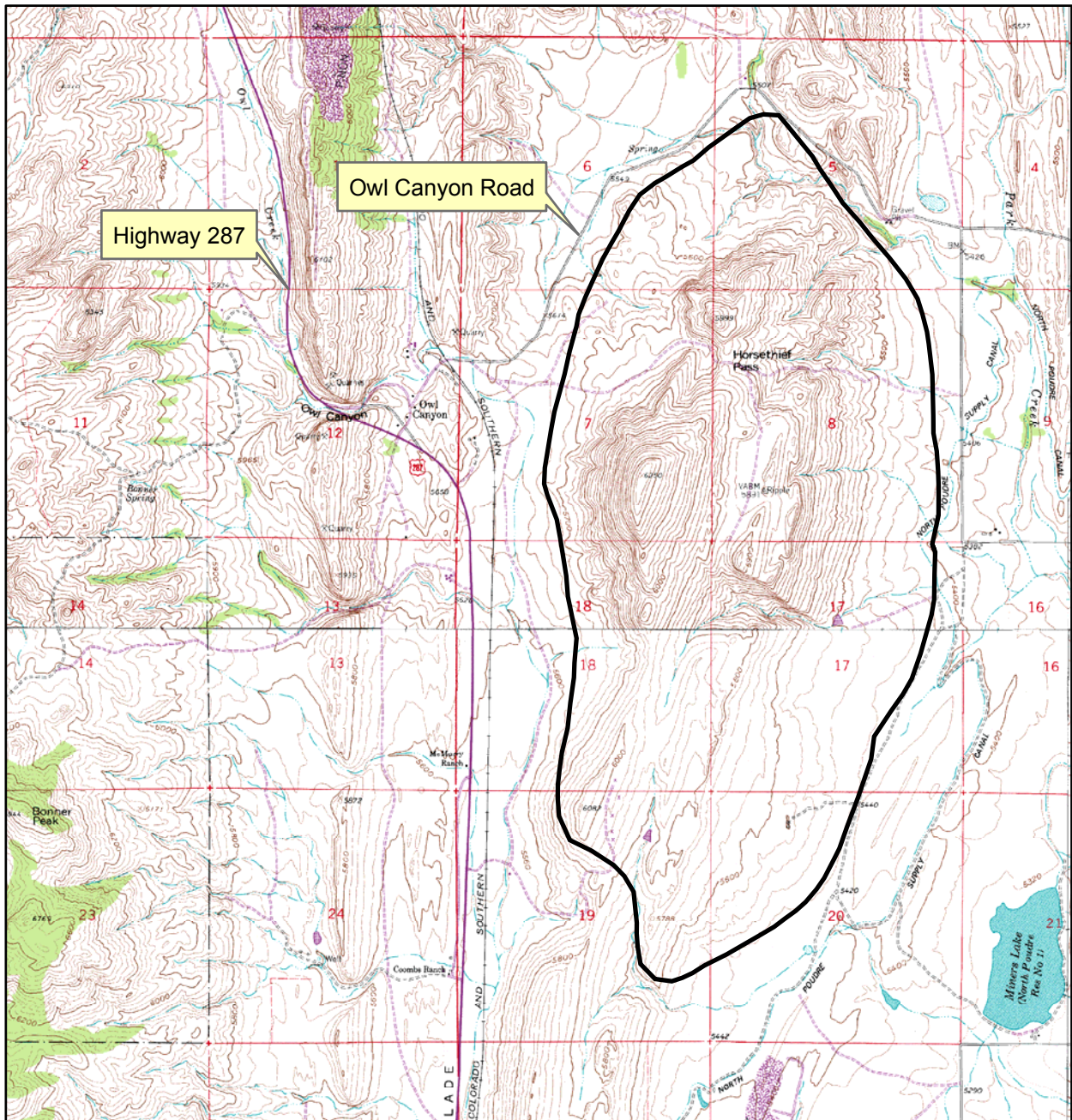
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary is intended to encompass the mountain mahogany shrublands and some adjacent grasslands as a buffer against direct impact.

**Protection Comments:** Most of the site is owned by a private landowner with one small parcel owned by a local mining company and another by a rod and gun club. Development pressures are high in the area with many nearby properties developed as 35-acre parcels. The site is not known to be currently threatened but pit mining and landscape rock mining have occurred in the area and may be expanded. Further mine expansion could impact the elements at the site by physically destroying habitat or by further introduction of non-native species.

**Management Comments:** Mining has occurred within the site and numerous non-native species have been used in reclamation efforts. Cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) are common. Grazing or fire management could be used as a tool to reduce the dominance of these species and increase the proportion of native species. Management may be needed to prevent the spread of the toadflax and Canada thistle (*Cirsium arvense*) that are common on other parts of the site. Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988).




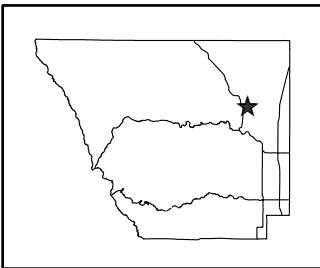
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Laporte, 40105-F2          Livermore, 40105-G2          Buckeye, 40105-G1          Wellington, 40105-F1</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 47. Horsethief Pass Potential Conservation Area B3: High Biodiversity Significance

## Jimmy Creek at Frenchwoman Creek

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a fair (C-ranked) occurrence of pale blue-eyed grass (*Sisyrinchium pallidum*), a globally imperiled (G2G3) wetland plant and an extant (E-ranked) occurrence of a Rocky Mountain ragwort (*Packera debilis*), a state critically imperiled (G4 S1) wetland plant.

**Protection Urgency Rank: P3 (Moderate urgency)**

The PCA is privately owned with no protection status. Development pressure is increasing in the area.

**Management Urgency Rank: M4 (Low urgency)**

Management may be needed in the future to maintain the current quality of the element occurrence.

**Location:** West of the Laramie River, southwest of Bull Mountain, along Jimmy Creek, approx. 0.4 miles above the confluence with Frenchwoman Creek.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Crazy Mountain  
T11N R76W Sections 21, 22, 27, and 28

**Size:** 167 acres (68 ha)

**Elevation:** 8000 – 8040 ft. (2438 – 2451 m)

**General Description:** Jimmy Creek is a perennial creek flowing at the west base of low, sedimentary mountains and along the eastern edge of a large, relatively flat river terrace that was probably formed at the end of the last ice age (around 13,000 years ago at the close of the Pleistocene). Several creeks flow out of the mountains into Jimmy Creek, and the creek is also fed by spring flow out of the ancient river terrace on the west side of the creek. The creek is separated by a low ridge from several shallow ponds (both permanent and ephemeral) that are fed by ground water seeping to the surface, the same ground water that feeds the creek. West of the creek and upstream are irrigated fields used to grow non-native grasses. The pale blue-eyed grass is found in a wet meadow fed by overflow from Jimmy Creek, ground water from the creek, and especially ground water seeping to the surface from the river terrace to the west.

**Biodiversity Comments:** This site contains a fair (C-ranked) occurrence of pale-blue eyed grass (*Sisyrinchium pallidum*), a globally imperiled (G2G3) wetland plant. In Colorado, this species is known primarily from peatlands in Park County. In addition, Rocky Mountain ragwort (*Packera debilis*), a state critically imperiled wetland plant (G4 S1) is currently known in Colorado only from the Jimmy Creek drainage in Larimer County and Park County peatlands. The site is in fair condition, containing mostly native species, but with much evidence of past and current agricultural use.

Natural Heritage element occurrences at the Jimmy Creek at Frenchwoman Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i><b>Sisyrinchium pallidum</b></i>	<b>Pale blue-eyed grass</b>	<b>G2G3</b>	<b>S2</b>			<b>BLM</b>	<b>C</b>	<b>8/14/96</b>
<i>Packera debilis</i>	Rocky Mountain ragwort	G4	S1				E	8/14/96

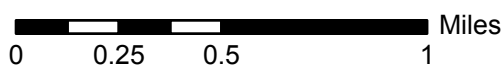
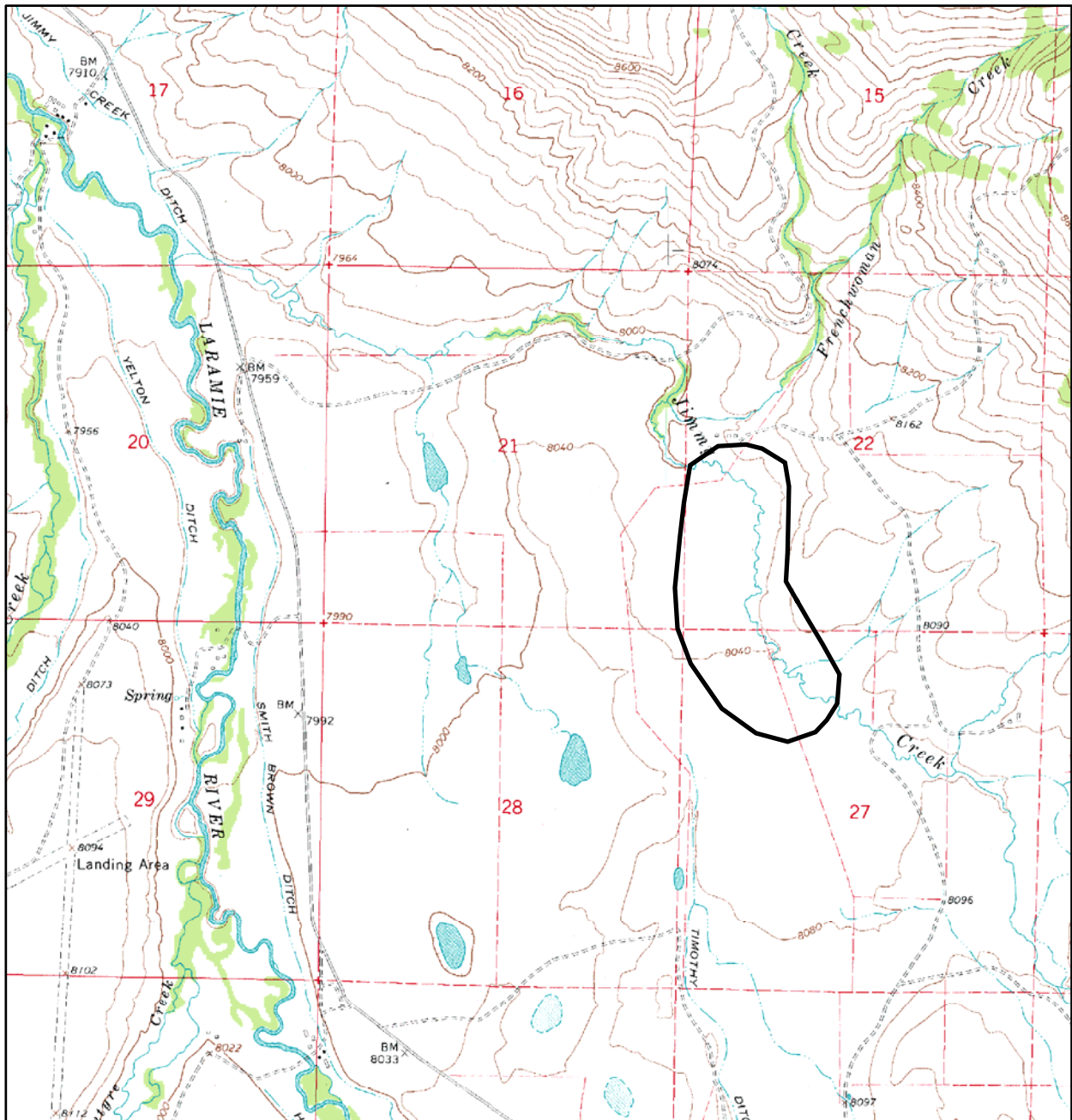
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site boundary includes the known location of the element, adjacent natural wet meadows, the creek itself, and a buffer of approximately 500 feet to protect from direct impacts to the plant. This boundary should be considered tentative until a flowering season inventory of the element is conducted. The element could occur along a much larger stretch of Jimmy Creek.

**Protection Comments:** The site is privately owned by one landowner. Development pressures are likely to increase in the near future. Most of Jimmy Creek in the area of this occurrence is privately owned, but portions of the creek are on U.S. Forest Service land. The Forest Service currently provides no formal protection for this area. Residential type buildings should be kept away from this site.

**Management Comments:** Management may be needed in the future to maintain current quality of element occurrences. With an irrigated hay field to the west, and grazing all around the site, agricultural activities may be affecting the elements. However, it is not clear if the effects are positive or negative. Irrigation can change the water regime of the wetland. While this may adversely affect portions of the habitat, it may also add to the wetland area. In South Park, creation of wet meadows through irrigation have extended the habitat of the pale blue-eyed grass. Grazing can be particularly heavy in riparian areas where cattle congregate. Heavy amounts of trampling and grazing of *Sisyrinchium* plants would probably lessen their growth and reproductive success. However, moderate levels of grazing do not appear to have a deleterious effect on the plant.




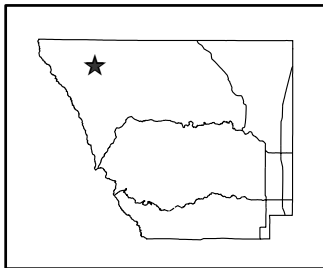
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Crazy Mountain, 40105-H8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 48. Jimmy Creek at Frenchwoman Creek Potential Conservation Area B3: High Biodiversity Significance

## Lake Pasture

***Biodiversity Rank: B3 (High biodiversity significance)***

This PCA supports an excellent (A-ranked) occurrence of a globally vulnerable (G3) wetland plant community.

***Protection Urgency Rank: P5 (No urgency)***

A conservation easement is in effect on the private property within the site. US Forest Service owns the remainder of the site.

***Management Urgency Rank: M4 (Low urgency)***

Management of grazing and recreation may be needed in the future to maintain the quality of the element occurrences.

**Location:** Elk Park, east of Route 7, southern Larimer County on the border with Boulder County (“Lake Pasture” on USGS topographic quad).

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Panorama Peak  
T4N R72W Sections 21, 27, and 28

**Size:** 431 acres (175 ha)

**Elevation:** 7940 – 8380 ft. (2420 –2554 m)

**General Description:** Lake Pasture is a cluster of small ponds that were likely formed at the end of the most recent glaciation, around 10,000-13,000 years ago<sup>1</sup>. Currently a visitor to this site sees several small ponds separated by low ridges surrounded by extensive wet meadows. The water is rather shallow, probably no more than six feet at the deepest, allowing rooted aquatic plants to thrive even in the pond centers. Elk visit these ponds frequently, as do waterfowl that breed in them and rest there during migration.

The ponds are situated in the northeastern portion of Elk Park. The Park itself is dominated by European hay grasses such as smooth brome (*Bromus inermis*) and timothy grass (*Phleum pratense*) in moist areas and native sedges and grasses in wetter areas. Conifers, especially ponderosa pine (*Pinus ponderosa*), dominate the surrounding forests, as is typical for mid-montane elevations in the Front Range.

Surveys for imperiled animals that may occur at this wetland are desirable, but they have not been conducted.

**Biodiversity Comments:** The Lake Pasture site is a very significant element of this area’s natural heritage. An intensive survey of Larimer County wetlands on non-public land has revealed only two other sites similar to this one, but nothing as large and high quality as Elk Park Ponds. Even on a statewide basis, sites such as this one are rare. Most ponds of

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<sup>1</sup> Whether these ponds formed by glacial action or another means is still being debated by scientists who know about this site. Regardless of their origin, this type of wetland at this elevation on the Front Range is both valuable and imperiled.

this sort occur in subalpine areas (above 9500 feet) and provide habitat for different plants and animals. The frequency of natural occurrences of this type suggest that those remaining in natural condition should be protected in order to preserve this unusual aspect of Colorado's natural heritage.

This site is significant on two levels. First, shallow montane ponds are uncommon. Such ponds provide special habitat not only for the obvious wildlife such as elk and waterfowl, but also for many poorly known animals (e.g., perhaps species of dragonflies or other insects) that may survive only in this environment. Second, based on existing reports of aquatic vegetation and the experience of the Colorado Natural Heritage Program, the plant communities that occur in these ponds appear to be rare in Colorado. These plant communities suggest that the site has high natural heritage value.

Two communities are of particular interest: (1) A dense pondweed (*Potamogeton natans*) community covers most of the deeper water in at least one larger pond, and (2) a bladderwort (*Utricularia vulgaris*) community is found in water less than a meter deep. Bladderworts are carnivorous plants that feed on microorganisms in the water. This particular species (*U. vulgaris*) occurs in many lakes and ponds in Colorado, but only rarely occurs in the numbers and density seen here.

The significance of this site is increased dramatically by the great conditions in which the pond vegetation exists. Grazing in and around the ponds has recently been light, so the plants and plant communities are robust. Very few non-native species of plants occur with the wetland vegetation. Also, there are no signs of major alterations to the natural hydrology of these sites.

Natural Heritage element occurrences at the Lake Pasture PCA.

Element	Common Name	Global Rank	State Rank	Federal/State Status	EO* Rank	Last Observed
Plant Communities						
<i>Potamogeton natans</i>	Montane floating/ submergent wetland	G5?	S1		A	6/28/96
<b><i>Utricularia vulgaris</i></b>	<b>Montane floating/ submergent wetland</b>	<b>G3?</b>	<b>S1</b>		<b>A</b>	<b>6/28/96</b>
<i>Glyceria borealis</i>	Montane emergent wetland	G4	S3		B	6/28/96
<i>Carex utriculata</i>	Montane wet meadow	G5	S4		B	6/28/96
<i>Sparganium angustifolium</i>	Montane floating/ submergent wetland	G4	SU		B	6/28/96

\*EO = Element Occurrence

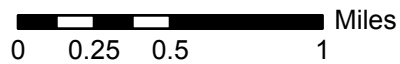
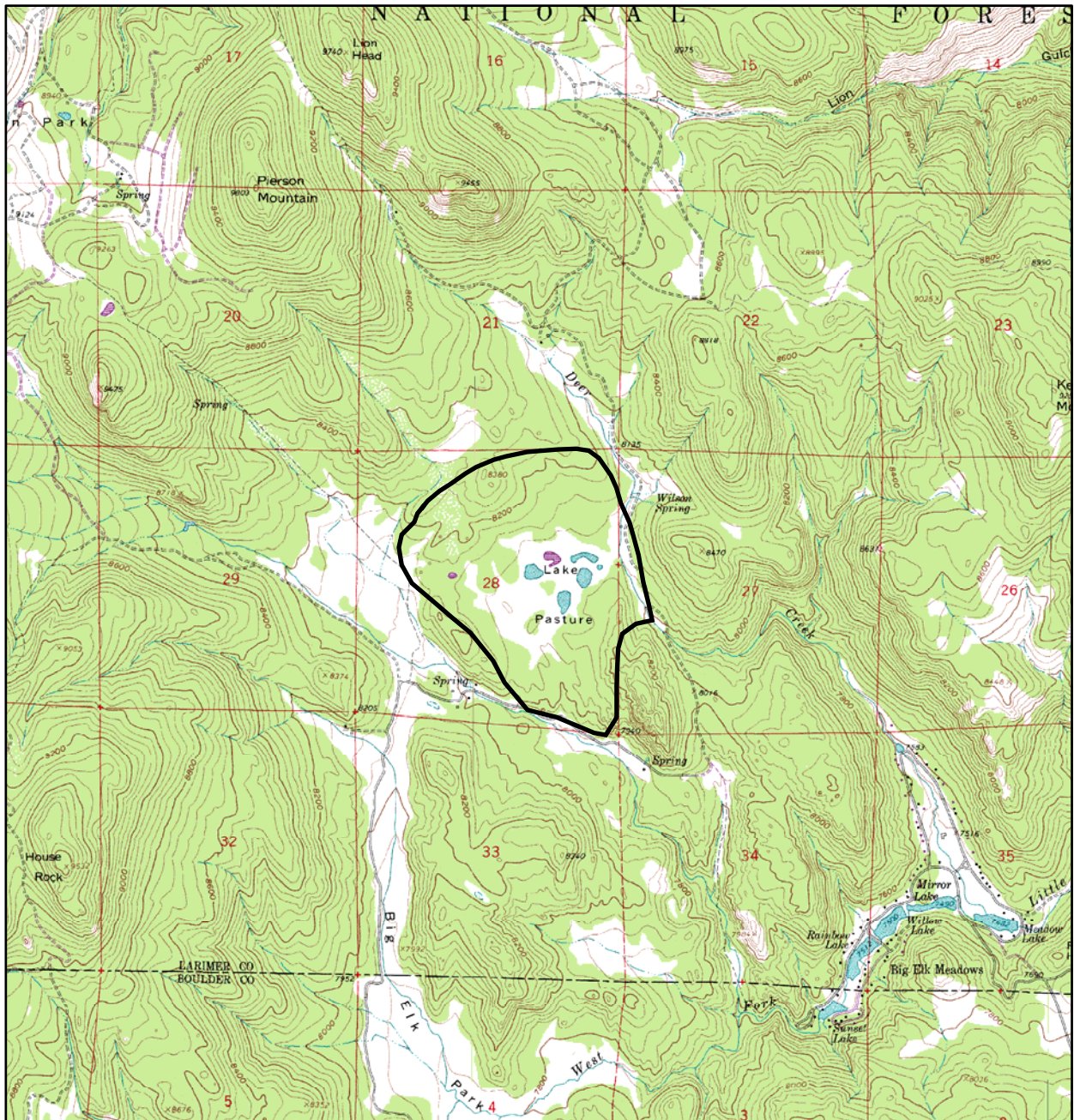
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the kettle ponds, adjacent wetlands, seep wetlands upslope from and adjacent to the ponds, and a buffer around the wetlands to protect from direct and indirect human impacts. The buffer generally extends to about 1000 feet beyond the edge of the wetlands, or to the tops of ridges that naturally separate the wetland ecosystem from adjacent areas.

**Protection Comments:** The site is owned by a family that worked with the Estes Valley Land Trust to place an easement on the property. The site is leased by Aspen Lodge. The Lodge brings visitors to and through the site on horseback. The light travel and grazing by horses appears to cause no adverse effects at the site, although a campsite between two of the ponds should be moved into the adjacent forest so that it does not block wildlife movement between the ponds.

**Management Comments:** As suggested above, the most critical factor governing the viability and integrity of this site is the maintenance of natural hydrology. No water should be added or removed from the ponds, and water levels should not be altered by any means, including levees, ditches, etc. Non-native plant species will not be a problem as long as grazing along the edges of the ponds remains light. Heavy grazing will expose bare soil, providing a niche for invasive species. Any buildings constructed in the area should be placed well back from the pond edges to maintain the game and non-game wildlife values of the ponds. Care should be taken so that effluent from buildings or runoff from roads does not add nutrients to the pond water.






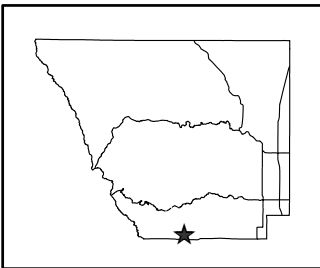
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Panorama Peak, 40105-C4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 49. Lake Pasture Potential Conservation Area  
 B3: High Biodiversity Significance

## Little Hohnholz Lake

**Biodiversity Rank: B3 (High biodiversity significance)**

This site includes a fair (C-ranked) occurrence of pale blue-eyed grass (*Sisyrinchium pallidum*), a globally imperiled (G2G3) wetland plant.

**Protection Urgency Rank: P4 (Low urgency)**

Ownership of the site is a mixture of private, BLM, and land managed by the Colorado Division of Wildlife. No threats known for foreseeable future.

**Management Urgency Rank: M2 (High urgency)**

New management action to manage trampling and invasive non-native vegetation may be needed to prevent loss of element occurrences.

**Location:** One mile west of the Laramie River.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Crazy Mountain; T11N R77W Section 1, 2, 11, and 12

**Size:** 244 acres (99 ha)

**Elevation:** 7920– 8000 ft. (2414 – 2438 m)

**General Description:** The Little Hohnholz Lake site is a wetland along a reservoir shore surrounded by poor to good condition sagebrush plains. The wetlands are alkaline and support Nebraska sedge (*Carex nebrascensis*), sedge (*Carex simulata*), spikerush (*Eleocharis quinqueflora*), pale blue-eyed grass (*Sisyrinchium pallidum*), arrowgrass (*Triglochin* sp.), and lousewort (*Pedicularis crenulata*). The reservoir is naturally spring fed, and the springs support small but good condition wetland habitat. The sagebrush shrublands surrounding the reservoir are dominated by big sagebrush (*Artemisia tridentata*), milkvetch (*Astragalus* sp.), and mixed graminoids, as well as larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*).

**Biodiversity Comments:** A narrow band of wetland vegetation along the edge of a man-made reservoir dominated by *Carex*, *Juncus*, and *Pedicularis* supports a fair (C-ranked) occurrence of a globally imperiled (G2G3) plant species and a state rare wetland plant community. The natural hydrology at the inlet of the reservoir and the reservoir itself provides foraging habitat for Great Blue Heron, White-faced Ibis, and White Pelican. Natural Heritage element occurrences at the Little Hohnholz Lake PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
Plants						
<b><i>Sisyrinchium pallidum</i></b>	<b>Pale blue-eyed grass</b>	<b>G2G3</b>	<b>S2</b>	<b>BLM</b>	<b>C</b>	<b>7/21/96</b>
Plant communities						
<i>Eleocharis quinqueflora</i> - <i>Triglochin</i> spp.	Alkaline spring	GU	S2		C	8/13/96

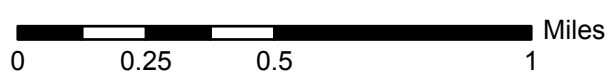
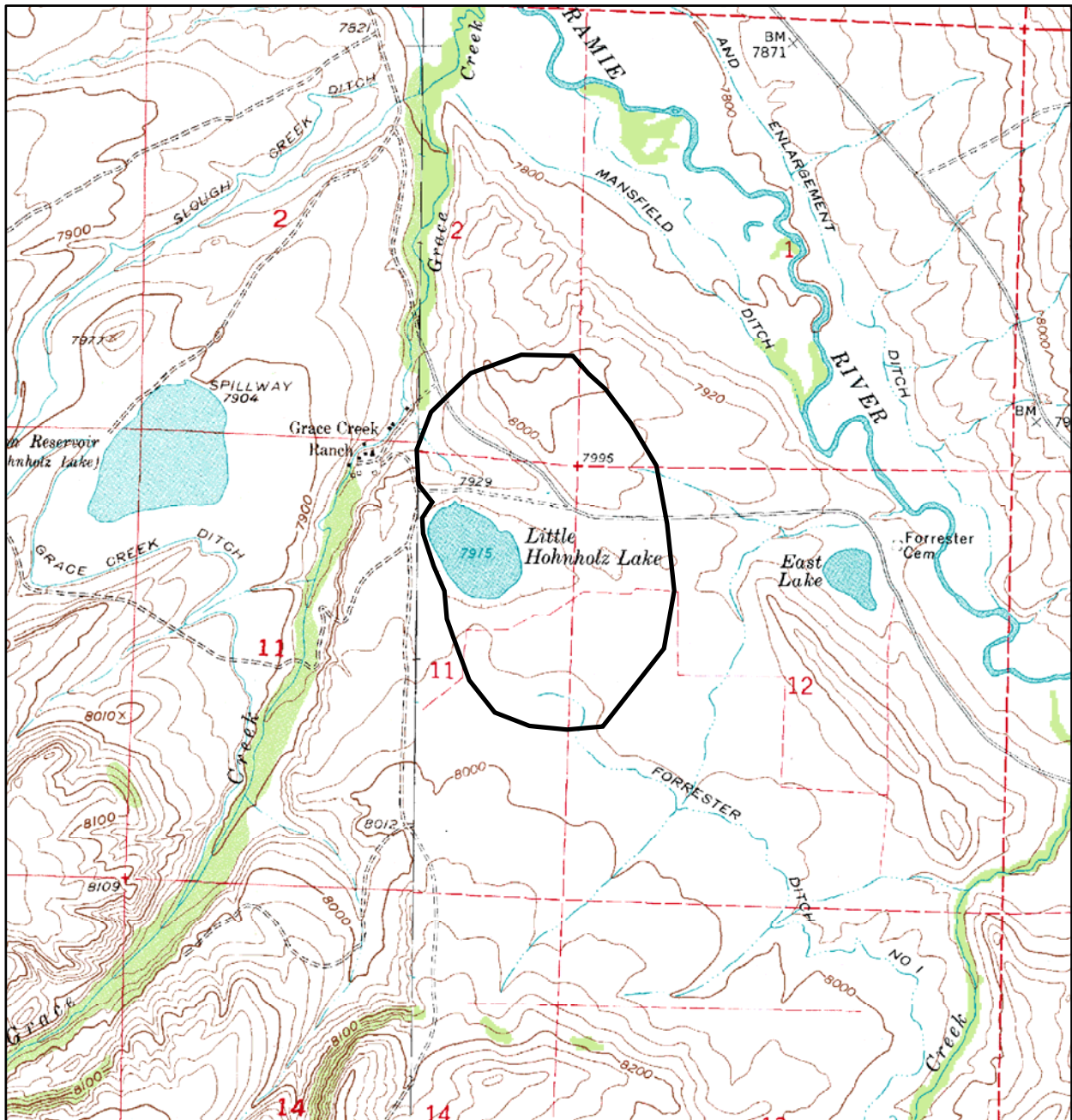
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the element occurrences and a buffer for these elements to protect the hydrology and to ensure against erosion. It is important to note that hydrologic modifications (e.g., wells, diversions) to the north, west, and south of the site *may* affect the hydrology of the site even if the modifications occur beyond the site boundary.

**Protection Comments:** The Colorado Division of Wildlife manages some of this site while most is privately owned.

**Management Comments:** Recreational uses and the associated increase in non-native plant species may threaten the occurrences, especially the pale blue-eyed grass. Sweetclover (*Melilotus officinale*) is established within the occurrence of the pale blue-eyed grass and control is recommended before it spreads. At least one area of Kentucky bluegrass (*Poa pratensis*) was observed; red clover (*Trifolium pratense*), and Canada thistle (*Cirsium arvense*) were also noted. The CDOW should be contacted and encouraged to develop a management plan to protect the imperiled plant species from spread of competing non-native plant species as well as trampling by fisherman and boaters. Site is used primarily by fisherman who pose a threat of trampling. A sign should be placed at the edge of the parking lot asking visitors to refrain from walking along the south and east reservoir shores in to protect the sensitive plant habitat. The hydrology of the site should be maintained. There appears to be old irrigation ditches on the north side of the reservoir. This may have been an old hay meadow before the reservoir was created.




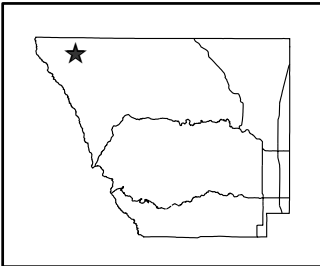
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Crazy Mountain, 40105-H8          Old Roach, 40106-H1</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 50. Little Hohnholz Lake Potential Conservation Area B3: High Biodiversity Significance

## Little Thompson River at Meadow Hollow

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a fair (C-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P2 (High urgency)**

This PCA is privately owned by multiple landowners with parcel size generally about 100 acres. Development pressure is high in this area. Additionally, the construction of reservoir on Little Thompson River and expansion of Carter Lake Reservoir have been proposed. Either of these projects would destroy this site.

**Management Urgency Rank: M3 (Moderate urgency)**

The potential for reservoir construction, subdivision, and management of non-native plants are the primary management concerns.

**Location:** South of Carter Lake Reservoir where Meadow Hollow meets the Little Thompson River drainage and northwest along the Little Thompson River.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Carter Lake Reservoir  
T4N R70W Sections 28, 33, and 34

**Size:** 210 acres (85 ha)

**Elevation:** 5400 – 6000 ft. (1646 – 1829 m)

**General Description:** This site is characterized by cliffs and outcrops of red sandstone dominated by mountain mahogany (*Cercocarpus montanus*) and mixed grasses and forbs. The outcrops and cliffs support sporadic and scattered patches of Bell's twinpod. The twinpod is known from a north-south trending hogback of Fountain Formation overlain by Ingleside Formation just north of the Little Thompson River as well as two outcrops of Lykins Formation at Dowe Pass and Meadow Hollow. These formations consist of red sandstone and siltstone and contain calcareous layers. (Braddock *et al.* 1988)

Some areas are heavily grazed but some sandstone outcrops are in good to excellent condition and dominated by native species in the understory such as fringed sage (*Artemisia frigida*) and Indian ricegrass (*Oryzopsis hymenoides*). Bottomlands support *Populus* spp., coyote willow (*Salix exigua*), and patches of cattails (*Typha* sp.).

**Biodiversity Comments:** This PCA supports a fair occurrence of Bell's twinpod. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). Bell's twinpod has long been considered to be primarily restricted to Niobrara shale. Its occurrence on Fountain and Ingleside formation sandstone and Lykin Formation such as within this PCA is little studied.

Natural Heritage element occurrences at the Little Thompson River at Meadow Hollow PCA.

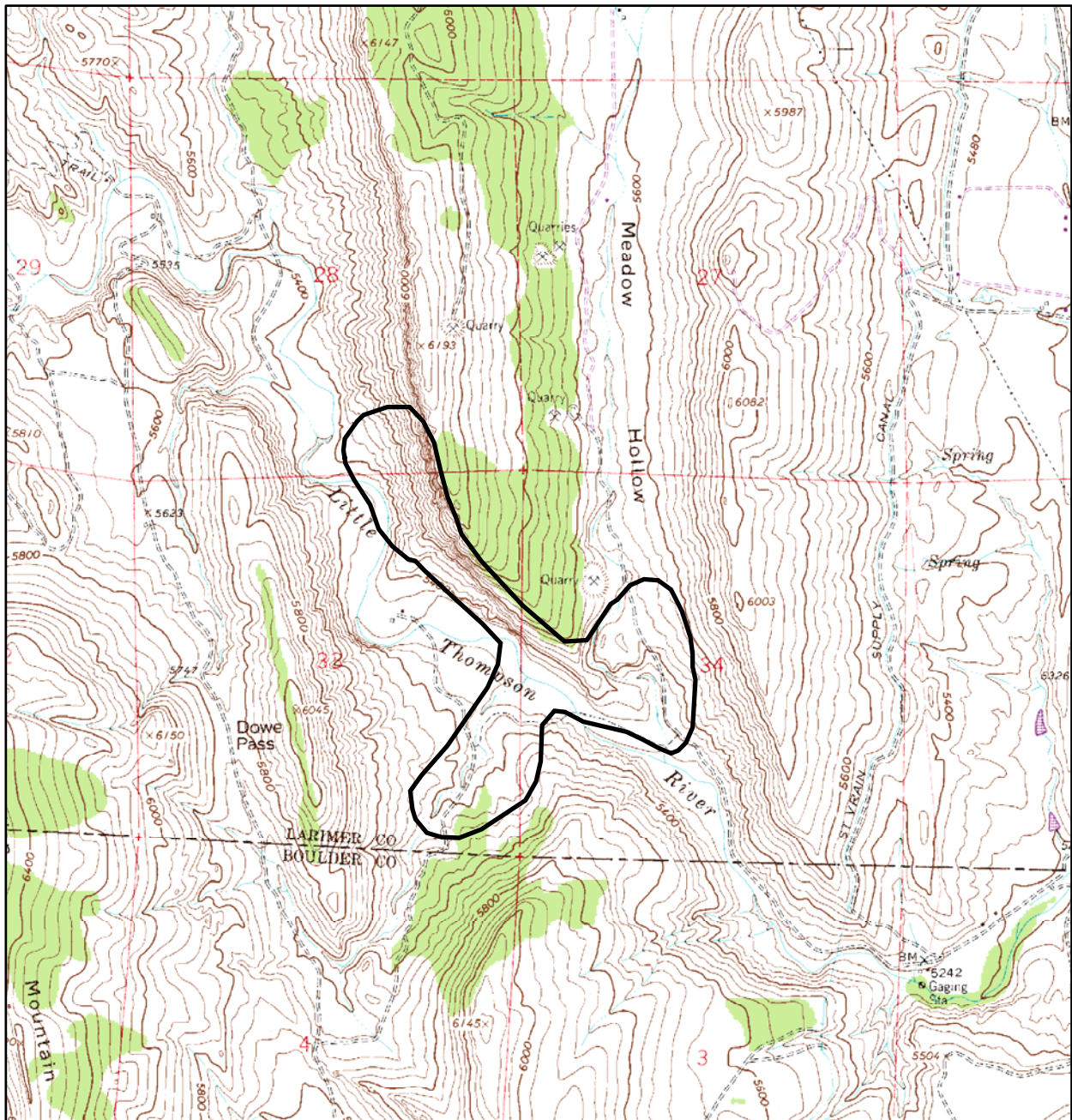
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plants								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	10/15/03

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the known occurrence and adjacent lands. The boundary was drawn to include a hogback of Fountain and Ingleside formations and outcrops of Lykins Formation. The boundary includes some intervening unsuitable habitat such as along the Little Thompson River. The PCA has not been thoroughly searched for Bell's twinpod and likely includes more plants than documented. Additionally, adjacent lands have not been searched for Bell's twinpod and the plants likely extend outside of the site boundary.

**Protection Comments:** The site is owned by multiple private owners. The expansion of Carter Lake Reservoir or construction of a reservoir on the Little Thompson River would destroy this site. Larimer County's Red-tail Ridge Open Space is partially within this PCA.

**Management Comments:** Management of non-native plants may be needed within five years to maintain the current quality of the element occurrences. Some areas are degraded with patches of Russian thistle (*Salsola australis*), spotted knapweed (*Acosta maculosa*), and great mullein (*Verbascum thapsus*). Control of these species, especially knapweed, should be undertaken.




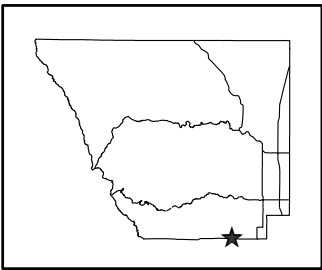
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Carter Lake Reservoir, 40105-C2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 51. Little Thompson at Meadow Hollow Potential Conservation Area B3: High Biodiversity Significance

## Lower Jimmy Creek Spring

**Biodiversity Rank: B3 (High biodiversity significance)**

This site includes a fair (C-ranked) occurrence of pale blue-eyed grass (*Sisyrinchium pallidum*), a globally imperiled (G2G3) wetland plant and a fair occurrence of a Rocky Mountain ragwort (*Packera debilis*), a state critically imperiled (G4 S1) wetland plant.

**Protection Urgency Rank: P4 (Low urgency)**

The site is within State Land Board and US Forest Service land. The State Land Board section is part of the Stewardship Trust Program.

**Management Urgency Rank: M2 (High urgency)**

New management of livestock grazing may be needed within five years to prevent loss of element occurrences.

**Location:** Along Jimmy Creek in the Laramie River Valley in northwestern Larimer County. The PCA is about three miles east of Four Corners.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Sand Creek Pass and Deadman  
T11N R76W Section 36  
T11N R75W Sections 19, 20,29-31

**Size:** 1050 acres (425 ha)

**Elevation:** 8600 – 9600 ft. (2620 – 2930 m)

**General Description:** This site is in a small valley in the Laramie River drainage that is surrounded by rolling hills dominated by sagebrush and grassland communities with a diverse assemblage of native forbs. The soil is red and sandy, with gravel that appears to be high in quartz. The valley bottom consist of a sedge (*Carex*) dominated wetland. There are large hummocks in the wetland that are the result of heavy grazing.

**Biodiversity Comments:** This site is one of the few documented locations of pale blue-eyed grass (*Sisyrinchium pallidum*) in Larimer County. In Colorado, this species is known primarily from peatlands in Park County. In addition, Rocky Mountain ragwort (*Packera debilis*) in Colorado is currently known only from the Jimmy Creek drainage in Larimer County and Park County peatlands. The site is in fair condition, containing mostly native species, but with much evidence of past and current livestock grazing.

Natural Heritage element occurrences at the Lower Jimmy Creek Spring PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
Plants						
<i>Sisyrinchium pallidum</i>	Pale blue-eyed grass	G2G3	S2	BLM	C	7/15/04
<i>Packera debilis</i>	Rocky Mountain ragwort	G4	S1		C	7/15/04

\*EO = Element Occurrence

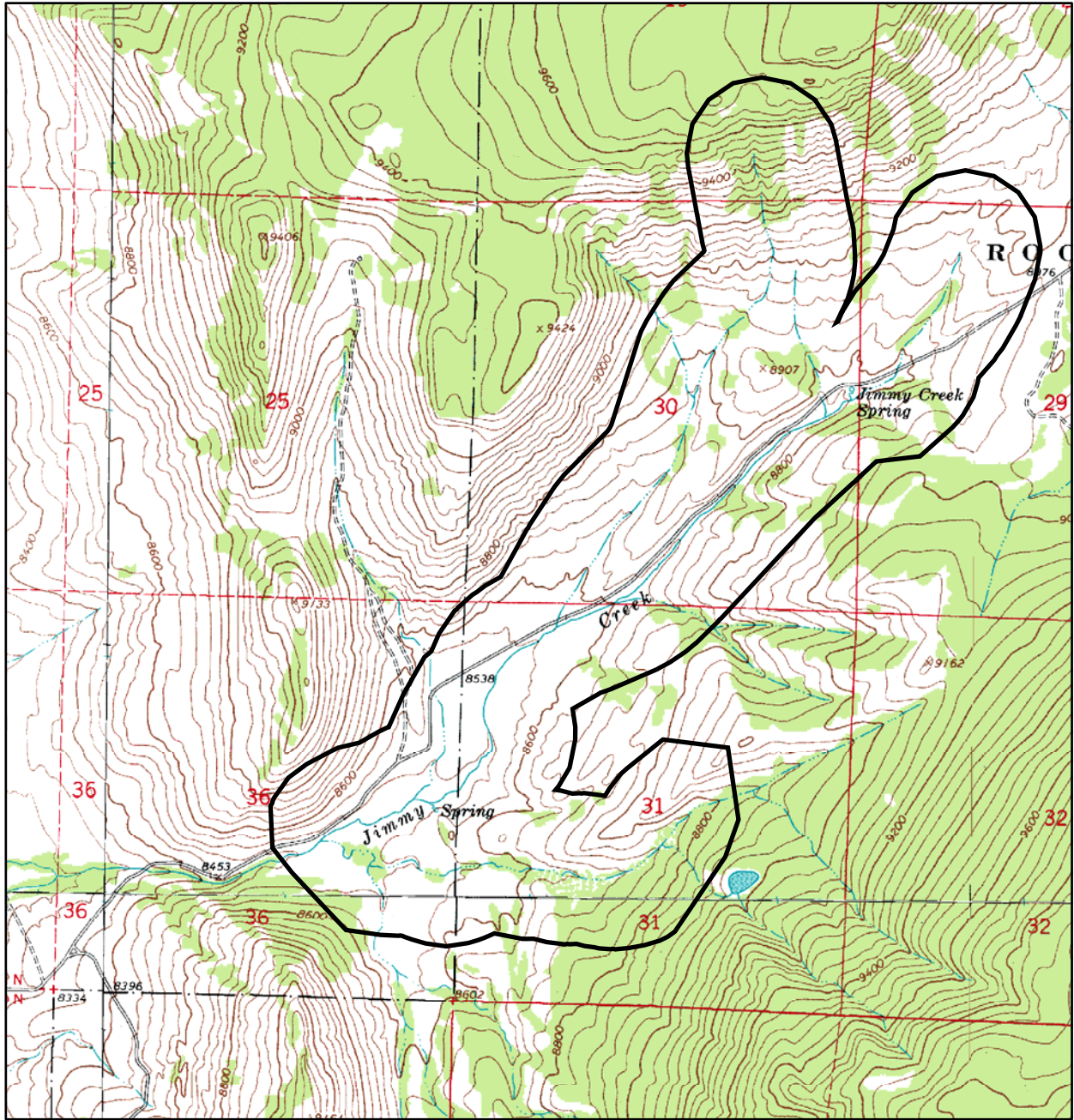
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.



**Boundary Justification:** The boundary includes the wet meadow with the rare plant occurrences and buffer of about 1000 ft. to protect from direct disturbance. The boundary does not encompass the recharge area for the springs supporting the wetland.

**Protection Comments:** The site includes a State Land Board section on which the wetland is located and upstream US Forest Service land. The State Land Board section is part of the Stewardship Trust Program. The wetland and the pale blue-eyed grass should be the highest priority for protection at this site.

**Management Comments:** Heavy grazing may threaten the occurrence of pale blue-eyed grass and Rocky Mountain ragwort. A grazing rotation system could be set up to allow the imperiled species time during each growing season to produce seed. The Colorado Department of Transportation should be informed of the significance of the site as road maintenance may also impact the elements.




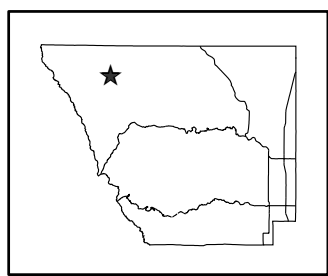
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Sand Creek Pass, 40105-H7          Crazy Mountain, 40105-H8          Deadman, 40105-G7          Glendevy, 40105-G8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 52. Lower Jimmy Creek Spring Potential Conservation Area  
 B3: High Biodiversity Significance

## Lower Laramie River Valley

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports several excellent to fair (A- to C-ranked) occurrences of larchleaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*), a globally imperiled subspecies (G4T2).

**Protection Urgency Rank: P3 (Moderate urgency)**

The PCA is under primarily privately owned large ranches and BLM land. Development pressures are expected to increase in the near future.

**Management Urgency Rank: M4 (Low urgency)**

The current land uses appear to be compatible with the persistence of the rare plant species.

**Location:** This PCA includes most of the Laramie River Valley in northwestern Larimer County. The PCA extends into Wyoming on its northern boundary and 15 miles south along the Laramie River and Road 103.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Crazy Mountain, Deadman, Glendevey, Jelm Mountain, Old Roach, Sand Creek Pass, and Woods Landing

T10N R76W Sections 1-6, 8-12, 14-17, 20-26

T11N R76W Sections 4-10, 16-36

T11N R77W Sections 1-6, 8-17, 21-26

T12N R76W Sections 19-22, 27-33

T12N R77W Sections 20-36

T12N R78W Section 36

**Size:** 51,615 acres (20,890 ha)

**Elevation:** 7700 – 8400 ft. (2347 – 2560 m)

**General Description:** The Lower Laramie River Valley includes open flat expanses and rolling hills of sagebrush shrublands. The sagebrush includes short-stature species such as black sagebrush (*Artemisia nova*) and Bigelow sagebrush (*Artemisia bigelovii*) (R. Rosentreter, pers. comm. 2004). Within the shrublands, and associated grasslands and shale barrens, grows the white flowered subspecies of larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*). This plant is thought to be ubiquitous throughout all these habitat types. The plant does not grow in the adjacent forested areas or in riparian habitat along the Laramie River and its tributaries.

**Biodiversity Comments:** This PCA supports several excellent to fair (A- to C-ranked) occurrences of a globally imperiled (G4T2) white flowered subspecies of larch-leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*). The subspecies is known primarily from the Laramie River Valley, the Chimney Rock area, and southern Wyoming.

Natural Heritage element occurrences at the Lower Laramie River Valley PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	<b>Larch-leaf beardtongue</b>	<b>G4T2</b>	<b>S2</b>			<b>FS</b>	<b>A</b>	<b>8/13/96</b>
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	<b>Larch-leaf beardtongue</b>	<b>G4T2</b>	<b>S2</b>			<b>FS</b>	<b>A</b>	<b>8/14/96</b>
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	<b>Larch-leaf beardtongue</b>	<b>G4T2</b>	<b>S2</b>			<b>FS</b>	<b>B</b>	<b>8/13/96</b>
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	<b>Larch-leaf beardtongue</b>	<b>G4T2</b>	<b>S2</b>			<b>FS</b>	<b>B</b>	<b>8/13/96</b>
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf beardtongue	G4T2	S2			FS	C	7/18/01
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf beardtongue	G4T2	S2			FS	C	8/14/96
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf beardtongue	G4T2	S2			FS	E	9/15/01
<i>Penstemon laricifolius</i> ssp. <i>exilifolius</i>	Larch-leaf beardtongue	G4T2	S2			FS	E	8/7/01

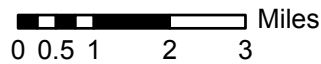
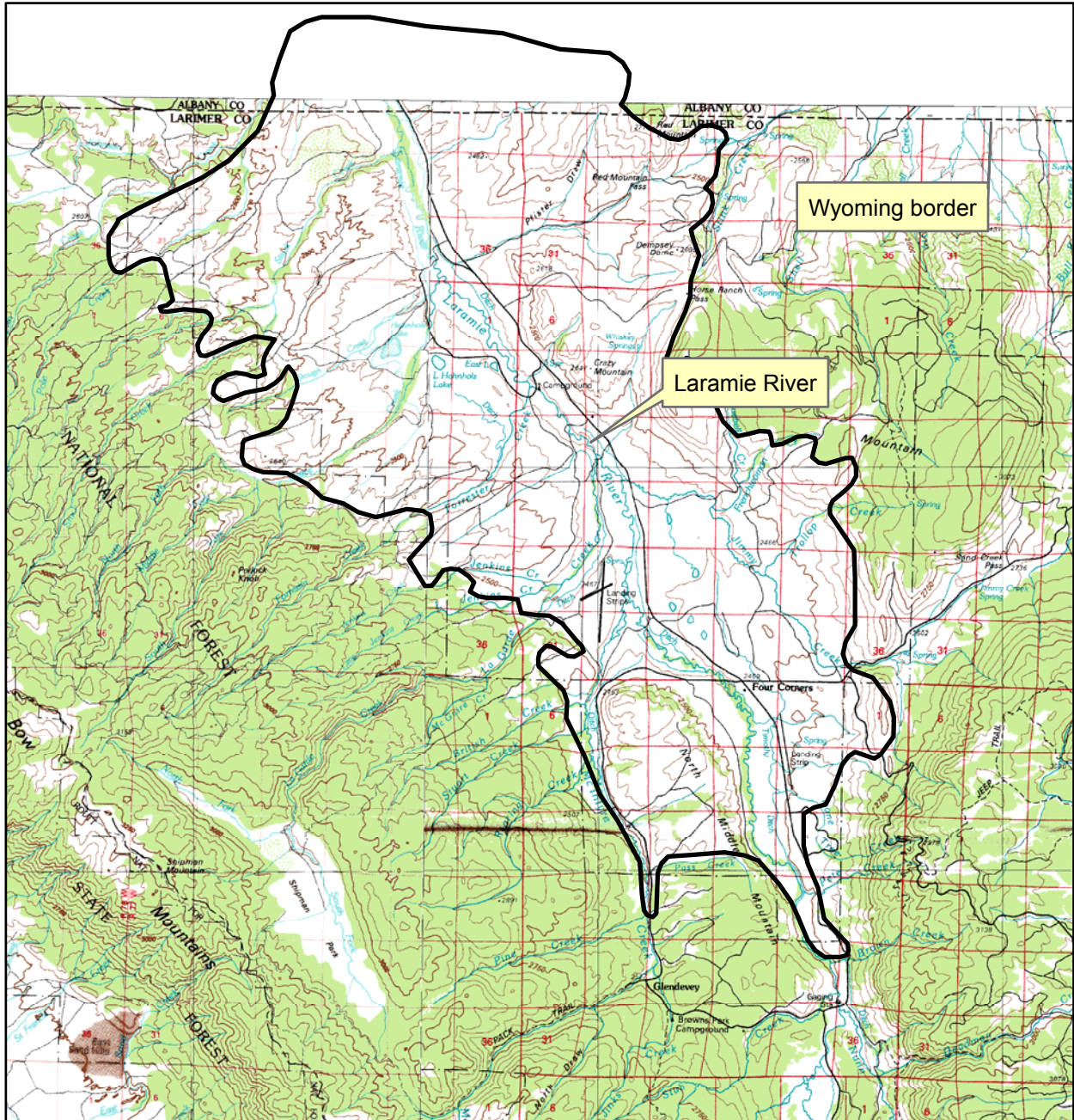
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the shrubland and grassland habitat for *Penstemon laricifolius* ssp. *exilifolius*. The boundary excludes forested areas at its edges. The Laramie River and its tributaries are included within the boundary though these areas are not habitat for the rare plant.

**Protection Comments:** The valley is largely pristine and relatively undeveloped. Portions of the site are protected as public land (primarily BLM and State Land Board). The southern portion of the site and the areas adjacent to the Laramie River in the north are privately owned and operated as large livestock ranches. Development pressures are expected to increase in the near future.

**Management Comments:** Current management appears adequate to support the subspecies. Management concerns include invasion by non-native species and direct displacement of habitat by human habitation.




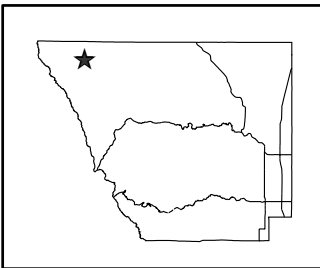
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/23/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1          Walden, 40106-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 53. Lower Laramie River Valley Potential Conservation Area B3: High Biodiversity Significance

## McIntyre Creek

**Biodiversity Rank: B3 (High biodiversity significance)**

This site contains a good occurrence of a plant community that is vulnerable on a global scale (G3).

**Protection Urgency Rank: P3 (Moderate urgency)**

The site is primarily under private ownership as one large parcel. Development pressure may increase in the area in the near future.

**Management Urgency Rank: M4 (Low urgency)**

The willow community appears in equilibrium with the agricultural activities along the creek.

**Location:** This site includes four miles of McIntyre Creek on the west side of North Middle Mountain, at the base of the Rawahs. The site is a few miles upstream from the confluence of McIntyre Creek with the Laramie River.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Glendevey  
T10N R76W Sections 5-8, 16-18, 20, 21, 28, and  
T11N R76W Section 32

**Size:** 1415 acres (573 ha)

**Elevation:** 8000 – 8250 ft. (2438 – 2515 m)

**General Description:** The site includes a stream at the base of the mountains. The mountains are primarily igneous bedrock, with significant influence from Pleistocene glaciation. The creek was formerly dominated by willows along its entire length, but now much of the riparian area is used for hay and grazing. Water is diverted out of the creek and runs along most of the length of the site on the upper edge of the riparian. This is among the most significant streams in the area because extensive patches of willow still exist where east-flowing creeks leave the mountains. These patches will provide adequate propagules for complete restoration of the rest of the creek.

**Biodiversity Comments:** This site contains a good occurrence of a plant community that is vulnerable on a global scale.

Natural Heritage element occurrences at the McIntyre Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal/State Status	EO* Rank	Last Observed
Plant Communities						
<i>Salix geeyeriana</i> - <i>Salix monticola</i> / <i>Calamagrostis canadensis</i>	Montane willow carr	G3	S3		B	8/21/96

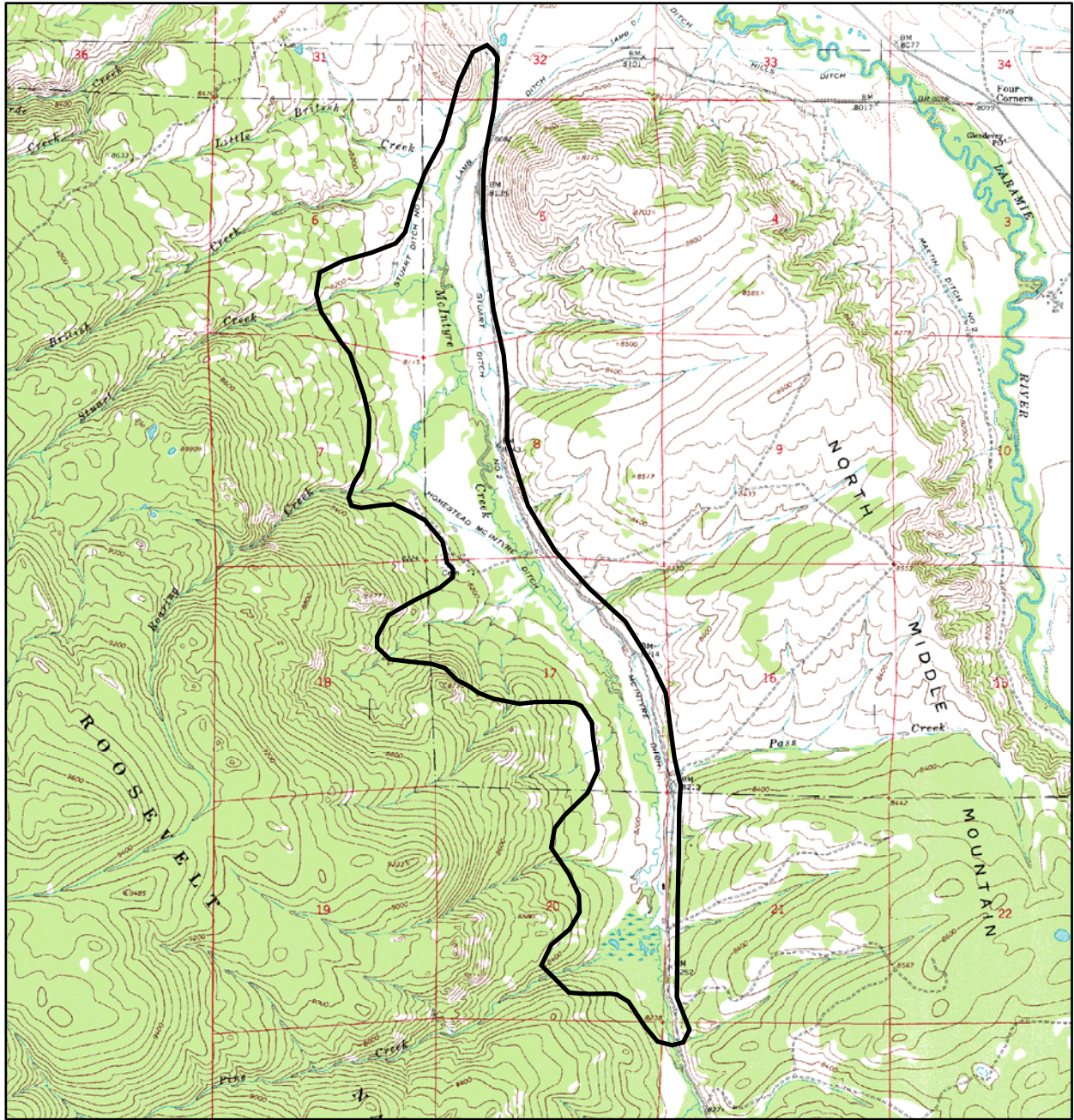
\*EO = Element Occurrence

**Boundary Justification:** The site includes all of the riparian that is either intact or with high potential for restoration. The site also includes a minimum 300-foot buffer around the

riparian zone to protect the area from direct impacts of heavy agricultural use and development, and from indirect impacts of vehicles and runoff.

**Protection Comments:** Protection of this site could be achieved with the appropriate management agreements with the private landowners.

**Management Comments:** Allowing for expanding regeneration and growth of willows at this site would benefit the community and associated elements.




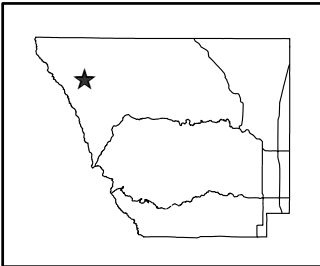
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Glendevey, 40105-G8          Crazy Mountain, 40105-H8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 54. McIntyre Creek Potential Conservation Area B3: High Biodiversity Significance



## Meadow Springs Ranch

**Biodiversity Rank: B4 (Moderate biodiversity significance)**

This site supports a fair (C-ranked) occurrence of Colorado butterfly weed (*Gaura neomexicana* ssp. *coloradensis*), a globally imperiled subspecies (G3T2) that is federally listed as a threatened species.

**Protection Urgency Rank: P4 (Low urgency)**

The PCA is owned by the City of Fort Collins Utilities Department as part of a large cattle ranch. The Utilities Department is aware of the rare plant and takes measures to protect the species.

**Management Urgency Rank: M2 (High urgency)**

The primary management concern is the timing and intensity of cattle grazing on the wetland supporting the rare species.

**Location:** Meadow Spring Ranch east of Interstate 25, one mile south of the Carr Road exit. The site is primarily in Weld County with a small portion extending into northeastern Larimer County.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Carr West  
T11N R67W Sections 19, 29, 30  
T11N R68W Sections 24

**Size:** 472 acres (191 ha)

**Elevation:** 5750– 5820 ft. (1753 – 1774 m)

**General Description:** Wet meadows within a matrix of shortgrass prairie support rare wetland plants including Colorado butterfly weed (*Gaura neomexicana* ssp. *coloradensis*), a federally listed threatened species, and gay-feather (*Liatris ligulistylis*), a state rare plant. The wetlands occur along Spring Creek just east of Interstate 25 and appear to be ground water and ditch-fed. Flow has been channellized through parts of the wetland. The wetland has been used for cattle grazing since the 1860's and is hummocked in areas

A few plant species associated with the butterfly weed and gay-feather are three-square (*Scirpus pungens*), rushes (*Juncus balticus* and *Juncus* sp.), prairie cordgrass (*Spartina pectinata*), Nebraska sedge (*Carex nebrascensis*), spikerush (*Eleocharis* sp.), alkali muhly (*Muhlenbergia asperifolia*), blue-eyed grass (*Sisyrinchium montanum*), redwool plantain (*Plantago eriopoda*), cinquefoil (*Potentilla plattensis*), fleabane (*Erigeron lonchophyllus*), and the non-native grasses Kentucky bluegrass (*Poa pratensis*) and fowl bluegrass (*Poa palustris*).

The presence of Colorado butterfly weed was first reported at this location by Ellen Wheeling in 1994. The following is a summary of the number of reproductive individuals that have been reported from this population: 1994 (500 individuals), 1995 (964), 1996 (620), 1998 (1000), 1999 (265), 2004 (55). There have been a number of low rainfall years

since 1999, a factor that has probably contributed to the lower number of plants in recent years (Hazlett 2004). The presence of reproductive individuals after a series of drought years is encouraging for the survival of the species at this site. Another consideration in the variation in survey results is the presence of cattle grazing on the wetland. Butterfly weed is palatable to cattle and other wildlife and individual plants show signs of grazing.

**Biodiversity Comments:** This site contains a fair (C-ranked) occurrence of Colorado butterfly weed, a globally imperiled subspecies (G3T2). The entire range for this subspecies includes four counties within three states (Wyoming, Nebraska, and Colorado).

Natural Heritage element occurrences at the Meadow Springs Ranch PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i><b>Gaura neomexicana ssp. coloradensis</b></i>	<b>Colorado butterfly weed</b>	<b>G3T2</b>	<b>S1</b>	<b>LT</b>			<b>C</b>	<b>8/5/04</b>
<i>Liatris ligulistylis</i>	Gay-feather	G5?	S1S2				C	8/5/04

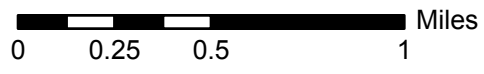
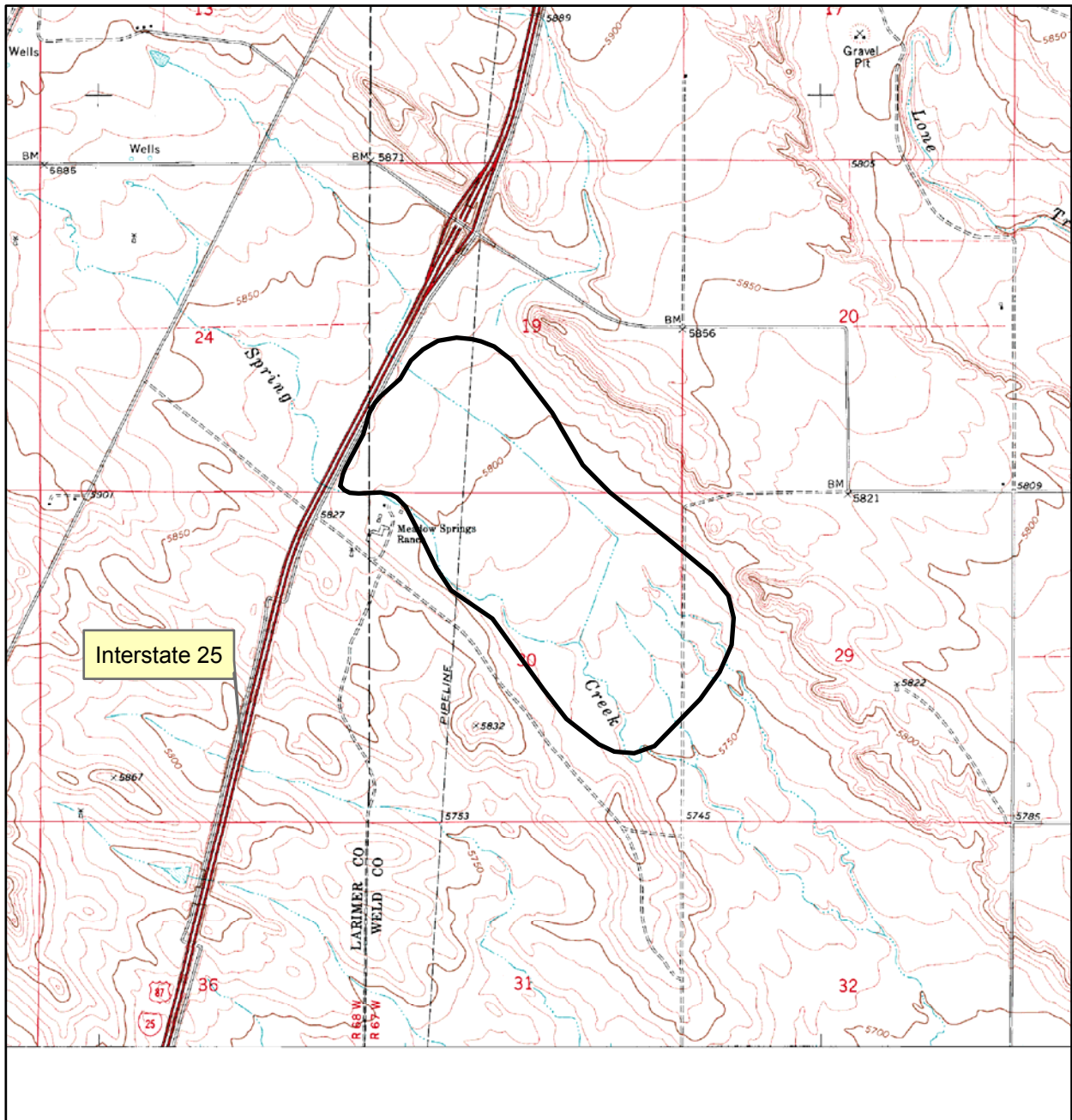
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary encompasses the wetland and known rare plant occurrences. The recharge area for the wetland is not included within the site boundary.

**Protection Comments:** The PCA is within Meadow Springs Ranch that is owned by the City of Fort Collins Utilities.

**Management Comments:** The primary management concern is the timing and intensity of cattle grazing in the portion of the wetland supporting the rare plants. Secondary concerns are managing the hydrologic modifications taking the needs of the rare plants into account and the control of non-native invasive plant species.



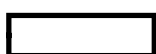
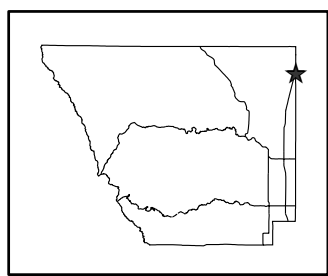
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Carr West, 40104-H8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 55. Meadow Springs Ranch Potential Conservation Area B3: High Biodiversity Significance

## North Fork Little Thompson River

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports a good (B-ranked) occurrence of a globally imperiled (G2Q S1) riparian community.

**Protection Urgency Rank: P5 (No urgency)**

A conservation easement is held by Larimer County Open Lands on this site.

**Management Urgency Rank: M4 (Low urgency)**

Monitor for recovery of the shrub layer and any establishment of invasive, non-native species.

**Location:** This site is about four miles west of Carter Lake Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Pinewood Lake  
T4N R71W Sections 11-14

**Size:** 851 acres (354 ha)

**Elevation:** 5700 – 6300 ft. (1737 – 1920 m)

**General Description:** The North Fork of the Little Thompson is free-flowing, coming out of the Roosevelt National Forest to the west. The river winds through granitic mountains covered in ponderosa pine (*Pinus ponderosa*) woodland and savanna that gives way to grasslands in the valleys. The site is within a 5000-acre bison ranch that is maintained in natural vegetation. Cattle were grazed on the ranch prior to its conversion to bison grazing in 1989. This will be an interesting example of how riparian areas change with the replacement of cattle grazing with bison grazing. The riparian woodland has a canopy of cottonwoods (narrowleaf cottonwood, *Populus angustifolia*, and plains cottonwood, *Populus deltoides*) with a dense understory of chokecherry (*Prunus virginiana*), willows (*Salix* spp.), and clematis (*Clematis ligusticifolia*). Mesic graminoids and forbs comprise the understory. Certain areas have early successional willows succeeding wet meadow vegetation.

As this reach of the North Fork of the Little Thompson is wild, natural flood regimes are the predominant environmental factor influencing the riparian natural communities.

**Biodiversity Comments:** This site was drawn for a good (B-ranked) occurrence of a globally imperiled (G2Q S1) riparian woodland, narrowleaf cottonwood/ chokecherry (*Populus angustifolia/Prunus virginiana*) woodland.

Natural Heritage element occurrences at the North Fork Little Thompson River PCA.

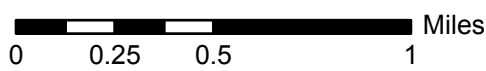
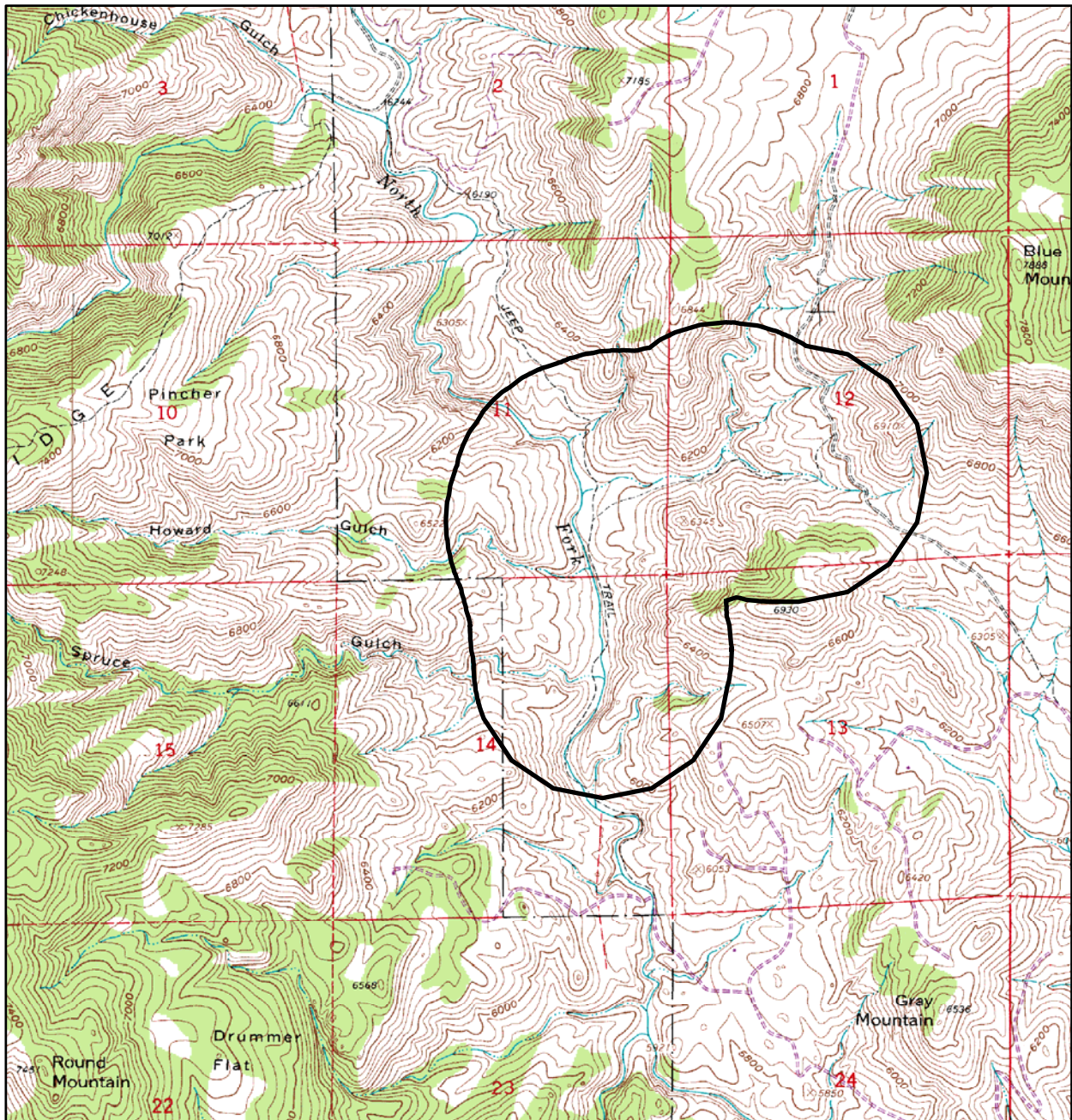
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Populus angustifolia/ Prunus virginiana</i>	Narrowleaf cottonwood/ chokecherry riparian woodland	G2Q	S1				B	9/19/04

\*EO = Element Occurrence

**Boundary Justification:** The element occurrence along this reach of the North Fork of Little Thompson River was buffered by 2000 feet. Keate (2004), Utah Division of Wildlife Resources, suggests a 2000-foot buffer distance to minimize impacts to associated wildlife.

**Protection Comments:** A conservation easement is held on the Blue Mountain Bison Ranch by Larimer County Open Lands.

**Management Comments:** The understory of the riparian woodland is in early succession, recovering from cattle grazing. A simple monitoring plan to detect changes in shrub cover would help others understand the differences between cattle grazing and bison grazing. Annual monitoring for early detection and removal of invasive and exotic weeds is the most cost-effective measure for maintaining a healthy system. An annual assessment of weeds is recommended.




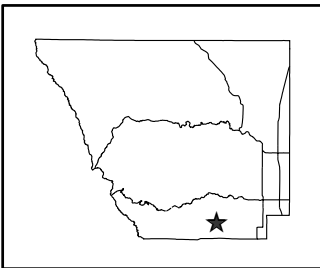
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Pinewood Lake, 40105-C3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 56. North Fork Little Thompson River Potential Conservation Area B3: High Biodiversity Significance

## North Poudre River

***Biodiversity Rank: B3 (High biodiversity significance)***

This site supports two good (B-ranked) and several fair (C-ranked) occurrences of the globally imperiled (G5T2 S1) Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a subspecies designated as threatened under the federal Endangered Species Act and by the Colorado Division of Wildlife.

***Protection Urgency Rank: P2 (High urgency)***

It is estimated that stresses may reduce the viability of the Preble's meadow jumping mice in the potential conservation area if protection action is not taken. Overall, about 70 percent of the site is privately owned while the remaining 30 percent is public lands (primarily USFS and State).

***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. Management concerns include maintenance of natural hydrologic regimes and riparian vegetation.

**Location:** The site is located east and northeast of the town of Livermore. This site includes Lone Pine Creek, Rabbit Creek, and the North Fork of the Cache la Poudre. The site can be accessed via the Red Feather Lakes Road (County Road 74E) or the Cherokee Park Road (County Road 80C).

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Diamond Peak, Poudre Park, Livermore, Livermore Mountain, Haystack Gulch, Virginia Dale, Red Feather Lakes, and Cherokee Park

T9N R70W Sections 5-6; T9N R71W Sections 1-6, 8, 9, 11, 12, 14-17; T10N R69W; T10N R70W Sections 5-8, 16-19, 20, 22, 27-34; T10N R71W Sections 1-6, 8-16, 21-36; T10N R72W Sections 5, 6, 36; T10N R73W Sections 1, 24, 26, 36; T11N R71W Sections 16-22, 26-35; T11N R72W Sections 13-17, 19-35; T11N R73W Section 25

**Size:** 32,400 acres (13,100 ha)      **Elevation:** 5900 – 8400 ft. (1800 - 2550 m)

**General Description:** The North Fork of the Cache la Poudre River (North Poudre River) flows from northwest to southeast in north-central Larimer County. This site includes much of the North Poudre River and the following major tributaries: Lone Pine Creek, Rabbit Creek, and Meadow Creek.

The floodplain of the North Poudre River and its tributaries is composed of gravel and silts and is defined by steep cliffs and gentle terraces. Willows, cottonwood galleries, and dense herbaceous cover dominate the riparian communities. Surrounding uplands are generally open grasslands or mountain mahogany shrublands, with ponderosa pine woodlands at higher elevations.

**Biodiversity Comments:** This PCA supports two good (B-ranked) and several fair (C-ranked) occurrences of the Preble’s meadow jumping mouse (PMJM) (*Zapus hudsonius preblei*), a globally imperiled (G5T2) subspecies. Because the riparian systems appear contiguous and more expansive than in other areas within PMJM’s range, and PMJM have been found at various locations along these systems, this PCA is considered of high biodiversity significance. Much of the area remains unsurveyed and it is probable that PMJM is more widespread and numerous than documented.

Natural Heritage element occurrences at the North Poudre River PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Mammals</b>								
<i>Zapus hudsonius preblei</i>	<b>Preble's meadow jumping mouse</b>	<b>G5T2</b>	<b>S1</b>	<b>LT, PDL</b>	<b>T</b>		<b>B</b>	<b>7/1/99</b>
<i>Zapus hudsonius preblei</i>	<b>Preble's meadow jumping mouse</b>	<b>G5T2</b>	<b>S1</b>	<b>LT, PDL</b>	<b>T</b>		<b>B</b>	<b>8/22/97</b>
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		C	8/18/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		C	8/11/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		C	7/13/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		C	8/28/97
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	8/19/98
<i>Zapus hudsonius preblei</i>	Preble's meadow jumping mouse	G5T2	S1	LT, PDL	T		D	7/22/98

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

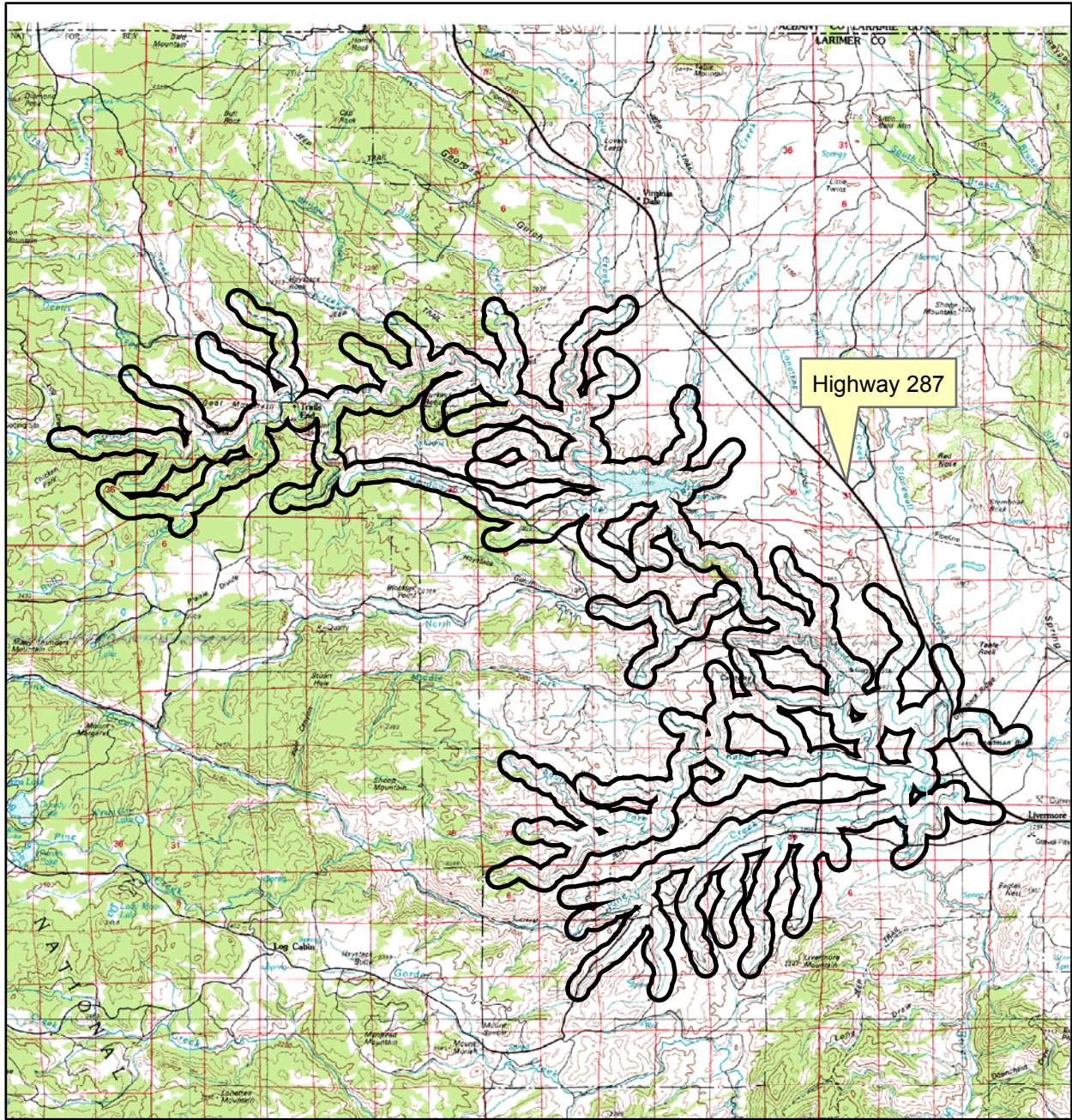
**Boundary Justification:** This PCA includes the riparian and upland grassland habitat components used by the PMJM. Included within the boundary are dense herbaceous and shrub riparian communities and upland grassland communities free from urban impacts. The site includes the riparian area and a 1000-foot (300-meter) buffer. Based on telemetry studies and trapping results in other areas where PMJM are found, these boundaries should provide the necessary habitat components for long-term stability of the population found there. It includes all known PMJM captures in this drainage, plus additional habitat upstream and downstream of these capture locations.



The buffer distance of 300 meters is 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 more refined boundary for this site would include the 100-year floodplain and an additional 100 meters of adjacent upland habitat. Until these data layers are available for all areas within the site, the present boundary should provide for the persistence of the PMJM in this area. The largeness of this site provides a degree of protection from stochastic and site-specific events that may affect portions of the population.

**Protection Comments:** About 70 percent of the site is privately owned with the remainder primarily U.S. Forest Service and State land. Although this area currently has relatively little urbanization, residential development continues to grow. It is important to understand the impact residential development may have on reducing the amount of riparian and upland habitat available to PMJM. In areas of Colorado that have intensive urban development PMJM are no longer found.

**Management Comments:** It is likely that the PMJM populations along the North Poudre River and its tributaries have always been small to moderate in number because the riparian systems are narrower and more confined than in other parts of the mouse's range. However, some habitat has been lost due to residential development, agricultural uses (livestock grazing and hay meadows), recreational activity, and management of water resources. Thus, management effort is needed to maintain the habitat quality; attempts to maintain or expand the density and extent of riparian shrublands may increase the PMJM population size.




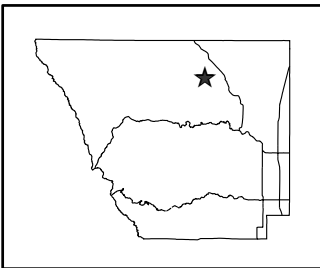
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 57. North Poudre River Potential Conservation Area B3: High Biodiversity Significance

## North Poudre River at Trails End

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports a good (B-ranked) occurrence of a globally vulnerable (G3) riparian plant community.

**Protection Urgency Rank: P3 (Moderate urgency)**

Portions of the site are within the Cherokee Park State Wildlife Area and U.S. Forest Service lands. The remainder is owned by one private landowner.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. Management issues at this PCA include invasive species and recreational access.

**Location:** East of Cherokee Park, immediately downstream of Trails End below Mount Evelyn on the North Fork of Cache la Poudre River.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Cherokee Park  
T11N R72W Sections 21-23 and 26-28

**Size:** 485 acres (196 ha)

**Elevation:** 6800 – 7200 ft. (2073 – 2195 m)

**General Description:** Granitic rocks form a steep, sinuous canyon through which the North Fork of Cache la Poudre River flows. The riparian corridor is approximately 130 feet (40 meters) wide. The slopes above the canyon support the Ponderosa pine (*Pinus ponderosa*) Woodland ecological system; dominant tree species include ponderosa pine, Douglas-fir (*Pseudotsuga menziesii*), and limber pine (*Pinus flexilis*). The river supports a shrubland community of alder with mixed graminoids (*Alnus incana*/mesic graminoid). Regular flood scouring maintains the early successional status of this site. Outcrops of Silver Plume granite occur and are occupied by the globally rare plant species Larimer aletes (*Aletes humilis*) and Rocky Mountain cinquefoil (*Potentilla rupincola*) (see Turkey Roost PCA).

**Biodiversity Comments:** This site was drawn for a good (B-ranked) occurrence of a globally vulnerable (G3 S3) riparian shrubland, alder/mesic graminoid (*Alnus incana*/mesic graminoid).

Natural Heritage element occurrences at the North Poudre River at Trails End PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
Plants						
<i>Alnus incana/ mesic graminoid</i>	Alder/ mixed graminoid riparian shrubland	G3	S3		B	7/16/96

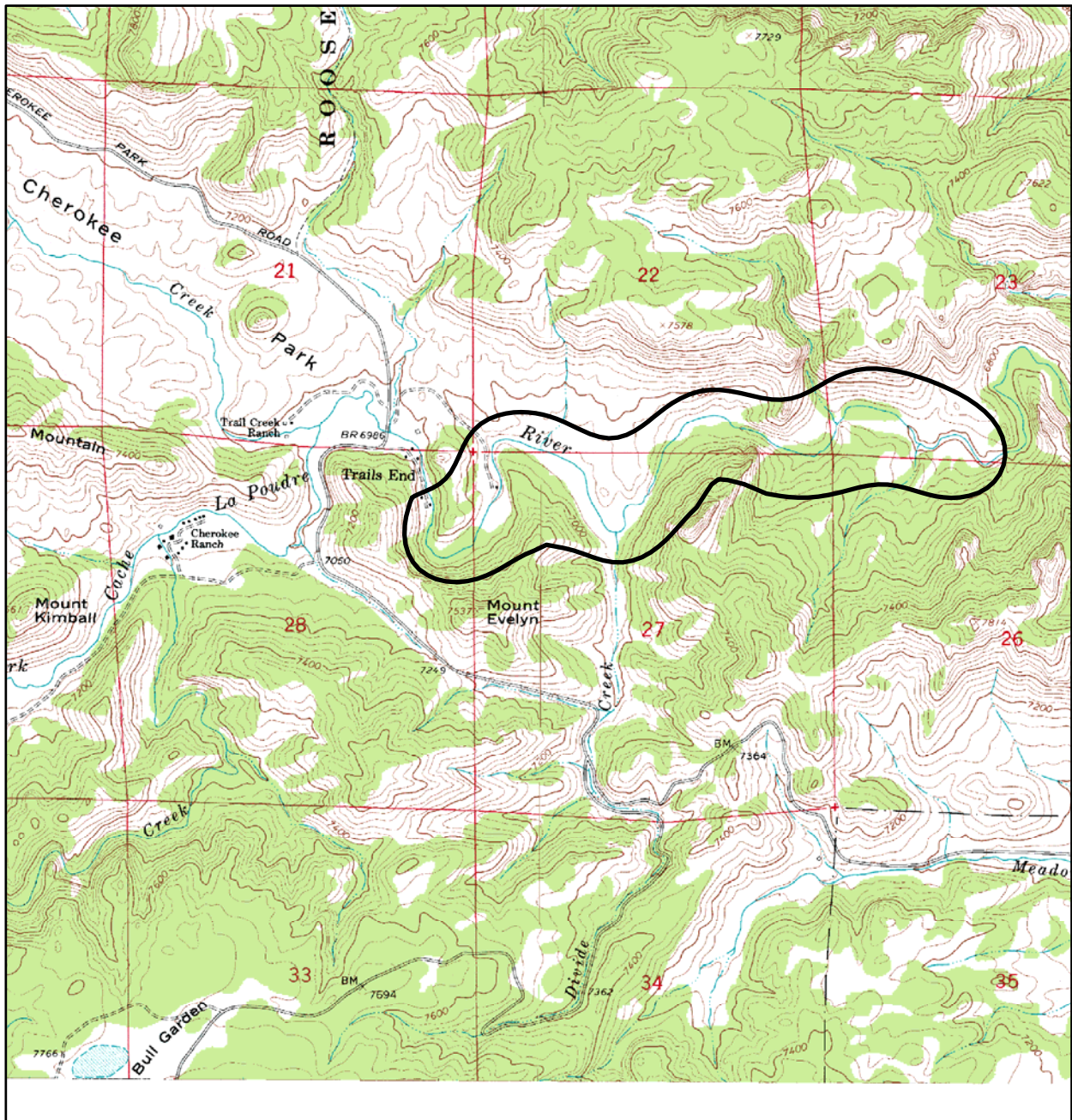
\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the riparian area and an approximately 300 meter buffer to protect from direct disturbance. Modifications to the upstream

hydrology should be avoided as this may affect the hydrologic regime upon which the targeted plant community depends.

**Protection Comments:** Portions of the site are within Cherokee Park State Wildlife Area and U.S. Forest Service lands. The remainder is owned by one private landowner. The valley occupied by the riparian shrubland is fairly rugged, which naturally restricts alternative uses.

**Management Comments:** The site is used for recreation and may need to be monitored so that the area is not degraded by excessive erosion or weed invasion along trails. Horse trails and a campsite occur within the site. Smooth brome (*Bromus inermis*) has become established along the flats above the stream and may need to be controlled to prevent degradation of the riparian shrubland. Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition.




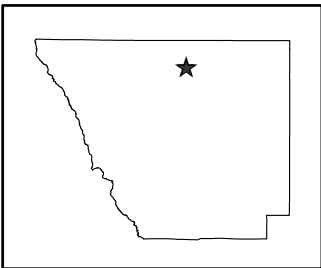
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Cherokee Park, 40105-H4</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 58. North Poudre River at Trails End Potential Conservation Area  
 B3: High Biodiversity Significance

## Nunn Creek

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a good (B-ranked) occurrence of a globally vulnerable (G3) plant community along with a collection of state rare elements

**Protection Urgency Rank: P3 (Moderate urgency)**

The site is privately owned and US Forest Service land. The private land is primarily one large narrow parcel running north south along the creek. Development pressures are likely to increase in the area in the near future.

**Management Urgency Rank: M3 (Moderate urgency)**

Management of non-native species may be needed in the future to maintain the current quality of the element occurrences.

**Location:** This PCA includes the east side of Middle Mountain; the entire area of interest includes 2.5 miles of Nunn Creek from where it begins to flow north, as well as a portion of Porter Creek in the same valley. The site also includes Lily Pond Lake to the south of Porter Creek.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Deadman and Boston Peak

T9N R75W Sections 6, 7, and 18

T9N R76W Sections 1, 12, 13, and 24

T10N R76W Section 36

**Size:** 900 acres (364 ha)

**Elevation:** 8400 – 8800 ft. (2560 – 2682 m)

**General Description:** The site consists primarily of a willow/sedge complex along a second order stream. The basin has been extensively shaped by glacial processes. One of the wetland communities (manna grass (*Glyceria borealis*) plant association) occurs only in two small ponds (toward the north end of the site on the east side of Nunn Creek. The valley is moderately wide (up to 100 m) and beavers are very active throughout the riparian zone.

**Biodiversity Comments:** The site includes several state rare elements and a globally vulnerable plant community. The condition and quality of the willow carrs along Nunn Creek are among the highest quality montane riparian areas in Larimer County

In at least one spot there is significant alkaline groundwater seepage; this hosts an uncommon bladderwort (*Utricularia minor*) and perhaps a state rare plant (*Carex scirpoidea*--identification could not be confirmed during the visit). State rare willows may be expected, but were not seen during our site visit. A state rare alkaline seep plant association (*Eleocharis quinqueflora-Triglochin* spp.) occurs in this small area. Before proceeding with protection actions at this site, a thorough assessment of the site should be performed.

Natural Heritage element occurrences at the Nunn Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plant Communities</b>						
<b><i>Salix geyeriana-Salix monticola/ Calamagrostis canadensis</i></b>	<b>Montane willow carr</b>	<b>G3</b>	<b>S3</b>		<b>B</b>	<b>8/20/96</b>
<i>Salix geyeriana-Calamagrostis canadensis</i>	Montane willow carr	G5	S3		B	8/20/96
<i>Glyceria borealis</i>	Montane emergent wetland	G4	S3		B	8/20/96
<i>Eleocharis quinqueflora-Triglochin</i> spp.	Alkaline spring wetland	GU	S2		C	8/20/96
<b>Animals</b>						
<i>Rana sylvatica</i>	Wood frog	G5	S3	FS	H	1980

\*EO = Element Occurrence

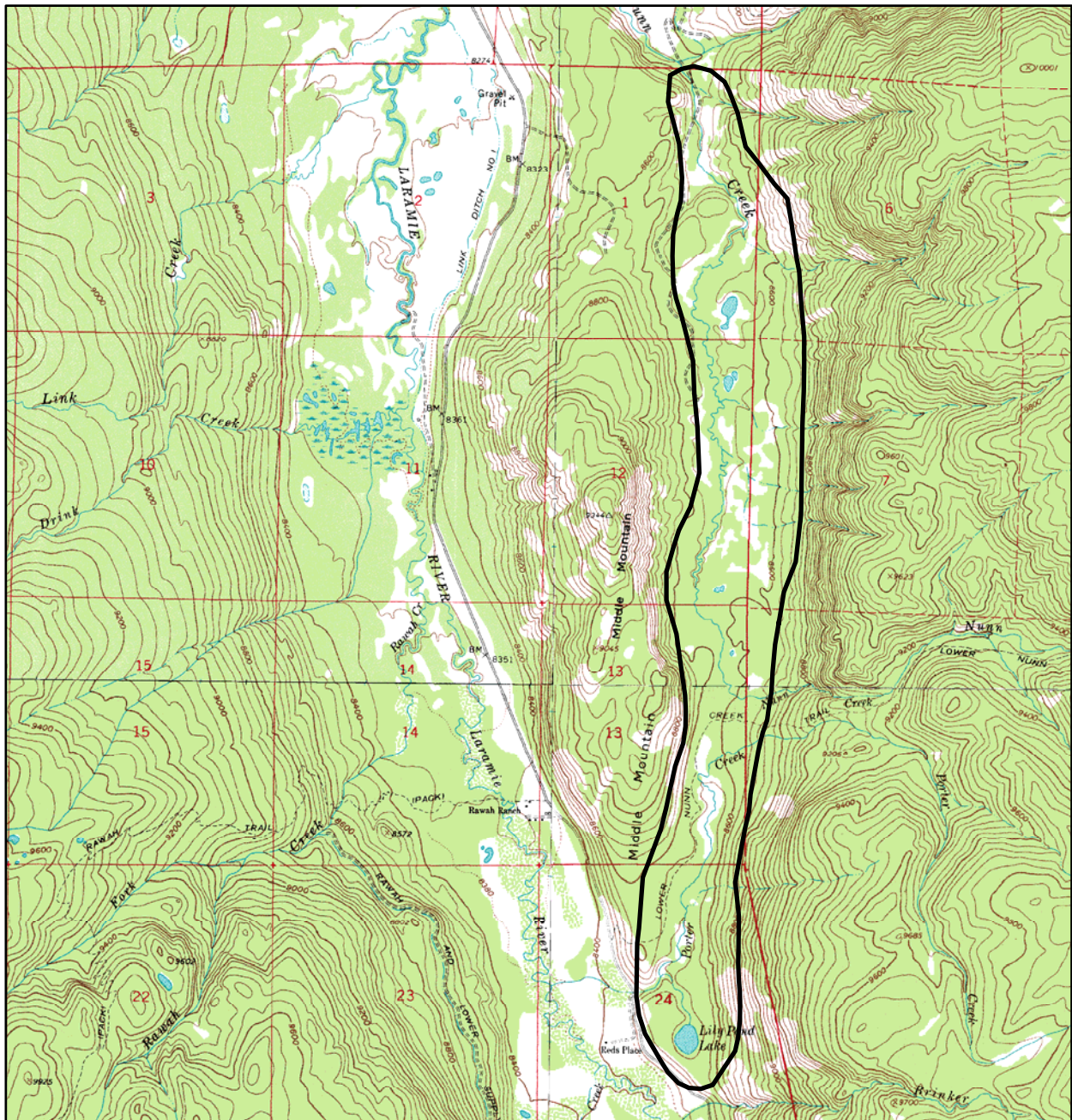
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes all the elements at the site, the entire bottom of the valley, and a 300-foot buffer extending back from the riparian area. The valley bottom is included to ensure that natural riverine processes can continue. The small buffer is included to protect from adverse indirect effects of runoff from logging, road building, etc.

**Protection Comments:** The site consists of a narrow band (about 800 feet) of private land flanked by US Forest Service land on either side. A conservation easement that minimizes domestic grazing and prevents extensive development may be appropriate for this site. The southern end of the site (including Lily Pond Lake) and much of the site edges are USFS land.

**Management Comments:** Many alien grass species were present with generally low to moderate cover. These should not be a problem and do not need to be managed. A small amount of Canadian thistle (*Cirsium arvense*) is also present. Control of this species is recommended before it spreads further.

Diversions and damming of water should be avoided at this site to allow natural riverine processes.




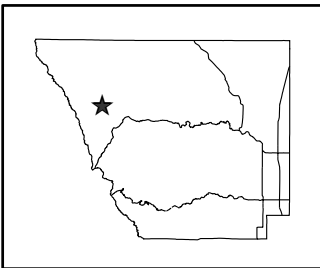
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Deadman, 40105-G7          Glendevey, 40105-G8          Boston Peak, 40105-F7          Rawah Lakes, 40105-F8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 59. Nunn Creek Potential Conservation Area  
 B3: High Biodiversity Significance



## Owl Canyon

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports a good to fair (BC-ranked) occurrence of the globally imperiled (G2), mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*) shrubland. The site also supports the northeastern-most stand of pinyon pine (*Pinus edulis*) in the U.S.

**Protection Urgency Rank: P2 (High urgency)**

Most of this site is owned by the State Land Board, Colorado Lien mining company, and one private landowner. Colorado Lien operates a limestone and gravel mine within the site.

**Management Urgency Rank: M4 (Low urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. Monitoring for any impacts from the adjacent mining operation is warranted.

**Location:** From Fort Collins, go north on US 287 approximately 16 miles to Owl Canyon. The site begins at or near this junction and continues northward on the hogback. The site is approximately three air miles south-southeast of Livermore.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Livermore  
T9N R69W Section 6; T9N R70W Sections 1 and 12; T10N R69W Sections 30 and 31;  
T10N R70W Sections 25, 26, 35, and 36

**Size:** 1566 acres (634 ha)

**Elevation:** 5840 – 6200 ft. (1780 – 1890 m)

**General Description:** The site is comprised of a pinyon pine (*Pinus edulis*) grove occurring on a sandstone hogback underlain by limestone. The tree layer of vegetation is dominated by pinyon pine and Rocky Mountain juniper (*Juniperus scopulorum*) with mountain mahogany (*Cercocarpus montanus*) common in the understory. This pinyon grove is disjunct from the primary geographic range, being 150 miles north of the northernmost continuous pinyon stand east of the continental divide. The site is adjacent to a Ponderosa Pine ecological system and forms a mosaic with Lower Montane/Foothills Shrubland ecological system dominated by mountain mahogany. Active mining occurs to the east and south of the site and has greatly reduced the total acreage of the natural community. The state rare (G5 S2S3) purple cliff-brake fern has been found on cliffs within the pinyon grove. Two historical plant element occurrence records are known from the Owl Canyon area, Rocky Mountain phacelia (*Phacelia denticulata*, G3? S3?, last observed 1949) and prairie goldenrod (*Oligoneuron album*, G5 S2S3, last observed 1918).

A globally critically imperiled (G1) tortricid moth (*Decodes stevensi*), was documented at Owl Canyon in 1977; 163 individuals were trapped inadvertently during a pheromone trapping study designed to study another group of moths (Stevens *et al.* 1985). This is the only time this moth has been documented and nothing is known about its biology, distribution, or abundance.

The general area is quite scenic and has been discovered by the growing population of the Colorado Front Range. The regional economy and developing transportation infrastructure has led to increased development with many surrounding ranches being divided into 35 - acre parcels. This is particularly noticeable today on Owl Canyon Road.

**Biodiversity Comments:** The site contains a good to fair (BC-ranked) occurrence of a globally imperiled (G2 S2) foothills shrubland, mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*). The site also supports the most northern occurrence of pinyon pine/mountain mahogany (*Pinus edulis/Cercocarpus montanus*) woodland in the arid west.

Natural Heritage element occurrences at the Owl Canyon PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plant Communities</b>						
<i>Cercocarpus montanus/Stipa comata</i>	<b>Mountain mahogany/ needle-and-thread foothills shrubland</b>	<b>G2</b>	<b>S2</b>		<b>BC</b>	<b>8/30/96</b>
<i>Stipa comata-Bouteloua gracilis</i>	Needle-and-thread – blue grama grassland	G5	S2S3		C	8/29/96
<i>Pinus edulis/Cercocarpus montanus</i>	Pinyon pine/ Mountain mahogany woodland	G5	S4		C	9/1/04
<b>Plants</b>						
<i>Pellaea atropurpurea</i>	Purple cliff-brake	G5	S2S3		E	9/3/91

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site includes the natural community occurrences and all adjacent slopes west to Highway 287. The entire State Natural Area is included within the boundary.

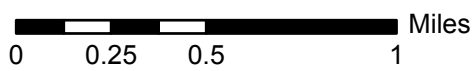
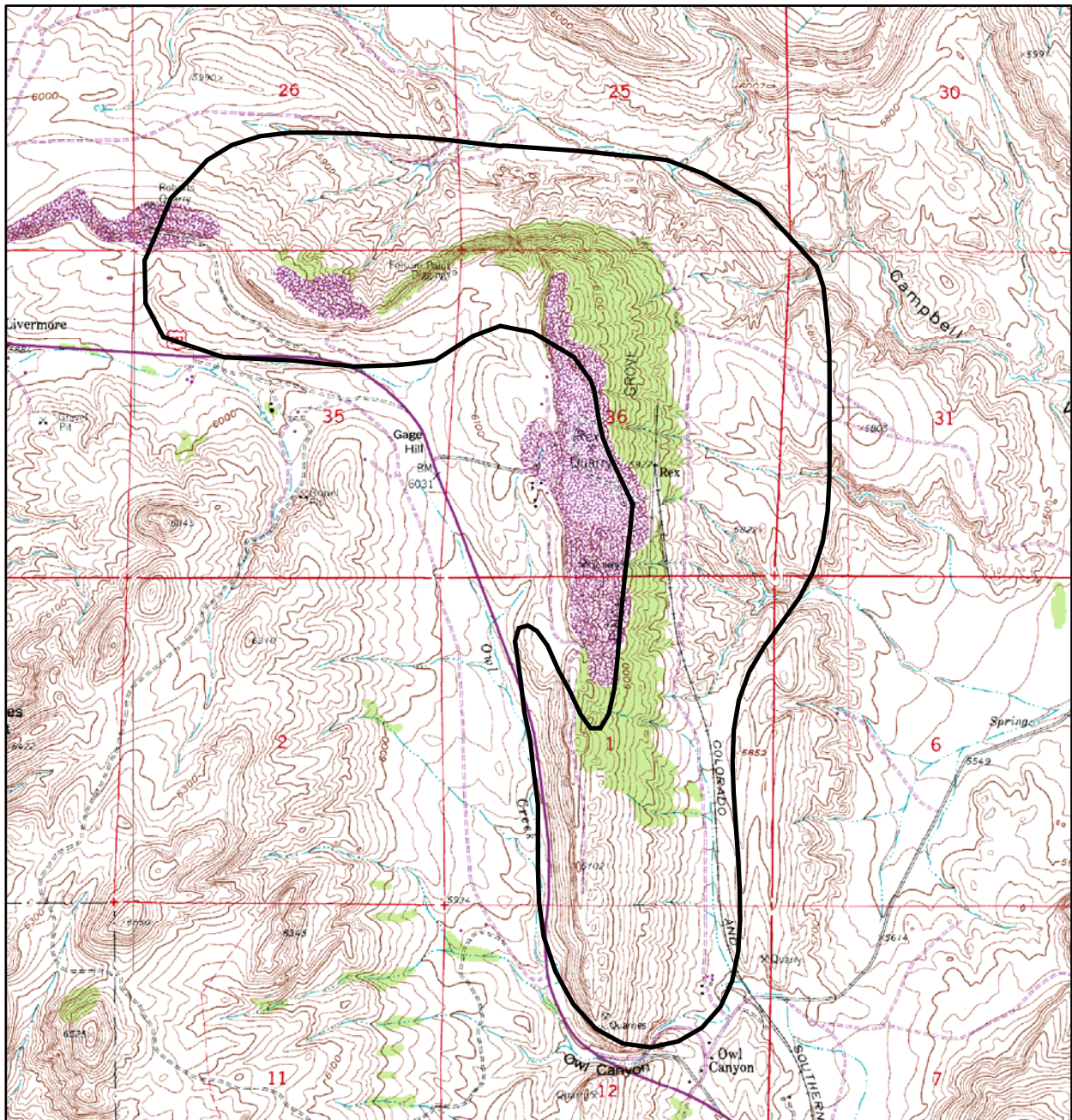
**Protection Comments:** Most of this site is owned by the State Land Board, Colorado Lien mining company, and one private landowner. Portions of the state land are leased to Colorado Lien for limestone and gravel mining. This PCA continues to be threatened by expansion of the mining operation, which directly impacts the site. Whereas the mining occurs on the opposite side of the hogback, it continues to decrease the total size of the targeted natural communities. The Colorado Natural Areas Program has designated most of the pinyon grove a State Natural Area. Such designation provides modest legal protection.

**Management Comments:** Existing management is adequate. Except for direct threats, there is little need to have active management. The limestone operation south and east of the site (on the opposite side of the hogback) is extensive. The owners/managers have been cooperative in the protection of the western slope, but continue to expand the mining operation. Monitoring for any impacts from the adjacent mining operation is warranted. Trapping for the tortricid moth (*Decodes stevensi*) within this and surrounding areas would greatly add to the understanding of this species.



**Photo 10. Pinyon pine woodland at the Owl Canyon PCA.**

*photo by G. Doyle*




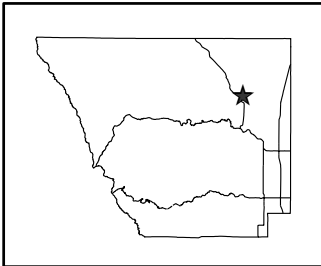
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Livermore, 40105-G2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 60. Owl Canyon Potential Conservation Area  
 B3: High Biodiversity Significance

## Panhandle Creek

***Biodiversity Rank: B3 (High biodiversity significance)***

Panhandle Creek supports a newly discovered location of adult boreal toads (*Bufo boreas*) (G4T1Q), a globally critically imperiled subspecies.

***Protection Urgency Rank: P3 (Moderate urgency)***

The PCA is owned and managed by the U.S. Forest Service with the exception of two sections in the northeast quadrant of the PCA that are privately owned by a single owner. The U.S. Forest Service property has no special conservation status.

***Management Urgency Rank: M3 (Moderate urgency)***

Current management seems to favor the persistence of the toad, but management actions may be needed in the future to maintain the current quality of the occurrence. Uses of the USFS portion of the creek include logging, cattle grazing, and recreational uses including fishing.

**Location:** This PCA is in north central Larimer County in the Laramie Mountains about one mile west of Crystal Lakes, a private mountain subdivision located a few miles northwest of Red Feather Lakes. The PCA includes Little Bald Mountain, Deadman Lookout, and the main and south forks of Panhandle Creek. Forest Road 169 passes through the PCA.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Deadman, South Bald Mountain, Eaton Reservoir, Sand Creek Pass

T10N R74W Sections 4-9 and 16-20

T10N R75W Sections 1-3 and 10-14

T11N R74W Sections 30-32

T11N R75W Sections 25-27 and 34-36

**Size:** 10,187 acres (4123 ha)      **Elevation:** 8880 – 10,710 ft. (2705 – 3265 m)

**General Description:** Panhandle Creek drains Little Bald Mountain and flows downstream through the Crystal Lakes subdivision, a private mountain subdivision located a few miles northwest of Red Feather Lakes. Upstream of Crystal Lakes, USFS biologists recently discovered adult boreal toads on both the main stem and south fork of Panhandle Creek. The creek includes an array of ponds and wet meadows along its course. The uplands support coniferous forest.

Adult toads were found at six locations within the PCA at elevations ranging from 9,600 to 10,440 feet. The closest known boreal toads are at a newly discovered breeding location at Trout Creek just east of Eaton Reservoir (see Trout Creek PCA). The Trout Creek breeding ponds are about seven miles northwest of the Panhandle Creek adult toad sightings. The next closest known active boreal toad breeding locations are at Rocky Mountain National Park (CNHP 2005).

**Biodiversity Comments:** This PCA supports boreal toad (*Bufo boreas*), a globally critically imperiled subspecies. The size of the population at Panhandle Creek is not well documented as surveys were conducted in early August. Eight adult toads were documented at six locations within the PCA. Future surveys in early spring will help define the local population size and locate breeding ponds.

The boreal toad was once common throughout the mountains of Colorado, but has undergone declines over the last 20 years (Goettl 1997). Reasons for the decline are unknown, but postulated to be due to a chytrid fungus (Cunningham 1998 as cited in Hammerson 1999). In 1993, the boreal toad was listed as state endangered. The Southern Rocky Mountain population of boreal toads is currently (2005) a candidate species for federal listing under the U.S. Endangered Species Act.

Natural Heritage element occurrences at the Panhandle Creek PCA.

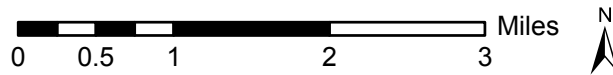
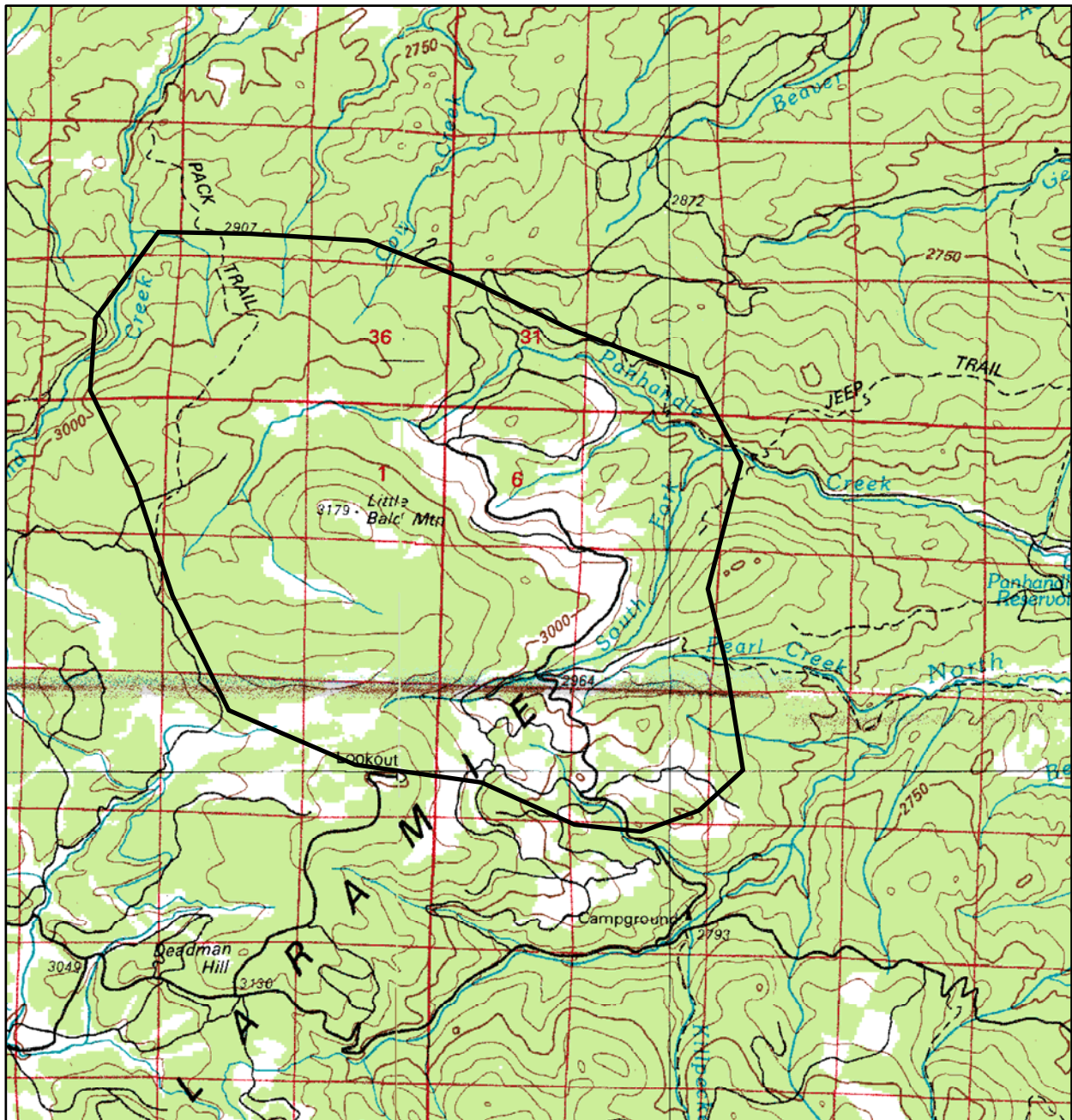
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Amphibians								
<i>Bufo boreas</i>	Boreal toad	G4 T1Q	S1	C	E	FS	E	8/11/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the known boreal toad locations and adjacent contiguous habitat. A buffer is provided to prevent direct disturbance to the aquatic habitats. These boundaries are intended to protect potential breeding habitat and some post-breeding dispersal. As this species is known to move over 2 ½ miles (4 km) between breeding and non-breeding habitat (Hammerson 1999), it could be impacted by off-site factors. The boundary represents an estimate of the area needed to maintain local hydrological conditions. Any activities along the creek, such as water diversions, impoundments, incompatible livestock grazing, logging, and development could potentially be detrimental to the functioning of the wetland areas within the site. This boundary represents the minimum area that should be considered for a conservation management plan.

**Protection Comments:** Most of the land within and to the north, south, and west of the PCA is owned by the USFS. Sections 29 and 31 in the northeast quadrant of the PCA are privately owned by a single landowner. The privately owned portion is within a mile of the toad sightings. The Crystal Lakes subdivision (lot sizes generally ½ to 10 acres) is within one mile of the eastern boundary of the PCA.

**Management Comments:** Land uses on the USFS portion of the PCA include livestock grazing, logging, and recreation. Uses on private lands within the PCA are currently unknown.




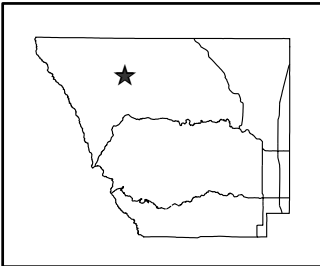
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 61. Panhandle Creek Potential Conservation Area B3: High Biodiversity Significance

## Rattlesnake Park

**Biodiversity Rank: B3 (High biodiversity significance)**

This site supports an excellent (A-ranked) occurrence of a globally vulnerable (G3 S1S2) plant, Southern Rocky Mountain cinquefoil (*Potentilla ambigens*). This site contains thousands of plants and is the largest known population in Colorado.

**Protection Urgency Rank: P4 (Low urgency)**

Most of the PCA is on a State Land Board section held within the Stewardship Trust. The remainder is on portions of an adjacent 5000-acre bison ranch with a conservation easement held by Larimer County Open Lands.

**Management Urgency Rank: M4 (Low urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. Management issues at this PCA include invasive species and grazing.

**Location:** This PCA is on the south side of Pinewood Lake along intermittent drainages flowing into the reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Pinewood Lake  
T5N R70W Section 36  
T4N R71W Sections 1 and 2

**Size:** 485 acres (196 ha)

**Elevation:** 6600 – 6900 ft. (2011 – 2103 m)

**General Description:** Rattlesnake Park is a moderately sized grassland park that occupies the valley to the east, between the occurrence and Blue Mountain. As elevation increases on the east-facing slopes, the midgrass grassland in the valley grades into *Pinus ponderosa* savanna, a mix of trees, shrubs, and graminoids, and then woodland. Roosevelt National Forest abuts the occurrence to the west, a 5000-acre bison ranch maintained as natural landscape abuts to the south and east. The Southern Rocky Mountain cinquefoil (*Potentilla ambigens*) subpopulations occur along intermittent drainages below the *Pinus ponderosa* savanna at the forest-grassland interface. The adjacent Blue Mountain Bison Ranch was established in 1989, replacing the cattle ranch operation.

**Biodiversity Comments:** This site was drawn for an excellent (A-ranked) occurrence of a globally vulnerable (G3 S1S2) plant, Southern Rocky Mountain cinquefoil (*Potentilla ambigens*). This site contains thousands of plants and is the largest known population in Colorado.



Natural Heritage element occurrences at the Rattlesnake Park PCA.

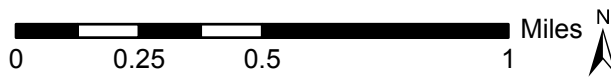
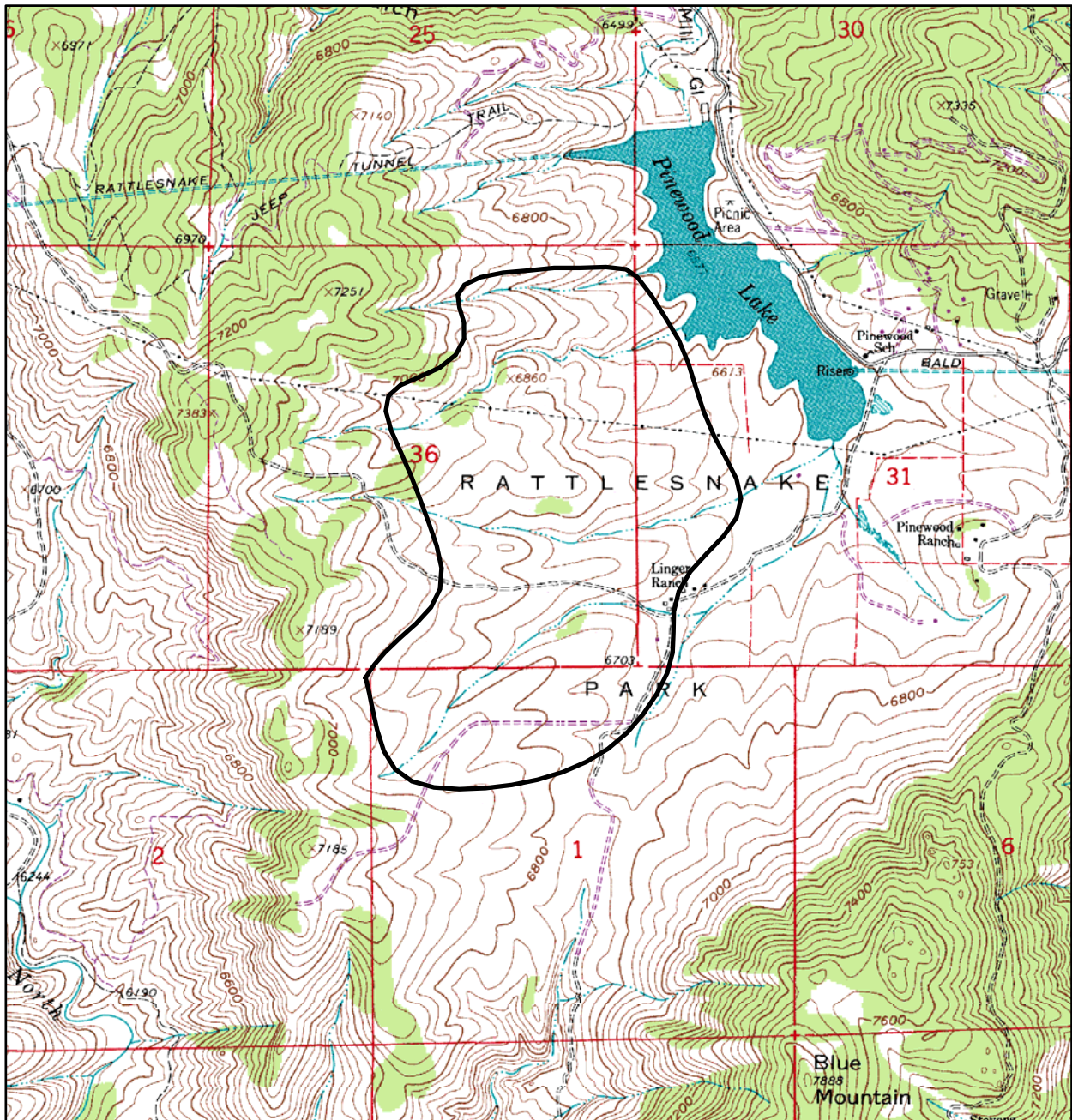
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Potentilla ambigens</i>	Southern Rocky Mountain Cinquefoil	G3	S1S2				A	8/18/04

\*EO = Element Occurrence

**Boundary Justification:** The site includes the open grassland areas around the intermittent drainages occupied by the rare plant population. Only those that share the same topography and aspect were included.

**Protection Comments:** The site is on State Land Board section held within the Stewardship Trust as well as on portions of a 5000-acre bison ranch with a conservation easement held by Larimer County Open Lands.

**Management Comments:** Monitoring invasive weeds and controlling any expansion will likely maintain the population at its current levels. Maintaining grazing at its current levels will likely have little impact to the rare plant population.




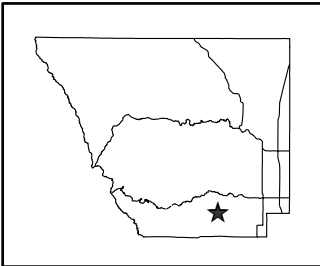
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Pinewood Lake, 40105-C3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 62. Rattlesnake Park Potential Conservation Area B3: High Biodiversity Significance

## Rawhide Flats Saltbush

**Biodiversity Rank: B3 (High biodiversity significance)**

This site contains an excellent (A-ranked) occurrence of a globally vulnerable (G3) natural community, four-winged saltbush/blue grama (*Atriplex canescens/Bouteloua gracilis*).

**Protection Urgency Rank: P2 (High urgency)**

About half of the site is owned by Larimer County or the City of Fort Collins. The remaining private lands exist as large cattle ranches and smaller subdivided parcels. Development pressures are high in the area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. Management issues at this PCA include livestock grazing and land application of biosolids.

**Location:** The south side of the site can be accessed via 15 Road approximately four miles north of its junction with 84 Rd north of Fort Collins.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Buckeye, Carr West, Carr SW, Round Butte, and Table Mountain

T11N R68W Section s3-10, 14-23, and 26-35

T11N R69W Sections 1-5, 8-17, 20-29, and 33-36

T12N R68W Sections 19, 20, and 28-33

T12N R69W Sections 19-29 and 32-36

**Size:** 46,515 acres (18,824 ha)      **Elevation:** 5700 – 6000 ft. (1737 – 1829 m)

**General Description:** Rawhide Flats is part of a large, broad, outwash plain with terraces that gradually descends south from the Soapstone Hills. The Soapstone Hills are an east-west running extension of primarily north-south running foothills hogbacks. The hills have fairly diverse bedrock geology, including sandstone, siltstones, and shales, and contain a mosaic of mountain mahogany (*Cercocarpus montanus*) shrublands and mid-grass grasslands. Drainages on the flats are incised and the outwash plain is punctuated by several isolated bluffs and circular buttes. On the west side is a series of northwest-southeast trending hogbacks, the first of which is occupied by shale barrens with mountain mahogany. The saltbush system is dominated by four-winged saltbush (*Atriplex canescens*) with some areas of winterfat (*Krascheninnikovia lanata*) and occupies flat to very gently rolling hills below the siltstone and shale of the hills. It predominantly occupies clay loam soils on the flats. Dominant graminoids in the system are buffalograss (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), and western wheatgrass (*Pascopyrum smithii*). The primary driving component of this system is the clay loam soils derived from siltstone and shale bedrock geology. The area has been used predominantly for cattle ranching although some low-intensity residential development occurs on the outskirts.

**Biodiversity Comments:** This site was drawn for an excellent (A-ranked) occurrence of a globally vulnerable (G3) natural community, four-winged saltbush/blue grama (*Atriplex canescens/Bouteloua gracilis*) shrubland. The site also supports an excellent occurrence of a more common, globally secure winterfat/western wheatgrass-blue grama (*Krascheninnikovia lanata/Pascopyrum smithii-Bouteloua gracilis*) shrubland.

Natural Heritage element occurrences at the Rawhide Flats Saltbush PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plant Communities</b>						
<i>Atriplex canescens/ Bouteloua gracilis</i>	<b>Four-wing saltbush/ blue grama shrubland</b>	<b>G3</b>	<b>S3</b>		<b>A</b>	<b>9/8/04</b>
<i>Krascheninnikovia lanata/ Pascopyrum smithii- Bouteloua gracilis</i>	Winterfat/ western wheatgrass-blue grama shrubland	G4	SU		A	9/10/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The site was drawn using subwatershed boundaries for Rawhide Creek and Coal Creek. These subwatersheds encompass drainage from the unique geology composition above and adjacent to the saltbush system. The geology includes Dakota Sandstone Group, Carlile Shale-Greenhorn Limestone-Graneros Shale-Mowry Shale Complex, Niobrara Formation, and Mitten Black Shale, which presumably provides chemical elements and clay particles that comprise the fine-textured, high cation content soils occupied by the system. The southern portions of the subwatershed were not included due to agricultural, industrial, and residential development.

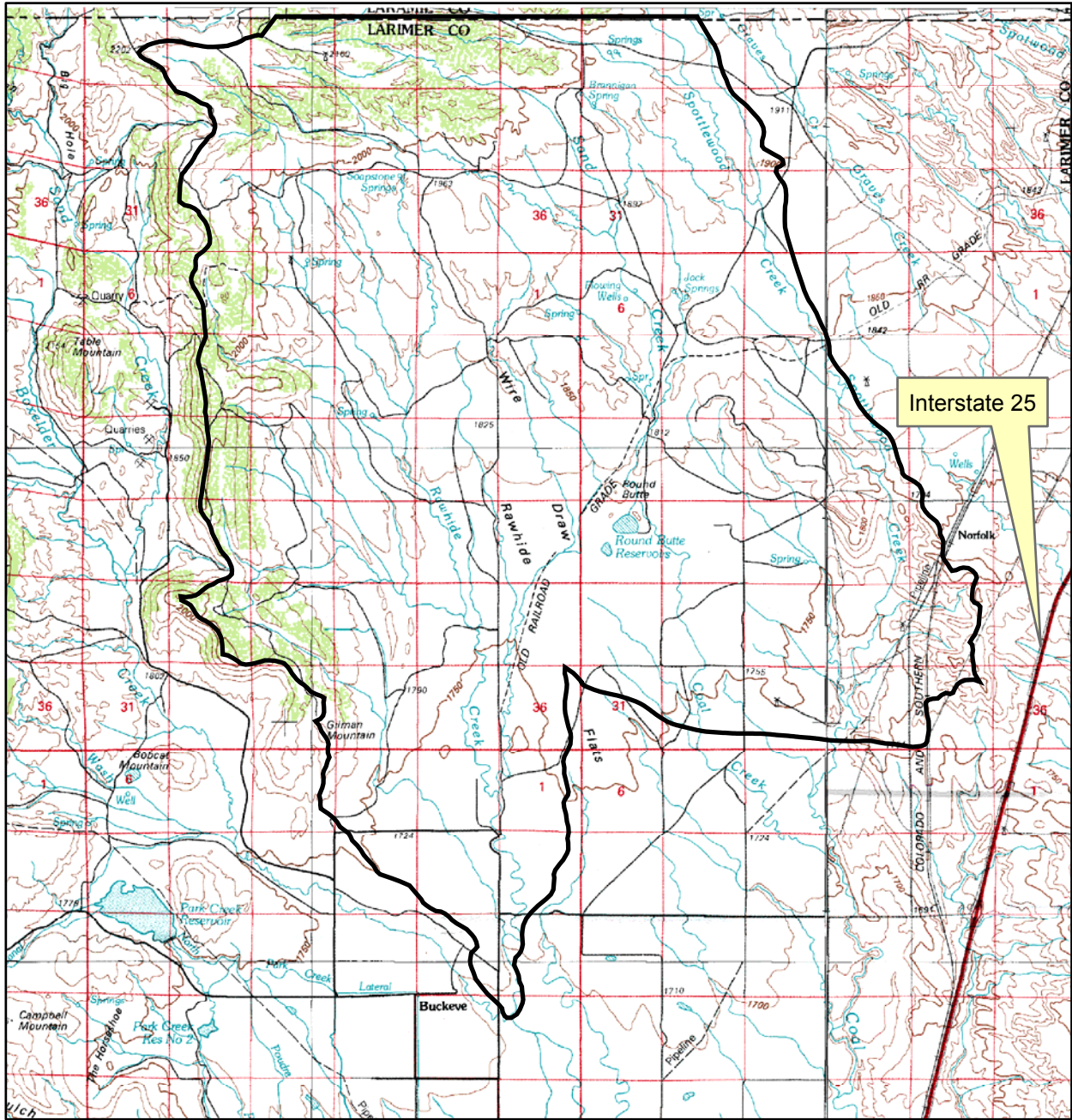
**Protection Comments:** About half of the site is contained within parcels owned by the City of Fort Collins or Larimer County. The private lands are a mixture of large livestock ranches and smaller subdivided parcels. The southwestern area of the site has been subdivided into 35-acre lots, some of which have been developed. Development pressures are high in the area.

**Management Comments:** Cattle grazing is the primary land use on the site. The Natural Resources Conservation Service (NRCS 2005) considers both four-wing saltbush and winterfat to be “decreasers,” that is, continuous cattle grazing reduces the cover and density of these species. NRCS believes that both species were more widespread than today, due to cattle grazing. Thus this site is an excellent representative site that suggests a well-managed cattle grazing operation. Maintaining current land management will likely maintain the occurrences. Further, the eastern portion of the site, on Meadow Springs Ranch, is used by the City of Fort Collins Utilities for land application of biosolids. The potential impact of this land use is unknown.



**Photo 11. Saltbush shrubland with Round Butte in the background at the Rawhide Flats Saltbush PCA.**

*photo by S. Neid*




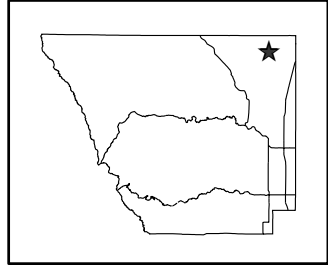
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1          Eaton, 40104-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 63. Rawhide Flats Saltbush Potential Conservation Area B3: High Biodiversity Significance

## Redstone Creek Cliffs

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports two fair (C-ranked) occurrences of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant.

**Protection Urgency Rank: P3 (Moderate urgency)**

Most of this PCA is privately owned as 40-acre and larger parcels; a small portion is within Horsetooth Mountain Park. Development pressures are high in the area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrences. The primary management concerns are residential development and invasion by non-native plants.

**Location:** This PCA is located along both sides of County Road 38E from the Horsetooth Mountain Park parking lot and north along the Redstone Canyon Road.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Horsetooth Reservoir

T6N R70W Sections 1, 2, 11, and 12

T7N R70W Sections 15, 16, 21, 22, 27, 34, and 35

**Size:** 1025 acres (415 ha)

**Elevation:** 5500 – 6000 ft. (1676 – 1829 m)

**General Description:** The site includes the lower west-facing slopes of Milner Mountain, a similar landform on the west side of Road 38E, cliffs to the east of Redstone Canyon road, and various outcrops along Redstone Canyon Road. This PCA roughly outlines the contact of the Fountain and Ingleside formations where the Bell's twinpod has been documented (Braddock *et al.* 1989). The diversity in topography is created by multiple geologic faults in the area. The slopes are generally composed of red sandy soils with small to medium rocks of white and red sandstone. The dominant vegetation is mountain mahogany (*Cercocarpus montanus*) with sunflower (*Helianthus pumilus*), three-awn grass (*Aristida purpurea*), prickly pear cactus (*Opuntia* sp.), blue grama (*Bouteloua gracilis*), fringed sage (*Artemisia frigida*), three-leaf sumac (*Rhus trilobata*), Rocky Mountain juniper (*Juniperus scopulorum*), yucca (*Yucca glauca*), Indian rice grass (*Oryzopsis hymenoides*), and snakeweed (*Gutierrezia sarothrae*). Total vegetative cover varies from 20 to 90 percent. A county road (38E) bisects the southern portion of the site and Redstone Canyon Road bisects the northern part. There is a housing development on Milner Mountain that is encroaching on the suitable habitat for Bell's twinpod (*Physaria bellii*).

**Biodiversity Comments:** This site contains two fair occurrences of the globally imperiled (G2) Bell's twinpod. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). Bell's twinpod has long been

considered to be primarily restricted to Niobrara shale. The occurrence on Fountain and Ingleside formation sandstone such as within this PCA is little studied.

Natural Heritage element occurrences at the Redstone Creek Cliffs PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plants								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	2/20/03
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	9/16/96

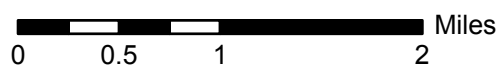
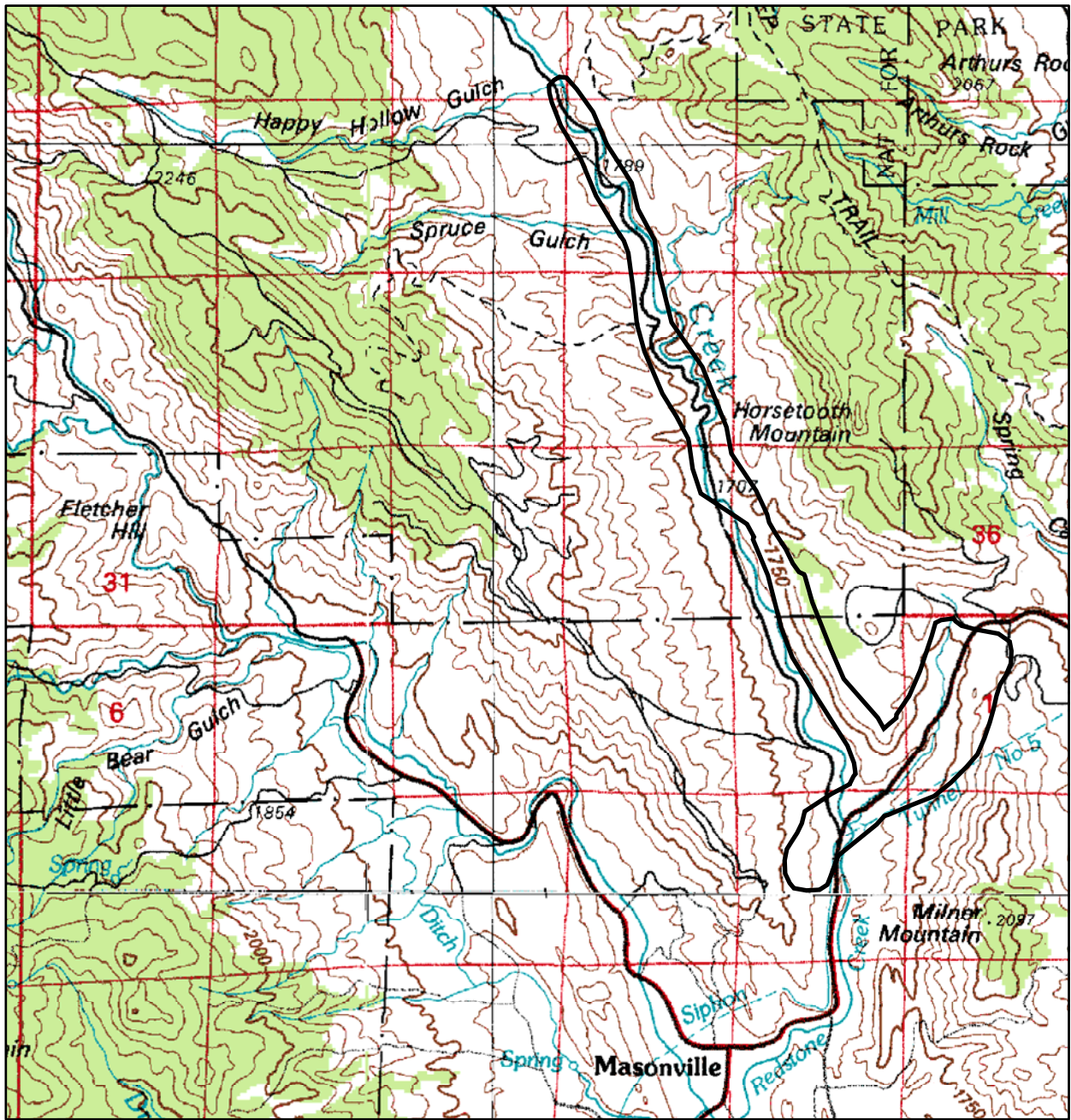
\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the occurrences and small buffer to protect against direct disturbance. The PCA was drawn to include the north-south trending hogback of Fountain and Ingleside formation along Redstone Canyon Road. Due to the complex geology in the area, some areas of non-suitable habitat are included within the boundary. The PCA has not been thoroughly searched for Bell's twinpod and likely includes more plants than documented.

**Protection Comments:** Development pressures are high in this area. Most of the land is privately owned as 40-acre parcels and the Milner Mountain Ranch subdivision encroaches on part of the occurrence. Much of the property within the PCA is unsurveyed, especially along Redstone Canyon Road.

**Management Comments:** The site is generally weed free and in good condition though cheatgrass (*Bromus tectorum*), hound's tongue (*Cynoglossum officinale*), yellow sweet clover (*Melilotus officinale*), and thistles (*Cirsium* spp.) were noted on roadsides and in some of the drainages. Notification and education of the property owners may increase the chances for long-term survival of *Physaria bellii* at this site.






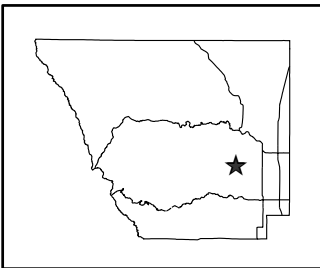
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1          Estes Park, 40105-A1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 64. Redstone Creek Cliffs Potential Conservation Area B3: High Biodiversity Significance

## Sand Creek Valley

**Biodiversity Rank: B3 (High biodiversity significance)**

This site contains a good (B-ranked) occurrence of a globally vulnerable, state critically imperiled (G3 S1) natural community, three-tipped sagebrush/Idaho fescue (*Artemisia tripartita/Festuca idahoensis*).

**Protection Urgency Rank: P3 (Moderate urgency)**

The PCA consists of a State Land Board section, a quarter section of Bureau of Land Management property, and many privately owned as 35-acre parcels. Development pressure is high in the area.

**Management Urgency Rank: M4 (Low urgency)**

Current management of livestock grazing appears adequate to maintain the element occurrence. Management needs will change as the area becomes increasingly developed.

**Location:** This site is located just south of the Wyoming border in western Larimer County about three air miles west of Eaton Reservoir.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Eaton Reservoir and Sand Creek Pass

T11N R75W Sections 1-4, 9-12, and 14-16

T12N R74W Sections 30 and 31

T12N R75W Sections 23-27 and 34-36

**Size:** 7167 acres (2901 ha)

**Elevation:** 8200 – 8700 ft. (2499 – 2652 m)

**General Description:** The Sand Creek Basin occurs south of Chimney Rock near the Colorado-Wyoming border. It forms a wide open valley of rolling hills supporting sagebrush shrublands, mountain mahogany shrublands, and native grasslands. Limber pine (*Pinus flexilis*) occurs on rock outcrops and ridges. Swales and valleys are dominated by three-tip sagebrush (*Artemisia tripartita*) and a variety of grasses such as Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and needle-and-thread grass (*Stipa comata*). A dense, very wet willow thicket occupies the riparian corridor of Sand Creek, which flows north into Wyoming. On the State Land Board section within the site, Sand Creek flows through a picturesque granitic canyon. Numerous stream channels exist within the site and are mostly ephemeral. Adjacent to the site is Bull Mountain, dominated by stands of aspen and Douglas-fir on steep east to north-facing slopes. Sandhill cranes have been noted to occur near this reach of Sand Creek. Larchleaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*) also occurs along roads and rock outcrops throughout the area.

**Biodiversity Comments:** This site was drawn for a good (B-ranked) occurrence of a globally vulnerable, state critically imperiled (G3 S1) natural community, three-tipped sagebrush/Idaho fescue (*Artemisia tripartita/Festuca idahoensis*) shrubland.

Natural Heritage element occurrences at the Sand Creek Valley PCA.

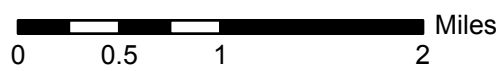
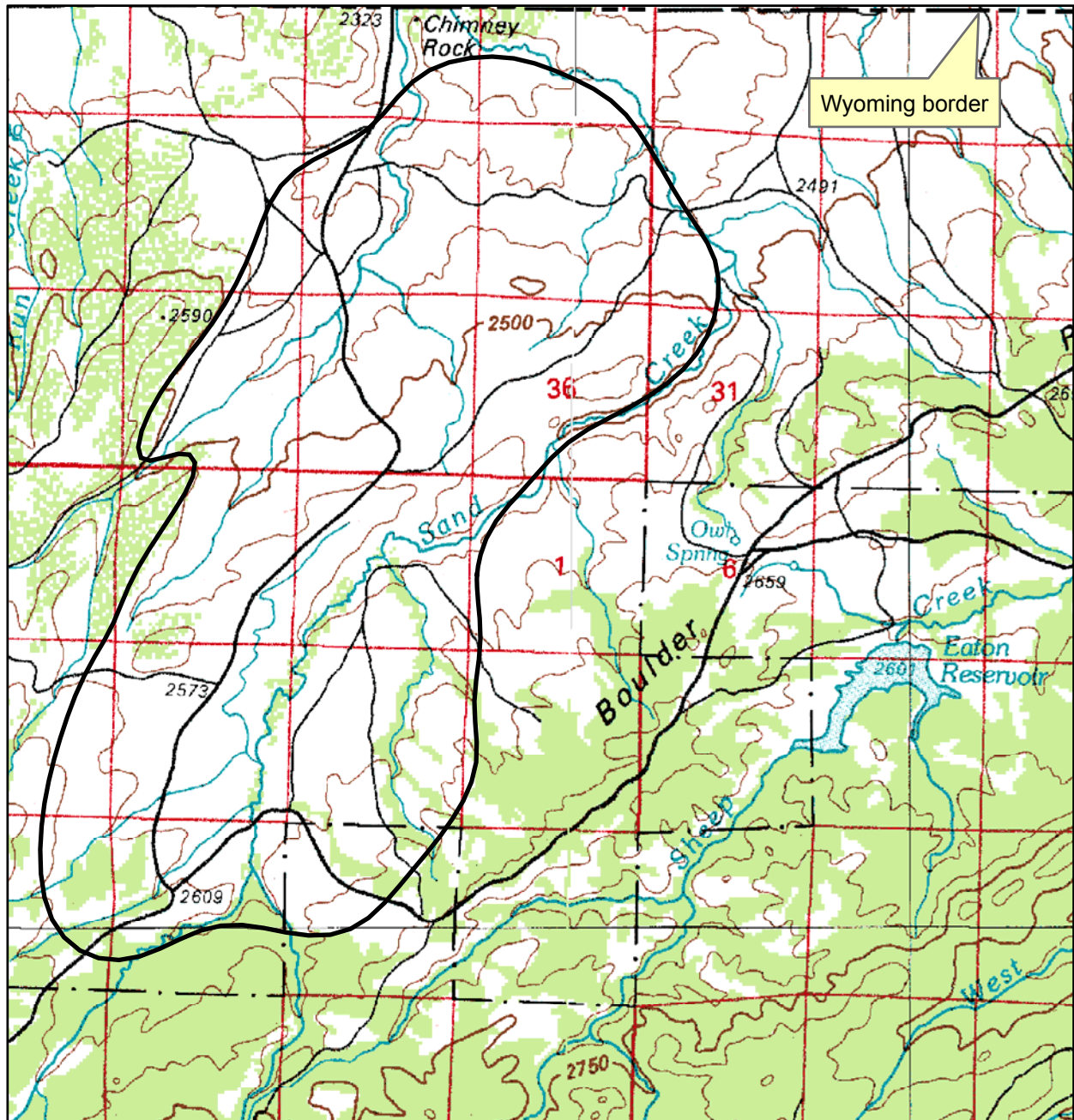
Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plants</b>						
<i>Artemisia tripartita/ Festuca idahoensis</i>	Three-tip sagebrush/ Idaho fescue shrubland	G3	S1?		C	7/16/04

\*EO = Element Occurrence

**Boundary Justification:** Similar topographic terrain immediately surrounding the delineated element occurrence within Sand Creek Valley was incorporated into the site boundary.

**Protection Comments:** The site includes private land, a State Land Board section, and a quarter section owned by the Bureau of Land Management. There is currently no formal protection for this area. Most of the private lands have been subdivided as 35-acre parcels however there may still be some opportunity for conservation action. Working with the landowners may help assure long-term protection of the plant community.

**Management Comments:** A majority of the site is grazed by cattle. Maintaining or decreasing grazing in the sagebrush steppe at current levels will likely maintain the condition of the occurrence. Management concerns will change as the area becomes increasingly developed.




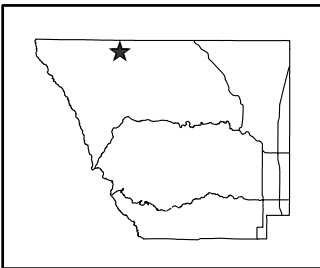
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 65. Sand Creek Valley Potential Conservation Area B3: High Biodiversity Significance

## Scout Camp Meadows

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports an excellent (A-ranked) occurrence *Potentilla ambigens* (Southern Rocky Mountain cinquefoil), a globally vulnerable (G3 S1S2) plant species.

**Protection Urgency Rank: P4 (Low urgency)**

This PCA is contained within the Ben Delatour Scout Ranch owned by the Boy Scouts of America. The Scout Ranch is a Boy Scouts summer camp.

**Management Urgency Rank: M4 (Low urgency)**

Current management seems to favor the persistence of the element, but management actions may be needed in the future to maintain the current quality of the element occurrence. Management issues within the PCA include livestock grazing and non-native plants.

**Location:** This PCA is roughly in the center of the Ben Delatour Scout Ranch about four miles southeast of Red Feather Lakes.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Big Narrows and Haystack Gulch  
T9N R72W Section 17.

**Size:** 40 acres (16 ha)

**Elevation:** 7450 – 7650 ft. (2270 – 2331 m)

**General Description:** The site is a mosaic of grassland valleys dotted with rock outcrops that have Ponderosa pine (*Pinus ponderosa*) and bitterbrush (*Purshia tridentata*) growing around them. Valleys are surrounded by rough, steep, granitic hills with more sparsely vegetated slopes, especially south-facing. The Southern Rocky Mountain cinquefoil (*Potentilla ambigens*) population occurs in a mesic meadow above a tributary of Elkhorn Creek, which itself is a tributary of Cache la Poudre River. Elkhorn Creek and its tributaries are lined with willow carr vegetation punctuated by small groves of aspen (*Populus tremuloides*). The site is on Boy Scout camp, so it is traversed with hiking and horseback riding trails.

**Biodiversity Comments:** This PCA supports a good occurrence of a globally vulnerable (G3) plant species, Southern Rocky Mountain cinquefoil (*Potentilla ambigens*).

Natural Heritage element occurrences at the Scout Camp Meadows PCA.

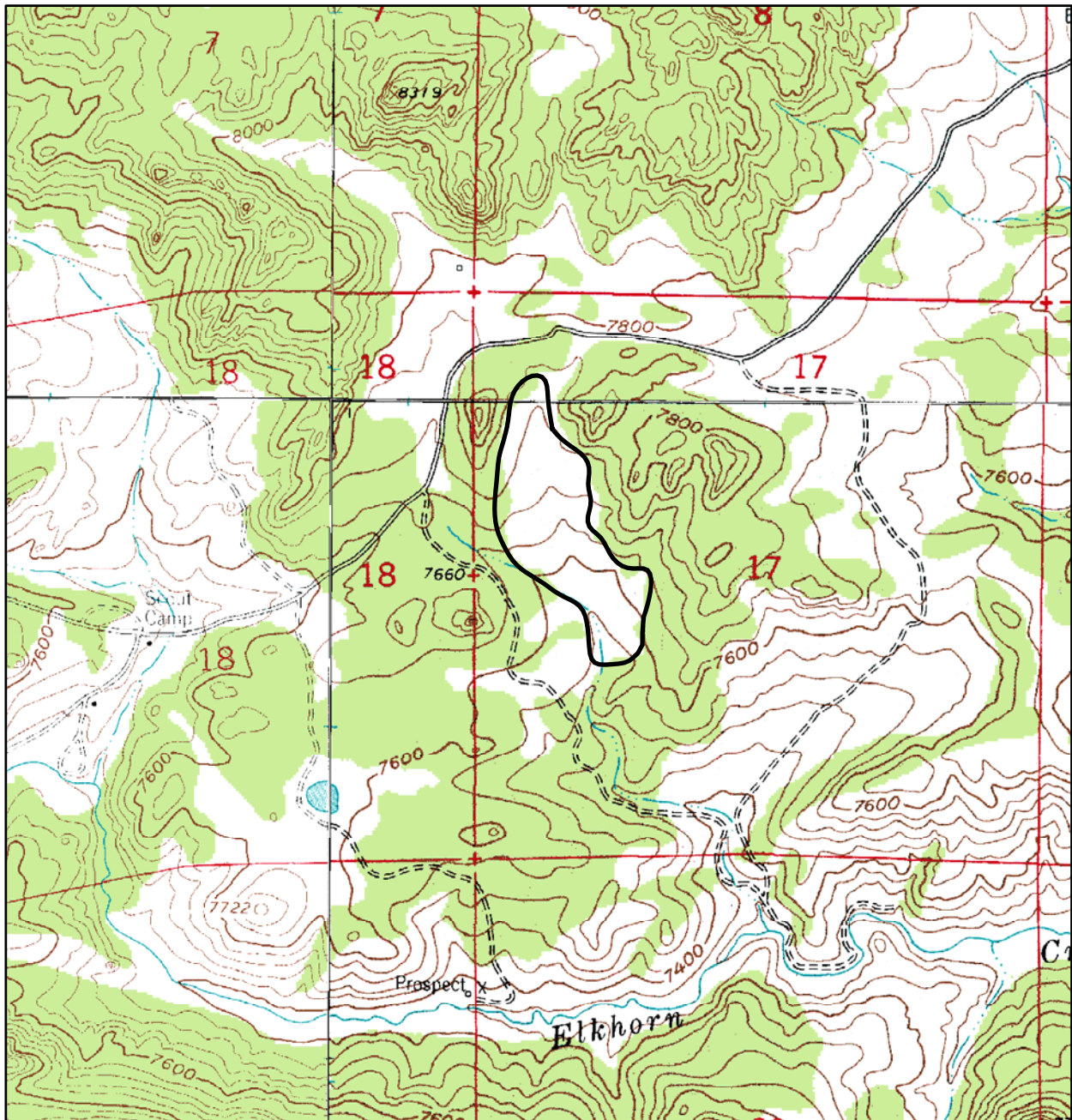
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant								
<i>Potentilla ambigens</i>	Southern Rocky Mountain cinquefoil	G3	S1S2				B	9/30/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the mesic, open grassland habitat surrounding the occurrence; it includes the entire occurrence plus adjacent habitat.

**Protection Comments:** This PCA is contained within the Ben Delatour Scout Ranch owned by the Boy Scouts of America. The Scout Ranch is a Boy Scouts summer camp.

**Management Comments:** Boy Scouts of America manages the property as a summer camp. They also graze livestock. Management issues within the PCA include livestock grazing and non-native plants.




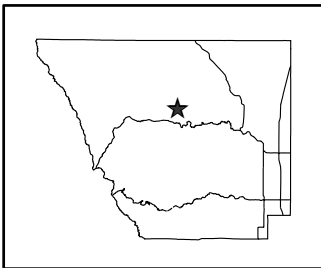
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Big Narrows, 40105-F4          Rustic, 40105-F5          Haystack Gulch, 40105-G4          Red Feather Lakes, 40105-G5</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 66. Scout Camp Meadows Potential Conservation Area B3: High Biodiversity Significance

## Sheep Mountain near Virginia Dale

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports a fair to good (BC-ranked) occurrence of a globally imperiled (G2) natural community.

**Protection Urgency Rank: P3 (Moderate urgency)**

This site is primarily within Maxwell Ranch owned by Colorado State University. There is also a State Land Board section within it. Development pressures are high in the area and the site has no formal protection status.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. The primary management issues at this PCA are grazing management and invasive species.

**Location:** The site is approximately five air miles southeast of Virginia Dale.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Table Mountain and Virginia Dale  
T11N R70W Sections 3-5, 7-10, 15-22, 27, and 28

**Size:** 5276 acres (2135 ha)

**Elevation:** 6800 – 7312 ft. (2073 – 2229 m)

**General Description:** This site is comprised of gently rolling prairie dissected by numerous draws and small drainages and is bounded by sandstone hogbacks to the south and east. Elevation increases north and west of the site, and the grassland begins to form a mosaic with ponderosa pine (*Pinus ponderosa*) woodlands that occupy granitic rock outcrops. The grassland is punctuated by small, isolated buttes. The grassland is characterized by midgrasses, especially needle-and-thread grass (*Stipa comata*), blue grama (*Bouteloua gracilis*), and slimstem muhly (*Muhlenbergia filiculmis*), with mountain muhly (*Muhlenbergia montana*) in the swales. The grassland occupies relatively deeper soils surrounded by sandstone hogbacks and areas with granitic rock outcrops.

Maxwell Ranch is a working ranch. The southern half of the site is maintained for winter grazing, whereas the north end is grazed in the summer.

**Biodiversity Comments:** This PCA was drawn for a fair to good (BC-ranked) occurrence of a globally imperiled (G2) natural community.



Natural Heritage element occurrences at the Sheep Mountain near Virginia Dale PCA.

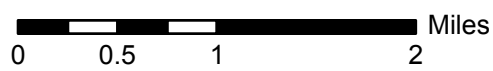
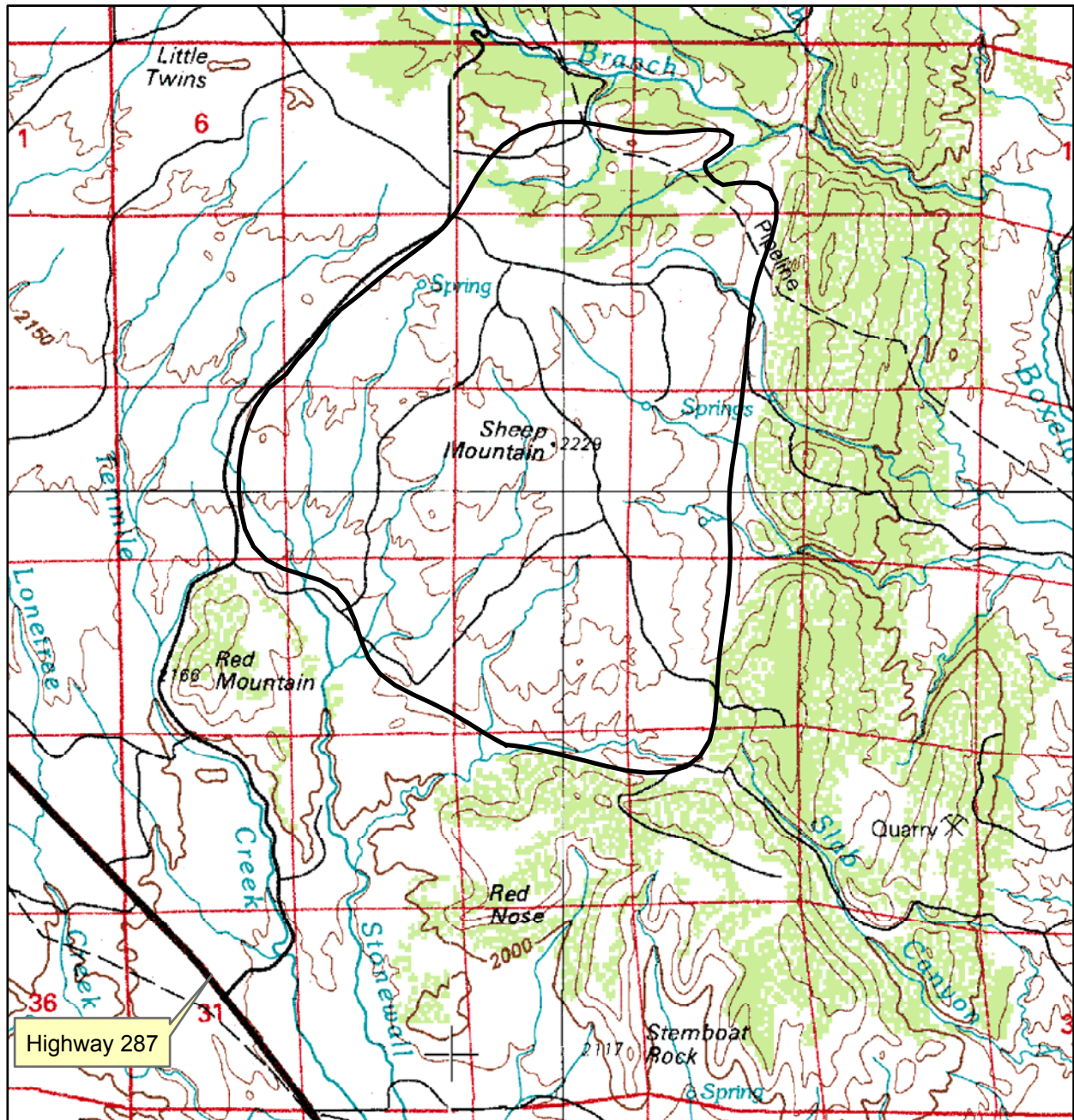
Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
Plant Communities						
<i>Muhlenbergia montana/ Stipa comata</i>	Mountain muhly – needle-and-thread grassland	G2	S2		BC	8/12/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary of this site was drawn to incorporate the area of deeper soils occupied by grassland surrounding the element occurrence east of County Road 37.

**Protection Comments:** This site is primarily within Maxwell Ranch owned by Colorado State University. There are also state land board sections within it. Development pressures are high in the area and the site has no formal protection status. The land to the west of County Road 37 is already subdivided and is being developed into low intensity residential housing.

**Management Comments:** Control or eradication of invasive weeds including dalmation toadflax (*Linaria dalmatica*), cheatgrass (*Bromus tectorum*), and Jim Hill mustard (*Sisymbrium altissimum*) may be necessary to maintain the current quality of the occurrence.




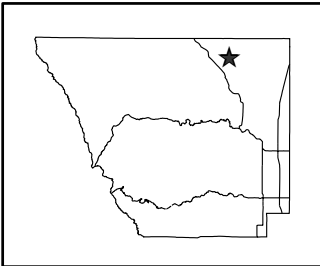
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 67. Sheep Mountain near Virginia Dale Potential Conservation Area B3: High Biodiversity Significance

## Spottlewood Creek

***Biodiversity Rank: B3 (High biodiversity significance)***

This PCA supports a good (B-ranked) occurrence of a mosaic of wetland plant communities including the globally vulnerable (G3G4) clustered sedge (*Carex praeegracilis*) community.

***Protection Urgency Rank: P3 (Moderate urgency)***

Most of the PCA is part of the Meadow Springs Ranch owned by the City of Fort Collins Utilities. The northern portion of the PCA is privately owned and managed for cattle grazing. The privately owned portions have no formal protection status and may be vulnerable to development in the long term.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management issues within the PCA include livestock grazing, land application of biosolids, and non-native invasive plants.

**Location:** This PCA is in the southwest portion of the City of Fort Collins Meadow Springs Ranch about two miles southeast of Round Butte and two miles northeast of the Rawhide Power Plant.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Carr West, Carr SW, Round Butte, and Buckeye  
T10N R68W Sections 3 and 4.  
T11N R68W Sections 20-22, 27-29, 33, and 34.

**Size:** 1434 acres (580 ha)

**Elevation:** 5700 – 5800 ft. (1740 – 1770 m)

**General Description:** Striking wetlands occur on Spottlewood Creek and its tributaries in the southeastern portion of the Meadow Springs Ranch. The wetlands support a wide range of native wetland species including Nebraska sedge (*Carex nebrascensis*), clustered field sedge (*C. praeegracilis*), Baltic rush (*Juncus balticus*), hardstem bulrush (*Scirpus acutus*), threesquare bulrush (*Scirpus pungens*), cattail (*Typha latifolia*), and brookgrass (*Catabrosa aquatica*). Open water ponds and marshy areas house northern leopard frogs (*Rana pipiens*), a Colorado Division of Wildlife species of special concern. Dragonflies and damselflies are abundant around the open water. Additionally, Common Snipe, Red-winged Blackbirds, and a variety of duck species have been observed at the ponds.

The wetlands are supported by a series of seeps and springs. The hydrologic regime supporting the seeps and springs appears to be generally unaltered by human modifications. The wetlands also appear to be relatively unaffected by cattle grazing (banks are not trampled and there is no hummocking of soils). The noxious weed Canada thistle (*Cirsium arvense*) dominates in small patches. Non-native Kentucky bluegrass (*Poa pratensis*) is ubiquitous throughout the wetland but is not dominant. Other non-native plants noted

within the wetland include yellow sweetclover (*Melilotus officinale*), meadow foxtail (*Alopecurus pratensis*), and pennycress (*Thlapsi arvense*).

The wetland occurs within rolling hills of shortgrass prairie and fourwing saltbush (*Atriplex canescens*) shrublands. Some flat areas within the wetland support salt tolerant species including saltgrass (*Distichlis spicata*) and sea milkwort (*Glaux maritima*).

Human modifications of the area include channelization of the stream into a culvert beneath the railroad tracks and a little traveled dirt road leading to the wetland. Additionally, portions of the watershed are used by the City of Fort Collins for land application of biosolids.

**Biodiversity Comments:** This PCA supports a good (B-ranked) occurrence of a mosaic of wetland plant communities including the globally vulnerable (G3G4) clustered sedge (*Carex praegracilis*) community. Other wetland communities included in the mosaic include globally common Baltic rush (*Juncus balticus*) and Nebraska sedge (*Carex nebrascensis*) communities.

Although these wetlands are occupied by common plant communities they are nonetheless of biological interest as they provide good examples of prairie wetlands and provide a refugia for a variety of wildlife. Most prairie wetland complexes have been altered by heavy cattle grazing, spring development, reservoir construction, or invasion by non-native species, thus this site is a good example of a prairie wetland.

Natural Heritage element occurrences at the Spottlewood Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<b><i>Carex praegracilis</i></b>	<b>Clustered sedge wetland</b>	<b>G3G4</b>	<b>S2</b>				<b>B</b>	<b>6/15/04</b>
<i>Carex nebrascensis</i>	Nebraska sedge wetland	G4	S3				B	6/15/04
<i>Juncus balticus</i>	Baltic rush wetland	G5	S5				B	6/15/04

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the wetland community element occurrences and associated seeps and springs upstream from the occurrences. The boundary represents a 1000-foot buffer around the channel and seeps and springs. Keate (2004), Utah Division of Wildlife Resources, indicates a 1000 to 2000-foot buffer as the distance where impacts to associated wildlife may be minimal.

**Protection Comments:** Most of the PCA is part of Meadow Springs Ranch owned by the City of Fort Collins Utilities Department. The upgradient (northern) portion is on privately owned land managed for livestock grazing. The most downstream edge of the PCA is owned by Platte River Authority property. The privately owned portions have no formal protection status and may be vulnerable to development in the long term.

**Management Comments:** City of Fort Collins Utilities owns the Meadow Springs Ranch primarily for land disposal of biosolids. Additionally, the City leases livestock grazing rights to the Natural Fort Grazing Association. Management issues within the PCA include livestock grazing, land application of biosolids, and non-native invasive plants.

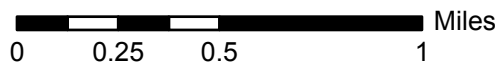
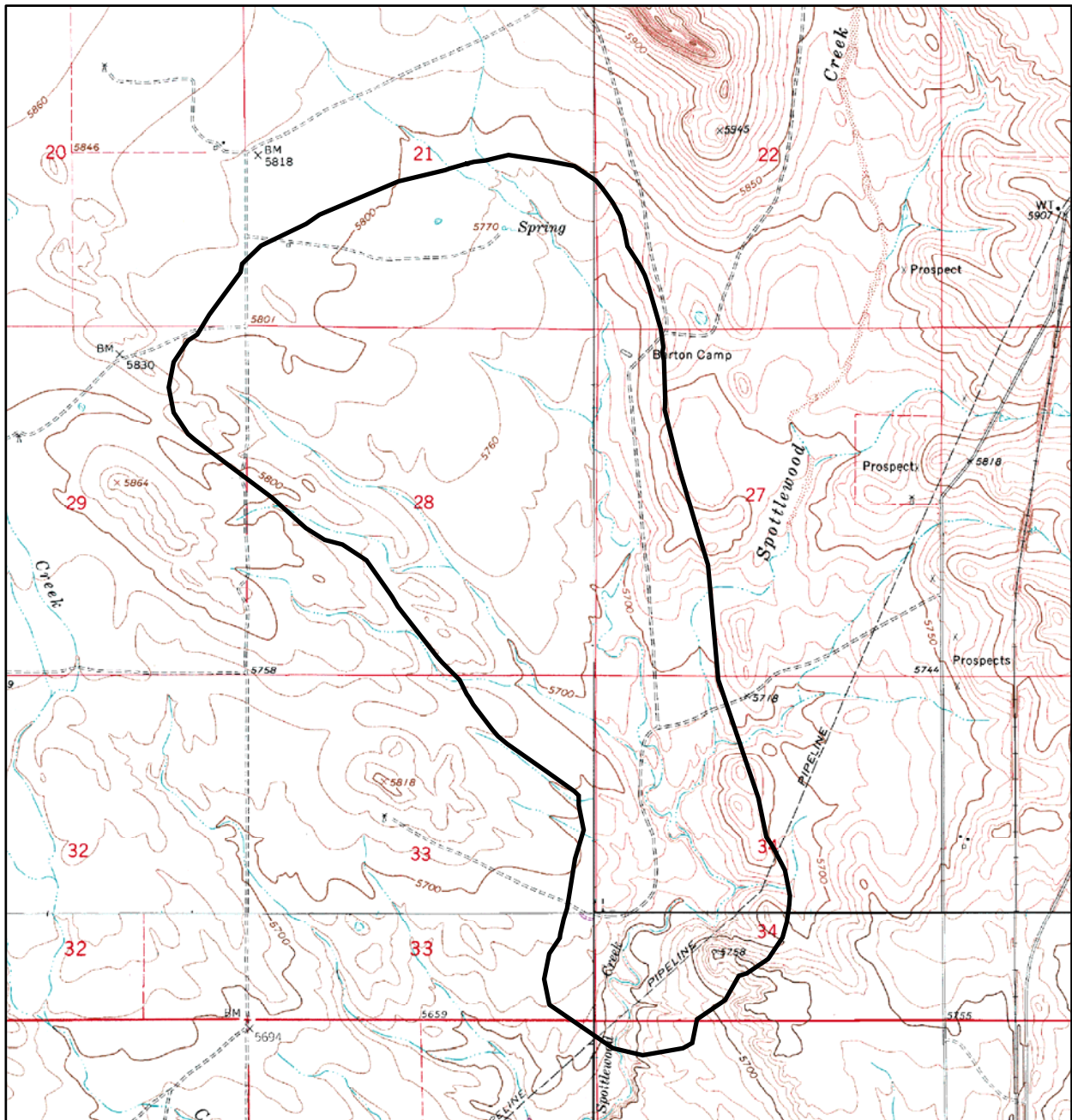
Current management of livestock grazing appears to have maintained the wetlands and associated uplands in good condition. The channel banks are gradual and do not show signs typical of heavy grazing such as trampling and bank slumping. Also, there is little to no hummocking of soils. Private lands in the northern portion of the PCA were not evaluated for signs of grazing pressure.

Federal and State regulations prohibit surface application of biosolids within 200 feet (60 m) of surface water (D. Meyer, pers. comm. 2005). The potential for increased nitrogen concentrations in the water due to biosolids application in the watershed has not been evaluated.



**Photo 12. Wetlands at the Spottlewood Creek PCA.**

*photo by G. Doyle*




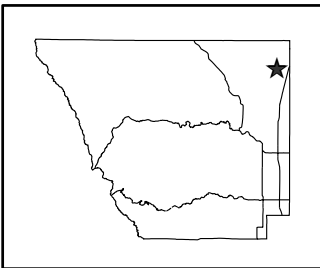
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Carr West, 40104-H8          Carr SW, 40104-G8          Round Butte, 40105-H1          Buckeye, 40105-G1</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 68. Spottlewood Creek Potential Conservation Area B3: High Biodiversity Significance

## Steinhoff Hills

**Biodiversity Rank: B3 (High biodiversity significance)**

This PCA supports fair (C-ranked) occurrences of two globally imperiled (G2) plant communities.

**Protection Urgency Rank: P3 (Moderate urgency)**

About half of the site is State Land Board property and the rest is privately owned as large parcels. Development pressures are high in the area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management of non-native species and fire regimes may be needed in the future to maintain the current quality of the element occurrences.

**Location:** Approximately five miles west of the town of Livermore north of the Red Feather Lakes Road.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Livermore Mountain  
T10N R71W Sections 25, 26, and 34-36

**Size:** 881 acres (356 ha)

**Elevation:** 6000– 6500 ft. (1585 – 1981 m)

**General Description:** The site is characterized by rounded hills that lie between Rabbit Creek to the north and Pine Creek to the south. The hills are formed by ancient Poudre River gravels which overly sandstones. Small drainages flow from the hills. The vegetation is dominated by a mosaic of mountain mahogany (*Cercocarpus montanus*) shrublands along the middle and lower slopes and intermixed grasslands. This site has a very diverse assemblage of plant communities in a relatively small geographic area.

**Biodiversity Comments:** The site supports occurrence of several imperiled plant communities. The mountain mahogany/needle-and-thread grass (*Cercocarpus montanus/Stipa comata*) foothills shrubland is globally imperiled. Almost all known occurrences are highly degraded by invasion of the non-native cheatgrass (*Bromus tectorum*) as is the case at this site. The mountain mahogany/Griffith's wheatgrass (*Cercocarpus montanus/Elymus lanceolatus x Pseudoroegneria spicata*) foothills shrubland has only been documented along the northern Front Range of Colorado and apparently occurs in southeastern Wyoming. This occurrence has been degraded by invasion of non-native species. The mountain mahogany/New Mexico feathergrass (*Cercocarpus montanus/Stipa neomexicana*) foothills shrubland was first documented from the area near Livermore in 1994. The occurrence at this site is in good condition but very small. The mountain mahogany/Scribner's needlegrass (*Cercocarpus montanus/Stipa scribneri*) foothills shrubland appears to be relatively uncommon but its status unknown to date. The occurrence at this site is in good condition, and although fairly small, is typical for this community in Larimer County. The needle-and-thread grass - blue grama (*Stipa comata-Bouteloua gracilis*) mixed grass prairie is common globally but uncommon in Colorado

(G5 S2S3). The occurrence at this site is in fairly good condition but relatively small compared to others known from the adjacent area.

Natural Heritage element occurrences at the Steinhoff Hills PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Cercocarpus montanus/ Stipa comata</i>	<b>Foothills shrubland</b>	<b>G2</b>	<b>S2</b>				<b>C</b>	<b>9/9/96</b>
<i>Cercocarpus montanus/ Stipa neomexicana</i>	<b>Foothills shrubland</b>	<b>G2G3</b>	<b>S2S3</b>				<b>C</b>	<b>9/9/96</b>
<i>Cercocarpus montanus/ Elymus lanceolata x Pseudoroegneria spicata</i>	Foothills shrubland	GU	S3				C	9/9/96
<i>Cercocarpus montanus/ Stipa scribneri</i>	Foothills shrubland	G3	S3				C	9/9/96
<i>Stipa comata- Bouteloua gracilis</i>	Mixed grass prairie	G5	S2S3				C	9/9/96

\*EO = Element Occurrence

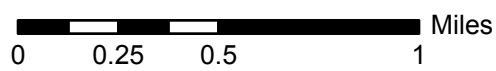
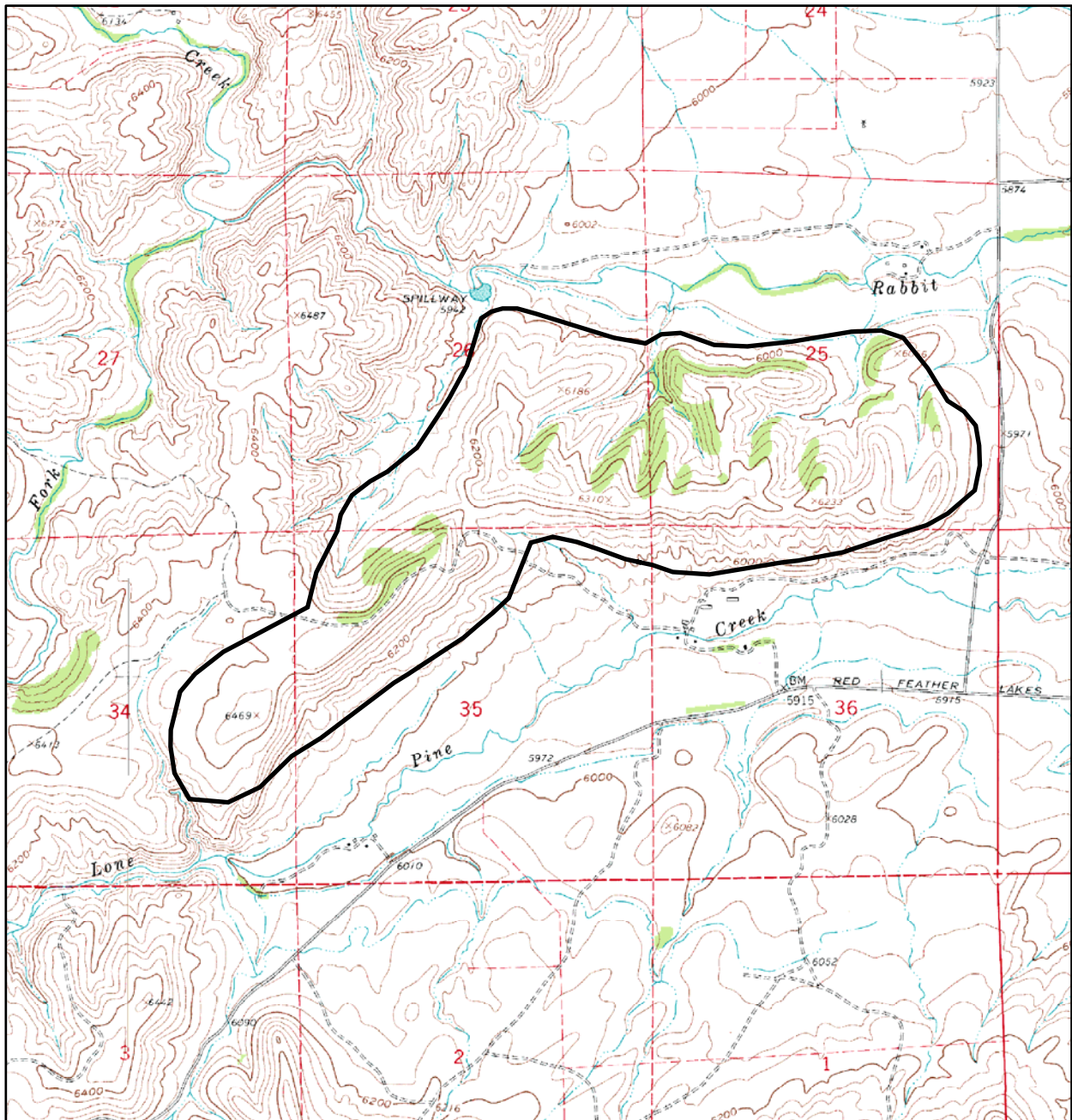
Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary includes the slopes of the hills and a buffer down to the valley bottoms to the north and south. Much of the land surrounding this site is heavily altered from its natural state.

**Protection Comments** Part of the site is leased from the State Land Board and managed as a Wildlife Area by the Division of Wildlife and part is privately owned and used for livestock pasture. There is no formal protection for the significant biologic features.

**Management Comments:** Smooth brome (*Bromus inermis*) is present at the site and may need to be controlled. Cheatgrass and Japanese brome (*Bromus japonicus*) are common on the ridges with the mountain mahogany and in swales on the grasslands. Further increase of non-native species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988). Grazing or fire management could be used as a tool to reduce the dominance of these species and increase the proportion of native species.






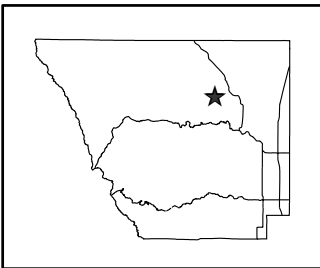
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Livermore Mountain, 40105-G3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 69. Steinhoff Hills Potential Conservation Area B3: High Biodiversity Significance

## Trout Creek at Sheep Creek

**Biodiversity Rank: B3 (High biodiversity significance)**

Trout Creek supports a newly discovered breeding location for the boreal toad (*Bufo boreas*) (G4T1Q), a globally critically imperiled subspecies.

**Protection Urgency Rank: P3 (Moderate urgency)**

Three-fourths of the PCA is owned and managed by the U.S. Forest Service with no special conservation status. The northwest quadrant of the PCA is privately owned with parcels ranging in size from 40 to 240 acres

**Management Urgency Rank: M3 (Moderate urgency)**

Current management seems to favor the persistence of the toad, but management actions may be needed in the future to maintain the current quality of the occurrence. Primary uses of the USFS portion of the Trout Creek watershed include logging of lodgepole pine forest, cattle grazing, and recreational uses including fishing and camping.

**Location:** This PCA is in north central Larimer County in the Laramie Mountains on County Road 80C about 30 miles west of Highway 287. Trout Creek is between Green Mountain and Boulder Ridge, about two miles east of Eaton Reservoir and two miles south of Wyoming. Trout Creek flows into Sheep Creek at County Road 80C.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Eaton Reservoir

T11N R74W Sections 1-3

T12N R74W Sections 25-27 and 34-36

**Size:** 3420 acres (1384 ha)

**Elevation:** 8400 – 9140 ft. (2560 – 2790 m)

**General Description:** Trout Creek is a small stream with a series of active beaver ponds. Adjacent slopes are vegetated with a mosaic of lodgepole pine forest and sagebrush shrublands. The beaver ponds support dense stands of beaked sedge (*Carex utriculata*) and water sedge (*C. aquatilis*) with shrublands of Geyer willow (*Salix geyeriana*) and planeleaf willow (*S. planifolia*) at the outer edges. Wildlife noted using the wetlands include moose, elk, deer, and a variety of songbirds. A four-wheel drive road travels along the creek and at places is nearly inundated by the beaver pond wetlands.

Two adult toads and two breeding pools with boreal toad tadpoles were found at the edges of beaver ponds. The elevation of the ponds (8520 feet) is at the low end of the usual boreal toad elevation range (8500 – 11,500 feet) (Hammerson 1999). The closest known boreal toads are about seven miles southeast at the newly documented Panhandle Creek site northwest of Red Feather Lakes (see Panhandle Creek PCA). The next closest known active boreal toad breeding locations are at Rocky Mountain National Park (CNHP 2005).

**Biodiversity Comments:** This PCA supports a known active breeding location of boreal toad (*Bufo boreas*), a globally critically imperiled subspecies. The size of the population at

Trout Creek is not well documented as surveys were conducted in mid-summer after the breeding season. Future surveys in early spring will help define the local population size. Two adult toads and two breeding ponds with tadpoles were found within the drainage.

The boreal toad was once common throughout the mountains of Colorado, but has undergone declines over the last 20 years (Goettl 1997). Reasons for the decline are unknown, but postulated to be due to a chytrid fungus (Cunningham 1998 as cited in Hammerson 1999). In 1993, the boreal toad was listed as state endangered. The Southern Rocky Mountain population of boreal toads is currently (2005) a candidate species for federal listing under the U.S. Endangered Species Act.

Natural Heritage element occurrences at the Trout Creek at Sheep Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Amphibians								
<i>Bufo boreas</i>	Boreal toad	G4 T1Q	S1	C	E	FS	E	6/22/04

\*EO = Element Occurrence

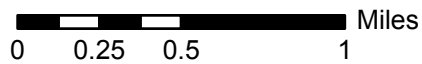
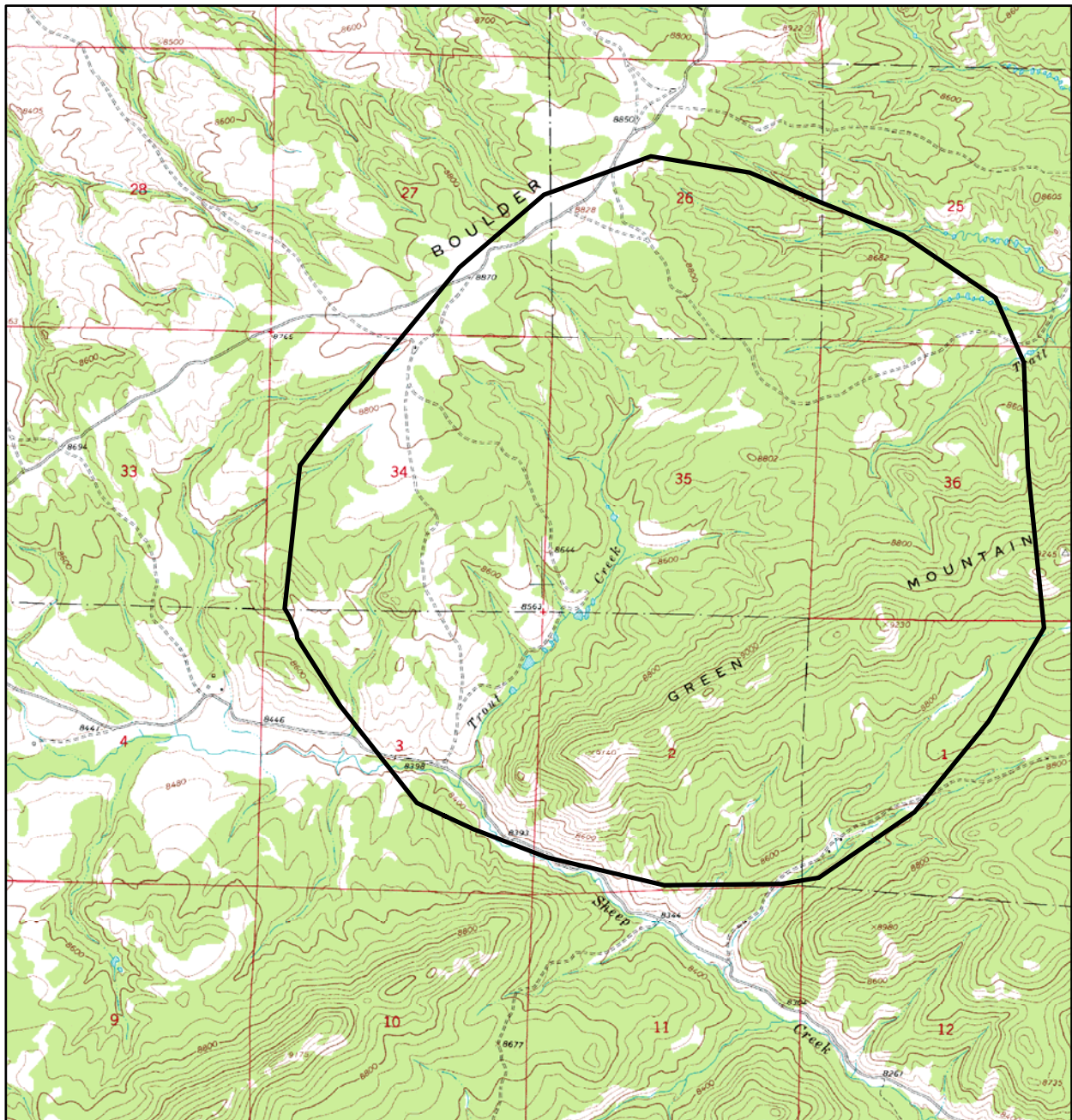
**Boundary Justification:** The boundary includes the known boreal toad breeding locations and adjacent contiguous habitat. A buffer is provided to prevent direct disturbance to the aquatic habitats. These boundaries are intended to protect potential breeding habitat and some post-breeding dispersal. As this species is known to move over 2 ½ miles (4 km) between breeding and non-breeding habitat (Hammerson 1999), it could be impacted by off-site factors. The boundary represents an estimate of the area needed to maintain local hydrological conditions. Any activities along the creek, such as water diversions, impoundments, incompatible livestock grazing, and development could potentially be detrimental to the functioning of the wetland areas within the site. This boundary represents the minimum area that should be considered for a conservation management plan.

**Protection Comments:** Most of the land within and surrounding the PCA is owned by the USFS. The northwest quadrant of the PCA (Section 34) is privately owned with parcel sizes ranging from 40 to 240 acres. The privately owned portions are within a quarter mile (400 meters) of the known breeding locations.

**Management Comments:** Boreal toads breed in shallow ponds, surrounded by wetlands that normally grade into coniferous forests. Current management on the public lands, which includes light recreation and cattle grazing, maintains the toads' primary habitat. Proposals or plans to alter this habitat should be assessed by a boreal toad expert prior to implementation. Uses on private lands within the PCA are currently unknown. Canada thistle (*Cirsium arvense*) and other non-native species often associated with grazing occur at the edges of some of the wetlands. Any potential weed control plans should take into account the presence of the amphibians.



**Photo 13. Beaver pond wetlands at the Trout Creek at Sheep Creek PCA. *photo by G. Doyle***




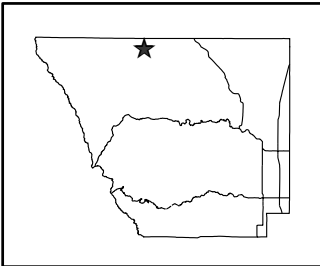
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Eaton Reservoir, 40105-H6</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 70. Trout Creek at Sheep Creek Potential Conservation Area  
 B3: High Biodiversity Significance

**B4 Potential Conservation Areas**

**Bobcat Ridge Canyons**

**Biodiversity Rank: B4 (Moderate biodiversity significance)**

This site supports a fair (C-ranked) occurrence of a globally vulnerable (G4T3) subspecies of butterfly, Moss' elfin (*Callophrys mossii schryveri*).

**Protection Urgency Rank: P5 (No urgency)**

This site was purchased by the City of Fort Collins in 2004 and will be managed as the Bobcat Ridge Natural Area.

**Management Urgency Rank: M3 (Moderate urgency)**

Management concerns include cattle grazing, invasive species, and recreation.

**Location:** About two miles west of Masonville.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Masonville and Drake  
T6N R70W Sections 16, 17, and 21

**Size:** 250 acres (101 ha)

**Elevation:** 5600 – 6000 ft. (1707 – 1829 m)

**General Description:** This site includes two steep sided, narrow foothills canyons that support Moss' elfin. This butterfly is greatly restricted to this habitat type. Habitat ranges from the mouth of the canyons up to the point where the canyon is shaded by ponderosa pine forest. Preferred habitat has rocky outcroppings created by stream cutting through granite. The best habitats have plunge pools (possibly creating higher humidity) and some grassy areas by the stream that receive sunlight for part of the day. These last are favored for courtship. Moss' elfins are avid visitors to the flowers of wild plum, and may also visit mountain mahogany, currents, and other flowering shrubs. Stonecrop (*Sedum lanceolatum*) the larval host, grows in rock crevices along the canyon walls, and in sparsely shaded ponderosa pine/grassland communities on the ridges above the canyon.

**Biodiversity Comments:** This site supports a fair (C-ranked) occurrence of a globally vulnerable (G4T3 S2S3) subspecies of butterfly, Moss' elfin (*Callophrys mossii schryveri*).

Natural Heritage element occurrences at the Bobcat Ridge Canyons PCA.

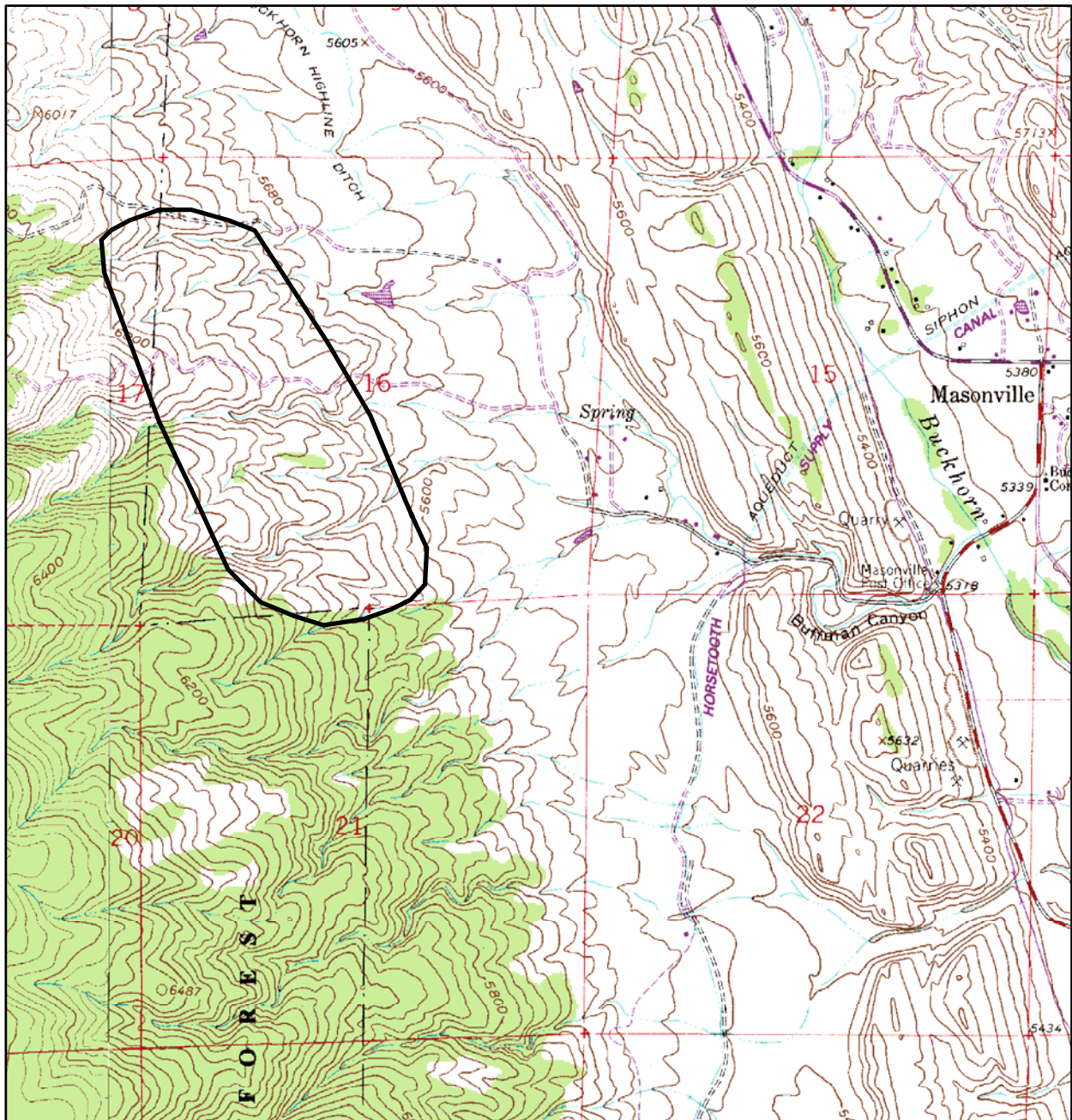
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Butterflies								
<i>Callophrys mossii schryveri</i>	Moss' elfin	G4T3	S2S3				C	4/16/04

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes two foothills canyons where Moss' elfin butterflies were documented in 2004. Additional canyons north and south of the site boundary may also support this species.

**Protection Comments:** Development pressures are high in the area but this site was recently purchased as a City of Fort Collins Natural Area.

**Management Comments:** Management concerns include cattle grazing, invasive species, and recreation. Removing cattle from the foothills canyons would help protect this fragile habitat; specifically, rocky plunge pool canyons need protection from hillside erosion. Cheatgrass has invaded the area and has crowded out native plants including stonecrop (*Sedum lanceolatum*), the larval host plant. Stonecrop primarily grows on rocky hillslopes. Recreational access must be balanced with the need to protect sensitive areas such as these canyons.




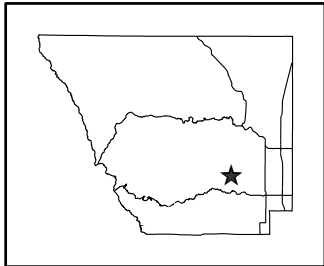
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Masonville, 40105-D2          Drake, 40105-D3</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 71. Bobcat Ridge Canyons Potential Conservation Area  
 B4: Moderate Biodiversity Significance



## Boulder Ridge

**Biodiversity Rank: B4 (Moderate biodiversity significance)**

This site supports a good to fair (BC-ranked) occurrence of a globally vulnerable (G3) plant community.

**Protection Urgency Rank: P3 (Moderate urgency)**

Most of the PCA is US Forest Service land with some privately owned areas. Development pressures are high in the area and some parts of the site are already 35-acre parcels.

**Management Urgency Rank: M4 (Low urgency)**

Management concerns include logging and livestock grazing.

**Location:** The PCA is located along Boulder Ridge Road (County Road 87C) in north-central Larimer County.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Eaton Reservoir  
 T11N R74W Sections 3 and 4  
 T12N R74W Sections 23, 26-28, and 32-34

**Size:** 1319 acres (534 ha)

**Elevation:** 5670 – 6230 ft. (1730 – 1900 m)

**General Description:** The area is characterized by open sagebrush/grassland stands with patches of aspen (*Populus tremuloides*) and mixed conifers including Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), lodgepole pine (*P. contorta*), and limber pine (*P. flexilis*). Sagebrush dominates the rolling hills. Conifers occur on rocky ridges and steep slopes. Granitic ridges (faults) run northwest to southeast in the area and these are generally dominated by stands of mixed conifers and narrow bands of the limber pine. Numerous access roads exist in the area, possibly leading to subdivided parcels. The land appears to be used mostly for cattle grazing.

**Biodiversity Comments:** This PCA contains a good to fair occurrence of a globally vulnerable (G3) limber pine community. This is the only known example of this community type in Larimer County.

Natural Heritage element occurrences at the Boulder Ridge PCA.

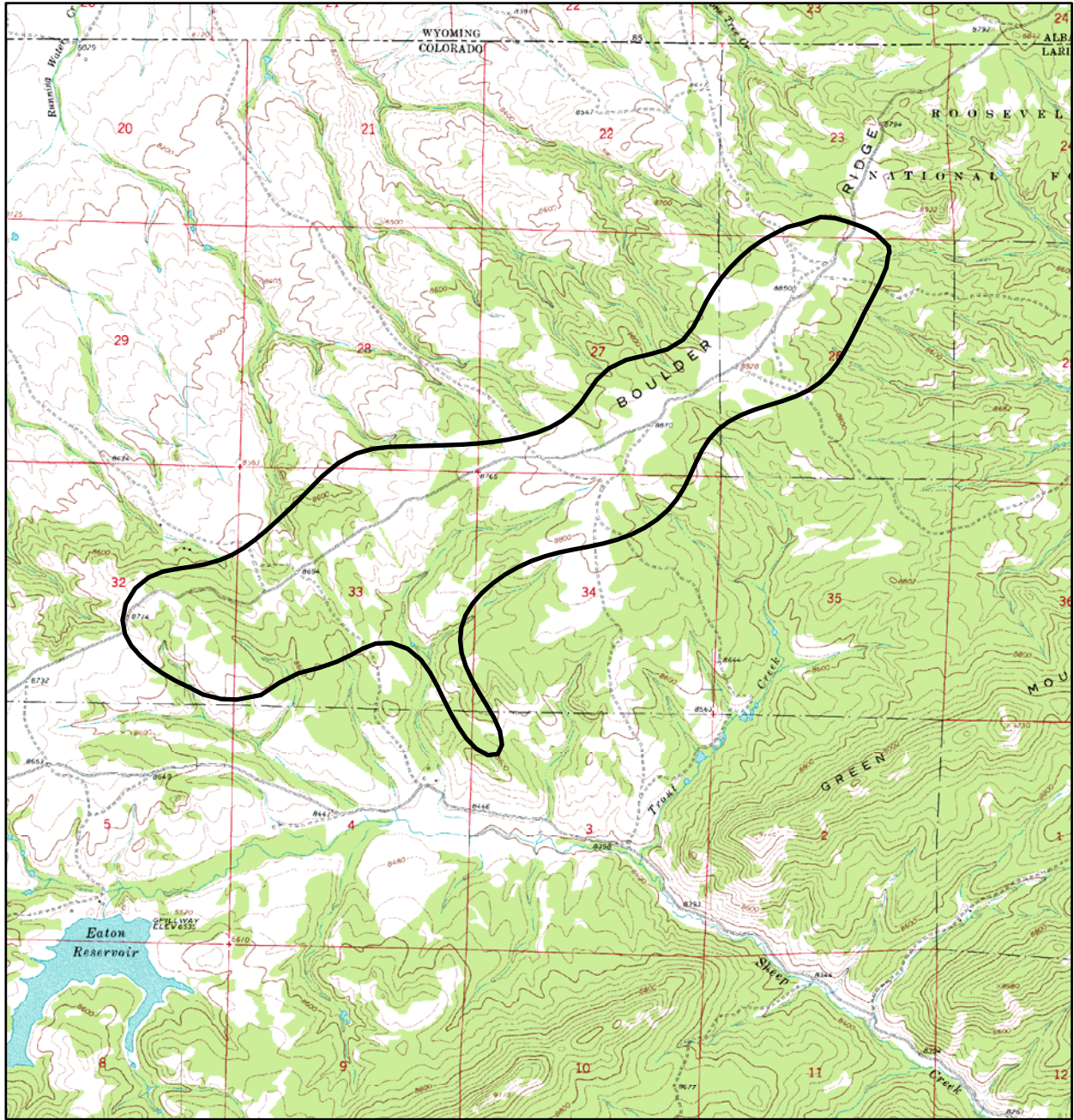
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Plant Communities								
<i>Pinus flexilis</i> / <i>Leucopoa kingii</i>	Lower montane woodlands	G3	S3				BC	8/21/96

\*EO = Element Occurrence

**Boundary Justification:** The boundary incorporates numerous geologic faults that are habitat for the community and will protect the occurrence from direct disturbance.

**Protection Comments:** Most of the site is US Forest Service land. The privately owned portions occur both as large parcels and 35-acre parcels.

**Management Comments:** Management concerns include road building to reach the 35-acre parcels, livestock grazing, and logging.




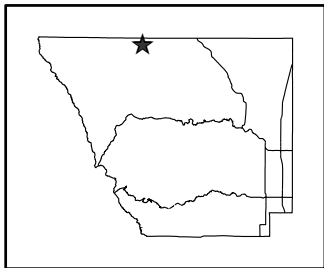
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Eaton Reservoir, 40105-H6</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 72. Boulder Ridge Potential Conservation Area  
 B4: Moderate Biodiversity Significance

## Hertha Reservoir Ridge

**Biodiversity Rank: B4 (Moderate biodiversity significance)**

This PCA supports a fair (C-ranked) occurrence of Bell's twinpod (*Physaria bellii*), a globally imperiled (G2) plant. The area has undergone residential development and the landscape context is poor.

**Protection Urgency Rank: P2 (High urgency)**

Development pressures are high in the area. Part of the PCA has undergone residential development as a subdivision and other parts are privately owned as 35-acre parcels.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the remainder of the element occurrence. Management concerns include future developments, road building, and invasive non-native plants.

**Location:** This PCA includes the shale outcrops from just west of Hertha Reservoir extending south about two miles along a Niobrara Formation hogback. Hertha Reservoir is located north of County Road 8E midway between Carter Lake Reservoir and the town of Berthoud.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Carter Lake Reservoir

T4N R69W Section 7

T4N R70W Sections 12, 13, 24, and 25

**Size:** 704 acres (285 ha)

**Elevation:** 5200 – 5440 ft. (1585 – 1658 m)

**General Description:** This PCA encompasses a small hogback ridge of exposed Niobrara limestone and shale. A county road bisects the ridge. A housing development occupies the central portion of the PCA and this portion is no longer of conservation value. Properties north and south of the development are privately owned as 35 acre and larger parcels. Depending on property management, these parcels may continue to support Bell's twinpod.

**Biodiversity Comments:** This site contains a fair occurrence of Bell's twinpod (*Physaria bellii*). The last thorough survey of the area was in the mid-1980s. Since then, portions of the site have been highly altered by residential development, and the current quality of the occurrence is uncertain. Bell's twinpod is known only from shale or sandstone hogbacks along the foothills of the Front Range from Jefferson County north to near the Wyoming border. Due to its limited range and direct threats to its habitat along the Front Range foothills Bell's twinpod is considered globally imperiled (G2). In order to compensate for lack of thorough survey of the area and poor landscape context the biodiversity rank of the PCA was lowered from B3 to B4. Before proceeding with protection actions at this site, a thorough assessment of the site should be performed.

Natural Heritage element occurrences at the Hertha Reservoir Ridge PCA.

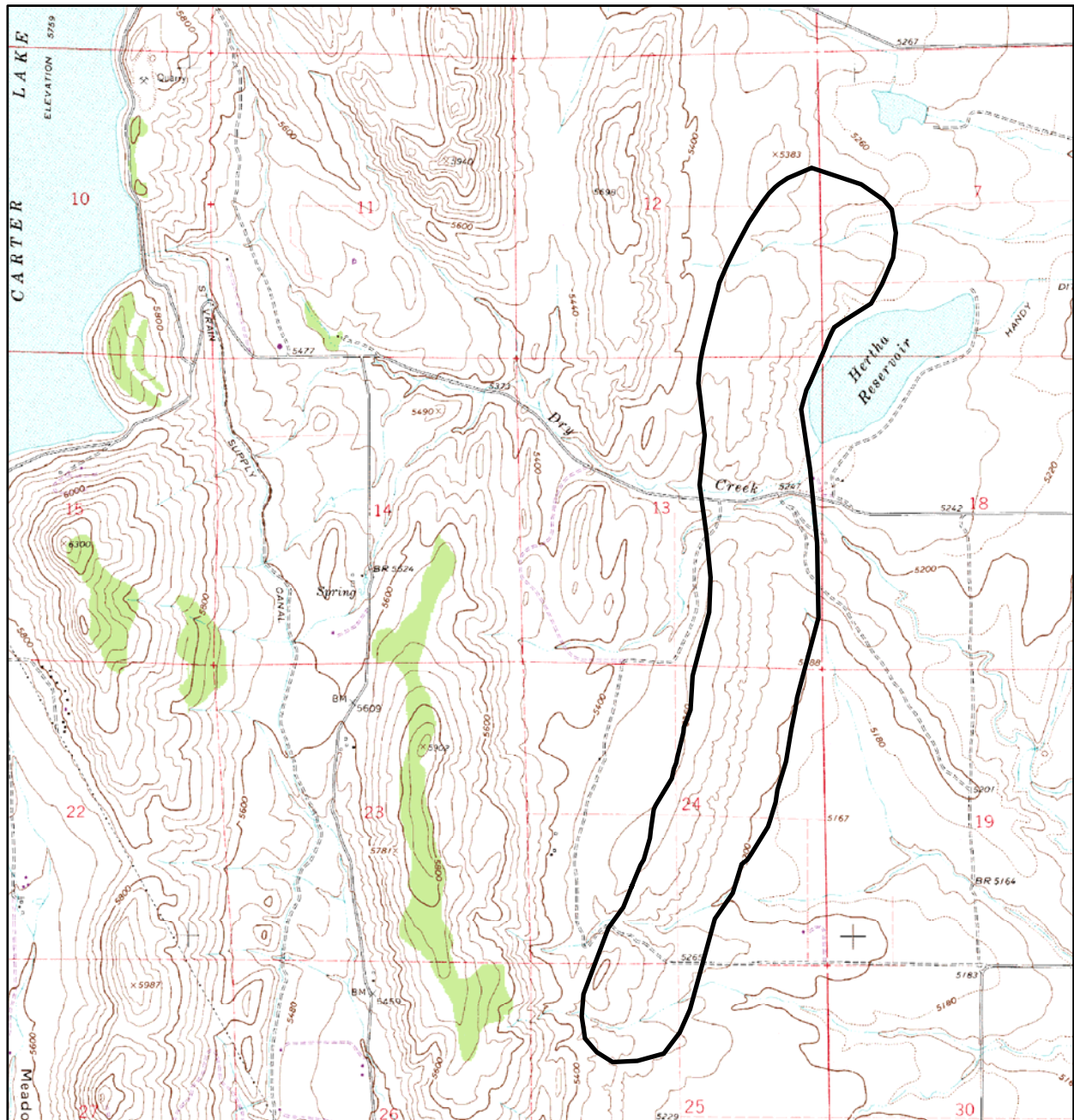
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
<b>Plants</b>								
<i>Physaria bellii</i>	Bell's twinpod	G2	S2				C	6/15/02

\*EO = Element Occurrence

**Boundary Justification:** The boundary includes the occurrence and adjacent slopes on the hogback. Included within the boundary are areas that have been developed as residential housing. These areas are not considered of conservation value but have been included as they separate areas that may still be in relatively natural condition.

**Protection Comments:** Portions of this site have been irreversibly altered by residential development to the detriment of the element occurrence; however, portions of the occurrence may still be viable. All land within the site is privately owned, with some portions as 35-acre and larger parcels. Development pressures are high in the area.

**Management Comments:** Management issues include future development, road building, invasion by non-native species, and encroachment of landscaping plants from existing subdivisions onto the hogbacks. If possible, work with the homeowners to protect what is left of the population. Individual management agreements and/or subdivision design considerations could minimize fragmentation and direct impacts.




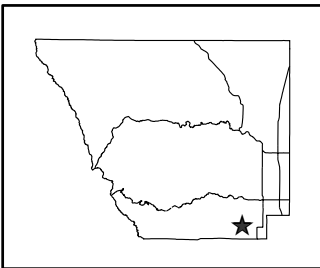
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Carter Lake Reservoir, 40105-C2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 73. Hertha Reservoir Ridge Potential Conservation Area B4: Moderate Biodiversity Significance

## Little Thompson River at Highway 287

***Biodiversity Rank: B4 (Moderate biodiversity significance)***

This PCA contains a fair (C-ranked) occurrence of a winter stonefly (*Mesocapnia frisoni*) that is globally common (G5) but critically imperiled (S1) in the state of Colorado. The stonefly was likely once widely distributed in Colorado's Front Range streams but now is only known from the Little Thompson River.

***Protection Urgency Rank: P2 (High urgency)***

The land within the PCA is privately owned. Historically, the land has been used agriculturally. Residential development pressures are increasing with the growth of Berthoud, Longmont, and other nearby Front Range towns.

***Management Urgency Rank: M3 (Moderate urgency)***

Management concerns include sedimentation of the creek due to road building, home building, and other land grading activities. Another concern is water diversions resulting in dewatering of the creek or impoundments resulting in a change in seasonal flows. Winter stoneflies such as *Mesocapnia frisoni* require flowing water in the winter.

**Location:** Little Thompson Creek PCA is located south and west of Berthoud in southeastern Larimer County and northeastern Boulder County.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Berthoud and Carter Lake  
T3N R69W Section 6  
T3N R70W Sections 1-3  
T4N R68W Section 19  
T4N R69W Sections 24-28 and 31-34  
T4N R70W Sections 28 and 33-36.

**Size:** 2186 acres (885 ha)

**Elevation:** 4900 – 5740 ft. (1500 – 1750 m)

**General Description:** Little Thompson Creek begins within the foothills of the Rocky Mountains a few miles south of Estes Park. The low elevation, low gradient river flows through foothills, agricultural lands, and the town of Berthoud and joins the Big Thompson River near the town of Milliken. This PCA encompasses a portion of the river upstream from and south of the town of Berthoud.

The Little Thompson River is home to a rare relict assemblage of aquatic macroinvertebrate species that probably closely resembles communities found in small transitional (linking foothills and plains) Front Range streams prior to agricultural and residential development (Kondratieff and Baumann 2002). Although most of the Little Thompson watershed has been developed for agricultural use (primarily production of grass hay), there are no major upstream modifications (e.g., dense urbanization, wastewater treatment plants, dams) in the transitional zone portion of the basin. In contrast, most Front Range watersheds (e.g., Boulder Creek, St. Vrain, Big Thompson, Cache la Poudre) have

been modified by humans to an extent that has drastically changed the stream fauna from their historical condition. Examples of the results of these modifications include the reduction in distribution of the South Platte transitional zone fishes northern redbelly dace (*Phoxinus eos*), common shiner (*Luxilus cornutus*), brassy minnow (*Notropis hankinsoni*), plains topminnow (*Fundulus sciadicus*), Iowa darter (*Etheostoma exile*), lake chub (*Couesius plumbeus*), greenback cutthroat trout (*Oncorhynchus clarki stomias*), and the extirpation of hornyhead chub (*Nocomis biguttatus*) and blacknose shiner (*Notropis heterolepis*). Unfortunately little is known about the historic distribution of aquatic macroinvertebrates of this region prior to irrigated agriculture, which began in the 1860s. It is likely that the effects of urbanization on aquatic macroinvertebrates in the region are similar to the effects on the fishes.

Six fish species including creek chub (*Semotilus atromaculatus*), longnose dace (*Rhinichthys cataractae*), fathead minnow (*Pimephales promelas*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersoni*) and green sunfish (*Lepomis cyanellus*) were documented in the Little Thompson on May 22, 2001. The results of this survey are similar to those conducted by the Colorado Division of Wildlife in 1982 and 1997. All species captured are native and common in streams along the Front Range corridor. Additionally, only a few fish out of several hundred captured showed signs of parasites or infection, indicating a healthy community. Creek chub were the most abundant species captured. Although common shiner is not known from the Little Thompson it is possible that it may occur in areas of the river that have not been investigated based on historical distributions. This state threatened species typically inhabits cool transitional zone streams in the South Platte Basin.

It is scientifically accepted that macroinvertebrates can be used as indicators of stream health. In particular, the numbers of three groups of species, mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera), found at a stream site are commonly used as a measure of stream health as many members of these groups are sensitive to human induced disturbance. All three of these groups are present within the Little Thompson. The mayflies known from the Little Thompson are widely distributed and are typical of low elevation, low-flow streams.

Five stonefly species are known from the Little Thompson River, a remarkable number for a Front Range stream of this size. It is likely that many of our Front Range streams historically supported similar fauna. Stoneflies are rarely encountered in Front Range streams at the distance from the foothills that they are in the Little Thompson. This lack of stoneflies in other streams is likely due to the siltation of these streams, organic enrichment, and other human-induced modifications caused by urbanization. A recent study of streams in Boulder and Fort Collins determined that stoneflies have been extirpated from the small streams of these cities (Zuellig 2001). Additionally, researchers in Denver reported similar results (Alan Polonsky, City of Denver, unpublished data).

One of the stonefly species in particular, *Mesocapnia frisoni* (Baumann and Gaufin), is known from relatively few low elevation streams near the Southern Rocky Mountains of Utah, Colorado, and New Mexico and from Kansas and Texas (Baumann and Gaufin 1970,



Opler and Kondratieff 1997). In Colorado, the species is only known to occur in the Little Thompson River. It likely that historically *Mesocapnia frisoni* was widely distributed in Colorado but it has undergone severe range reduction due to stream modifications associated with agricultural and urban development. Similarly, two species of caddisflies rarely encountered in Front Range streams at distances from the foothills as found in the Little Thompson (*Helicopsyche borealis* and *Oecetis inconspicua*) are known from the Little Thompson. It is highly likely that future surveys if conducted during different seasons will discover additional species as many life history attributes of the species involved inhibit detection during certain seasons.

Because stoneflies distribute only via connected waterways, populations are unable to reestablish once local extirpation has occurred. Therefore, survival of *Mesocapnia frisoni* in Colorado is dependent upon the Little Thompson River population. *Mesocapnia frisoni* is a winter-emerging stonefly that spends its larval (immature) stage in sediments beneath and adjacent to the creek (hyporheic zone). Therefore, siltation of the creek could result in clogging of these sediments resulting in extirpation of the stonefly from this reach.

The available evidence suggests that the aquatic insects present in Little Thompson may reflect historical conditions of the small streams along the Front Range of Colorado. Therefore, the Little Thompson is considered a potential candidate for use as a reference stream to compare to other streams along the Front Range to assess regional stream health.

The plant diversity and composition along the Little Thompson River has been modified during the long agricultural history of the area. The understory is dominated by smooth brome (*Bromus inermis*), a European pasture grass planted for grass hay, and by other non-native species including cheatgrass (*Bromus tectorum*) and whitetop (*Cardaria* sp.). Also present are native wetland plants including horsetail (*Equisetum arvense* and *Hippochaete* sp.), spikerush (*Eleocharis* sp.), and bulrush (*Scirpus acutus*). The overstory includes native plains cottonwood (*Populus deltoides*) and many non-native trees including Siberian elm (*Ulmus pumila*), crack willow (*Salix fragilis*), and Russian olive (*Elaeagnus angustifolia*). Native shrubs present at low percent cover include coyote willow (*Salix exigua*) and snowberry (*Symphoricarpos* sp.).

The adjacent uplands are primarily agricultural or have recently been converted to residential use. The dominant grass in the area is smooth brome with other introduced, non-native pasture grasses.

Vertebrate wildlife using the Little Thompson River and surrounding uplands include Red-tailed Hawks, Swainson's Hawks, Bald Eagles (winter), Great Blue Herons, black-tailed prairie dogs, red foxes, coyotes, deer, beavers, and raccoons.

**Biodiversity Comments:** This site contains a fair (C-ranked) occurrence of a globally common but critically imperiled in the state of Colorado (S1) stonefly (*Mesocapnia frisoni*).

Natural Heritage element occurrences at the Little Thompson River at Highway 287 PCA.

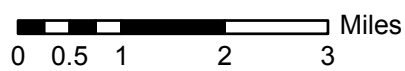
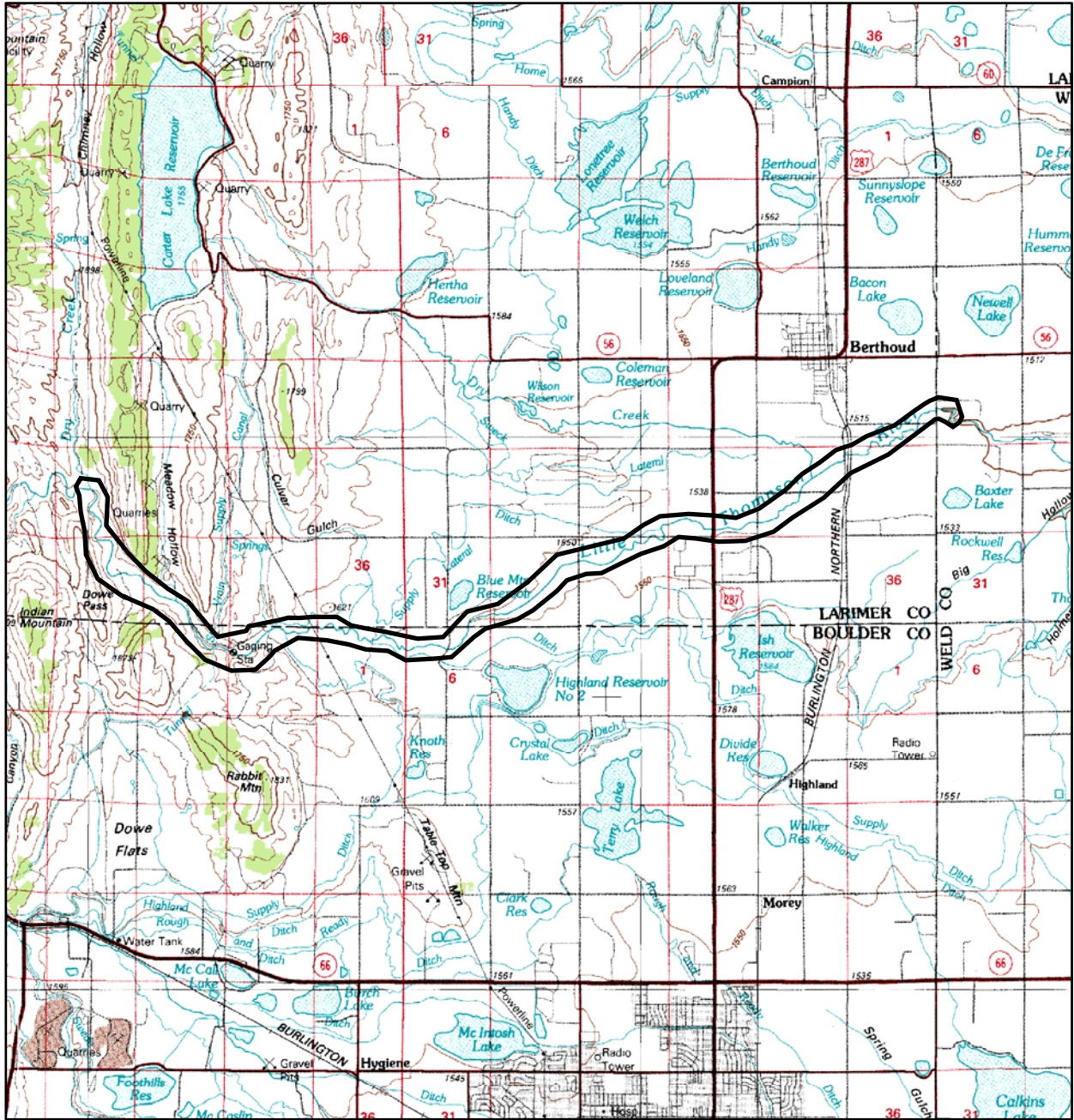
Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO*	Last Observed
Aquatic insects								
<i>Mesocapnia frisoni</i>	A winter stonefly	G5	S1				C	1/8/05

\*EO = Element Occurrence

**Boundary Justification:** The boundary encompasses the portion of the creek known to support *Mesocapnia frisoni* and a portion of the upstream watershed. The full areal extent of the stonefly population is not known at this time and the occurrence likely extends upstream from the known occurrence. Documented locations for the stonefly include the Highway 287 bridge, County Road 15 bridge, and the bridge at the Weld County line. Additionally, maintenance of the natural upstream hydrologic and ecological processes is necessary for the viability of the occurrence. The PCA could be expanded to include a greater proportion of the upstream watershed to ensure maintenance of the ecological and hydrological processes.

**Protection Comments:** The land is primarily privately owned and portions are currently being developed as 35 acre and smaller parcels. The primary land use in the watershed is production of grass hay and cattle grazing. Given the proximity to Berthoud, Longmont, and other Front Range towns, this area is currently undergoing increased residential development. .

**Management Comments:** Management concerns are minimization of siltation, maintenance of water quality, maintaining flow in the river during the winter, and maintenance of the natural flooding regime to flush accumulated fine-grained sediments from the stream sands and gravels.




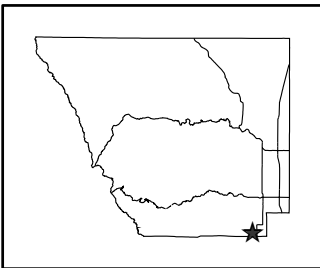
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Estes Park, 40105-A1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 74. Little Thompson River at Highway 287 Potential Conservation Area B4: Moderate Biodiversity Significance

## Sand Creek below Boulder Ridge

**Biodiversity Rank: B4 (Moderate biodiversity significance)**

This site supports a good (B-ranked) occurrence of a globally common (G5) riparian plant community.

**Protection Urgency Rank: P3 (Moderate urgency)**

Most of the PCA is on a State Land Board section held within the Stewardship Trust. The remainder is on portions of an adjacent 5000-acre bison ranch with a conservation easement held by Larimer County Open Lands.

**Management Urgency Rank: M3 (Moderate urgency)**

Management may be needed in the future to maintain the quality of the element occurrence. Work with private landowners to encourage maintenance of native vegetation.

**Location:** This site is located just south of the Wyoming border in western Larimer County about three air miles west of Eaton Reservoir

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles: Eaton Reservoir and Sand Creek Pass

T1N R74W Section 6

T11N R75W Sections 1-3, 10, 11, 14, and 15

T12N R74W Sections 30 and 31

T14N R75W Sections 25, 35, and 36

**Size:** 2994 acres (1212 ha)

**Elevation:** 8100 – 8500 ft. (2469 – 2591 m)

**General Description:** The Sand Creek Basin occurs south of Chimney Rock near the Colorado-Wyoming border. It forms a wide open valley of rolling hills supporting sagebrush shrublands, mountain mahogany shrublands, and native grasslands. Limber pine (*Pinus flexilis*) occurs on rock outcrops and ridges. Swales and valleys are dominated by three-tipped sage (*Artemisia tripartita*) and a variety of grasses such as Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and needle-and-thread (*Stipa comata*). A dense, very wet willow thicket occupies the riparian corridor of Sand Creek, which flows north into Wyoming. On the state land board section within the site, Sand Creek flows through a picturesque granitic canyon. Numerous stream channels exist within the site and are mostly ephemeral. Adjacent to the site is Bull Mountain, dominated by stands of aspen and Douglas-fir on steep east to north-facing slopes. Sandhill cranes have been noted to occur near this reach of Sand Creek. Larchleaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*) also occurs along roads and rock outcrops throughout the area.

**Biodiversity Comments:** This site supports a good (B-ranked) occurrence of the globally secure but state vulnerable (G5 S3) Geyer's willow/Beaked sedge (*Salix geyeriana/Carex utriculata*) Shrubland. The site also contains a fair (C-ranked) occurrence of a state

vulnerable (GU S3) riparian natural community, Geyer's willow-Park willow/Mesic graminoid (*Salix geyeriana-Salix monticola/Mesic graminoid*) Shrubland.

Natural Heritage element occurrences at the Sand Creek below Boulder Ridge PCA.

Element	Common Name	Global Rank	State Rank	Federal/ State Status	EO* Rank	Last Observed
<b>Plants</b>						
<i>Salix geyeriana-Salix monticola/ mesic graminoid</i>	Geyer willow-mountain willow/mesic graminoid riparian shrubland	GU	S3		C	7/16/04
<b><i>Salix geyeriana/ Carex utriculata</i></b>	<b>Geyer willow/ beaked sedge riparian shrubland</b>	<b>G5</b>	<b>S3</b>		<b>B</b>	<b>8/15/96</b>

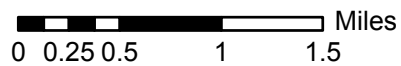
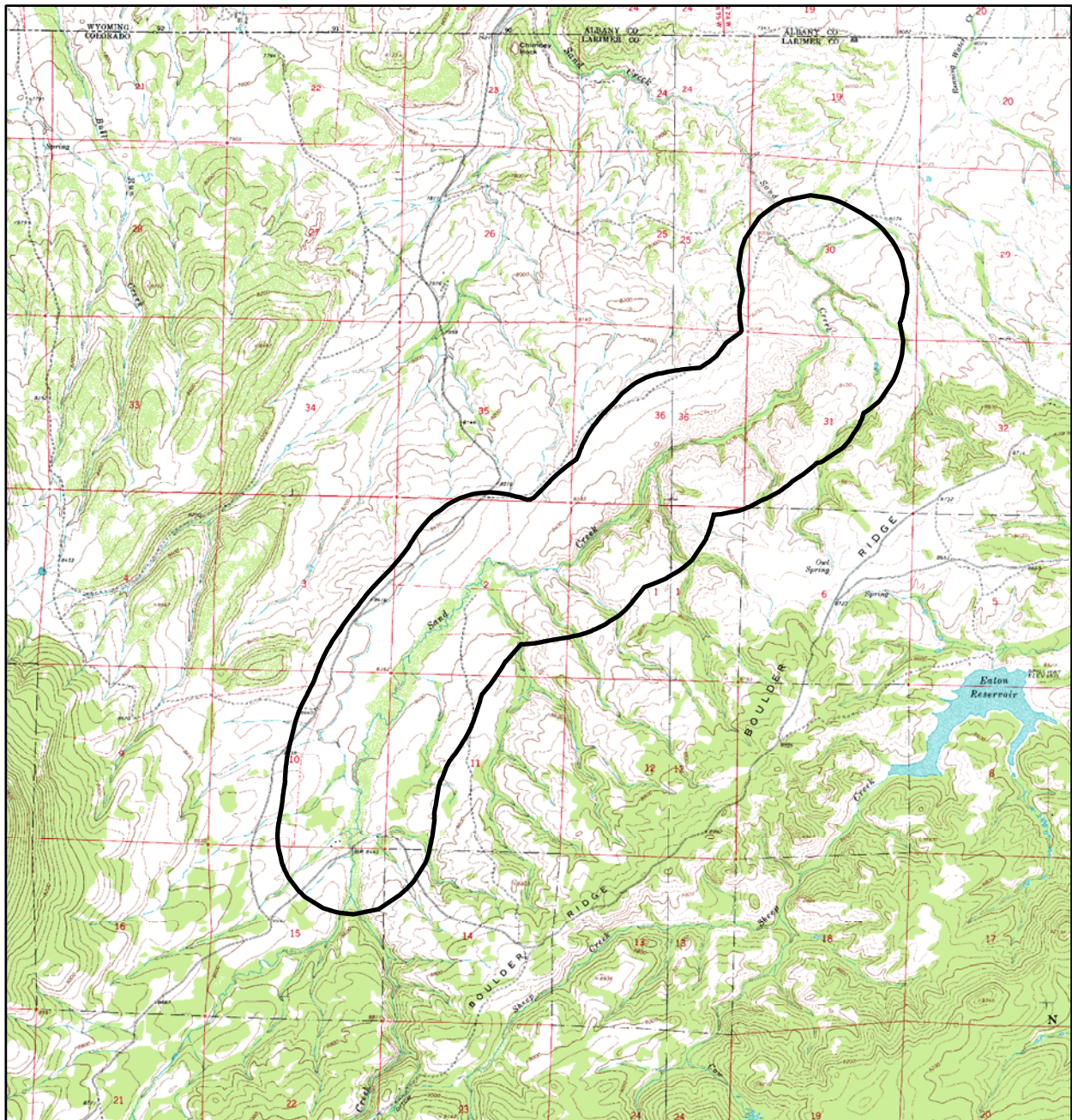
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The element occurrences along this reach of Sand Creek were buffered by 2000 feet. Keate (2004), Utah Division of Wildlife Resources, suggests a 2000-foot buffer distance to minimize impacts to associated wildlife.

**Protection Comments:** The site is primarily privately owned; one State Land Board section is included. Most of the site has already been subdivided into 35-acre ranchettes; therefore, protection actions directed toward the landowners association may be the most beneficial.

**Management Comments:** Discourage planting of non-native, potentially invasive species, especially non-native willow species, in landscaping projects within the site. Further, consultation with Colorado Division of Wildlife for recommendations on buffer distance that avoid disturbance to the cranes during nesting would be beneficial




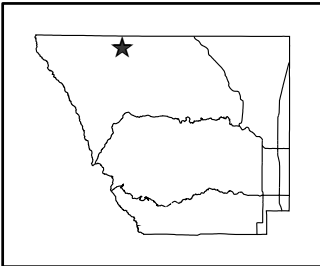
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Eaton Reservoir, 40105-H6          Sand Creek Pass, 40105-H7</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 75. Sand Creek below Boulder Ridge Potential Conservation Area  
 B4: Moderate Biodiversity Significance

## Stonewall Creek

**Biodiversity Rank: B4 (Moderate biodiversity significance)**  
 This PCA supports a fair (C-ranked) occurrence of the globally vulnerable (G3) Southern Rocky Mountain cinquefoil (*Potentilla ambigens*).

**Protection Urgency Rank: P4 (Low urgency)**  
 The PCA is within the Maxwell Ranch owned by Colorado State University Research Foundation.

**Management Urgency Rank: M1 (Very high urgency)**  
 Non-native invasive species and streambank erosion due to livestock grazing are the primary management concerns.

**Location:** The PCA is within Colorado State University’s Maxwell Ranch. The Maxwell Ranch is north of Livermore, along the Red Mountain Granite Canyon Road.

**Legal Description:**  
 U.S.G.S. 7.5-minute quadrangle: Virginia Dale  
 T11N R70W Sections 8 and 17

**Size:** 1517 acres (614 ha)                      **Elevation:** 6920 – 7080 ft. (2109 – 2158 m)

**General Description:** Stonewall Creek is a small, severely downcut, intermittent creek within rolling grassland. Rocky Mountain cinquefoil occurred on a flat, dry grassy bank at the top of a sharply cut stream bank. The plants occurred in a tight clump on the west bank of the creek. Documented in 1996, no recent searches have not been conducted. Associated species include Wood’s rose (*Rosa woodsia*), rush (*Juncus* sp.), goldenrod (*Solidago* sp.), and timothy (*Phleum pratense*).

**Biodiversity Comments:** The PCA contains a fair (C-ranked) occurrence of a globally vulnerable (G3 S1S2) plant species.

Natural Heritage element occurrences at the Stonewall Creek PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<i>Potentilla ambigens</i>	Southern Rocky Mountain cinquefoil	G3	S1S2				C	8/7/96

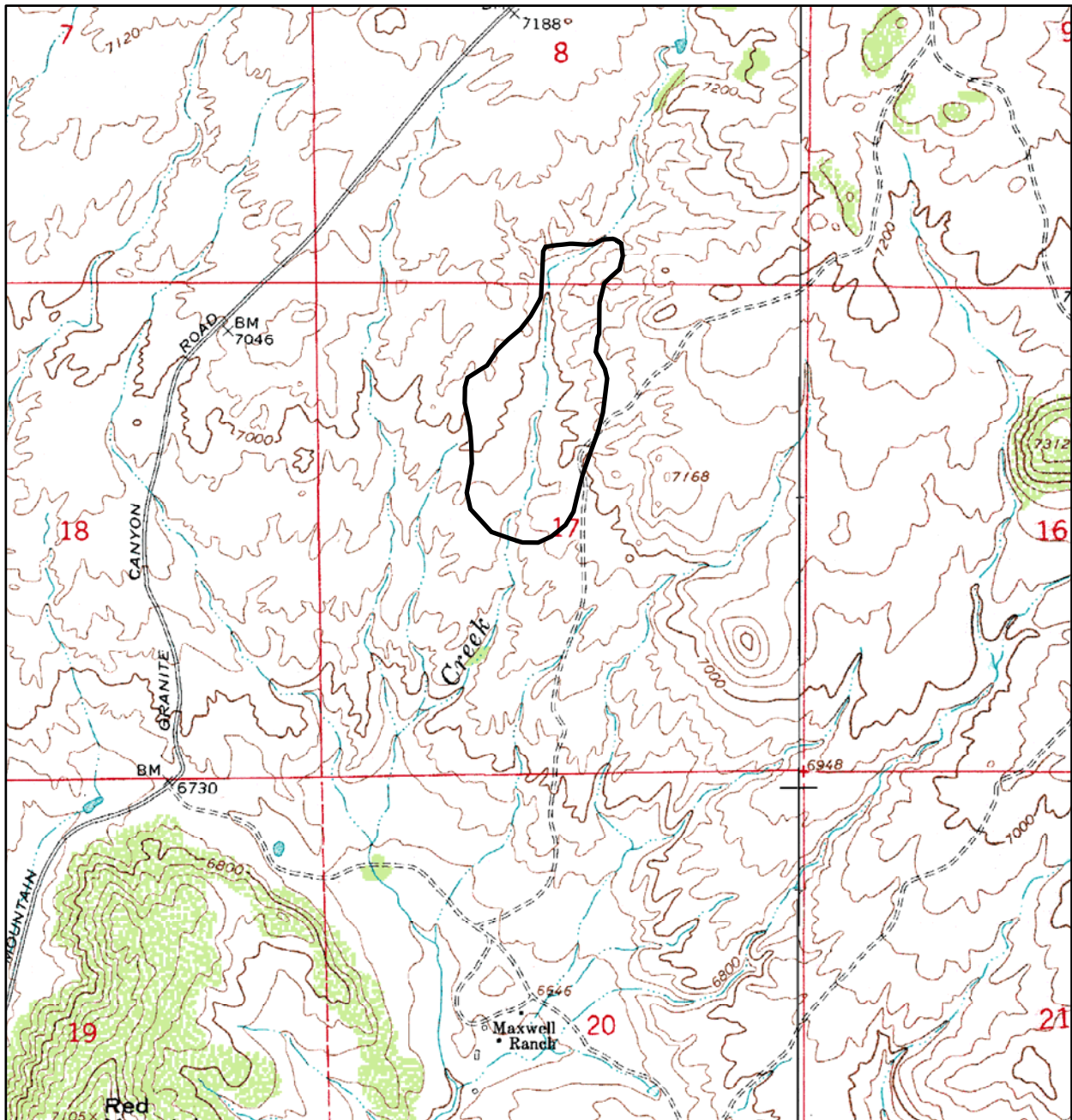
\*EO = Element Occurrence

**Boundary Justification:** The site includes the element and a small buffer of similar creekside habitat to protect from direct impacts such as trampling or increasing the downcut of the creek. The surrounding habitat will also allow additional individuals to establish over time.

**Protection Comments:** Colorado State University owns this property and is not known to be interested in selling. The land managers should be notified of the presence of this plant and encouraged to manage for it.

**Management Comments:** Cattle grazing has downcut the streambank which supports the plants. This erosion may not be recoverable. The plants will be lost if the downcutting continues. Exotic plant species are quite abundant in the site.






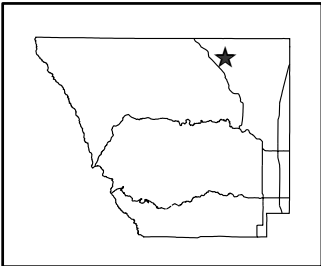
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Virginia Dale, 40105-H3          Table Mountain, 40105-H2</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 76. Stonewall Creek Potential Conservation Area  
 B4: Moderate Biodiversity Significance

## Terrace Ponds

***Biodiversity Rank: B4 (Moderate biodiversity significance)***

This PCA supports two occurrences of good quality, state imperiled wetland communities.

***Protection Urgency Rank: P3 (Moderate urgency)***

The site is privately owned by one landowner. Development pressures are likely to increase in the near future..

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. The primary concern is grazing management.

**Location:** One mile east of the Laramie River, 1.5 miles north of Four Corners

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Crazy Mountain  
T11N R76W Sections 21, 27, 28, 33, and 34

**Size:** 984 acres (398 ha)

**Elevation:** 7990 – 8040 ft. (2435 – 2451 m)

**General Description:** The area east of the Laramie River just north of Four Corners is apparently a large river terrace formed during the Ice Age (the Pleistocene). The area is mostly flat with shallow depressions (probably formed by wind erosion) and gentle slopes rising from the wet, low areas. The depressions intercept a high water table, forming a few permanent shallow water bodies. Most of the permanent water bodies appear heavily impacted by cattle, but one appears to contain very robust emergent communities in excellent condition. The wet (often flooded) meadow between the ponds contains both native and non-native communities. The native communities consist largely of species that succeed under intense grazing (Nebraska sedge, *Carex nebrascensis*, and Baltic rush, *Juncus balticus*), while foxtail barley (*Hordeum jubatum*) completely dominates some areas.

**Biodiversity Comments:** The two communities at this site are globally secure and widespread across North America, but in Colorado they are uncommon and considered imperiled (as are many wetland communities). Good examples of these communities are quite rare in Colorado, and very rare in Larimer County. Terrace Ponds contains by far the best example of both of these communities in Larimer County. These wetlands also have high value for migrating and nesting waterfowl and shorebirds.

Natural Heritage element occurrences at the Terrace Ponds PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plants</b>								
<i>Scirpus tabernaemontani</i> <i>-Scirpus acutus</i>	<b>Emergent wetland</b>	<b>G4</b>	<b>S2S3</b>				<b>B</b>	<b>8/15/96</b>
<i>Scirpus maritimus</i>	<b>Emergent wetland</b>	<b>G4</b>	<b>S2</b>				<b>B</b>	<b>8/15/96</b>

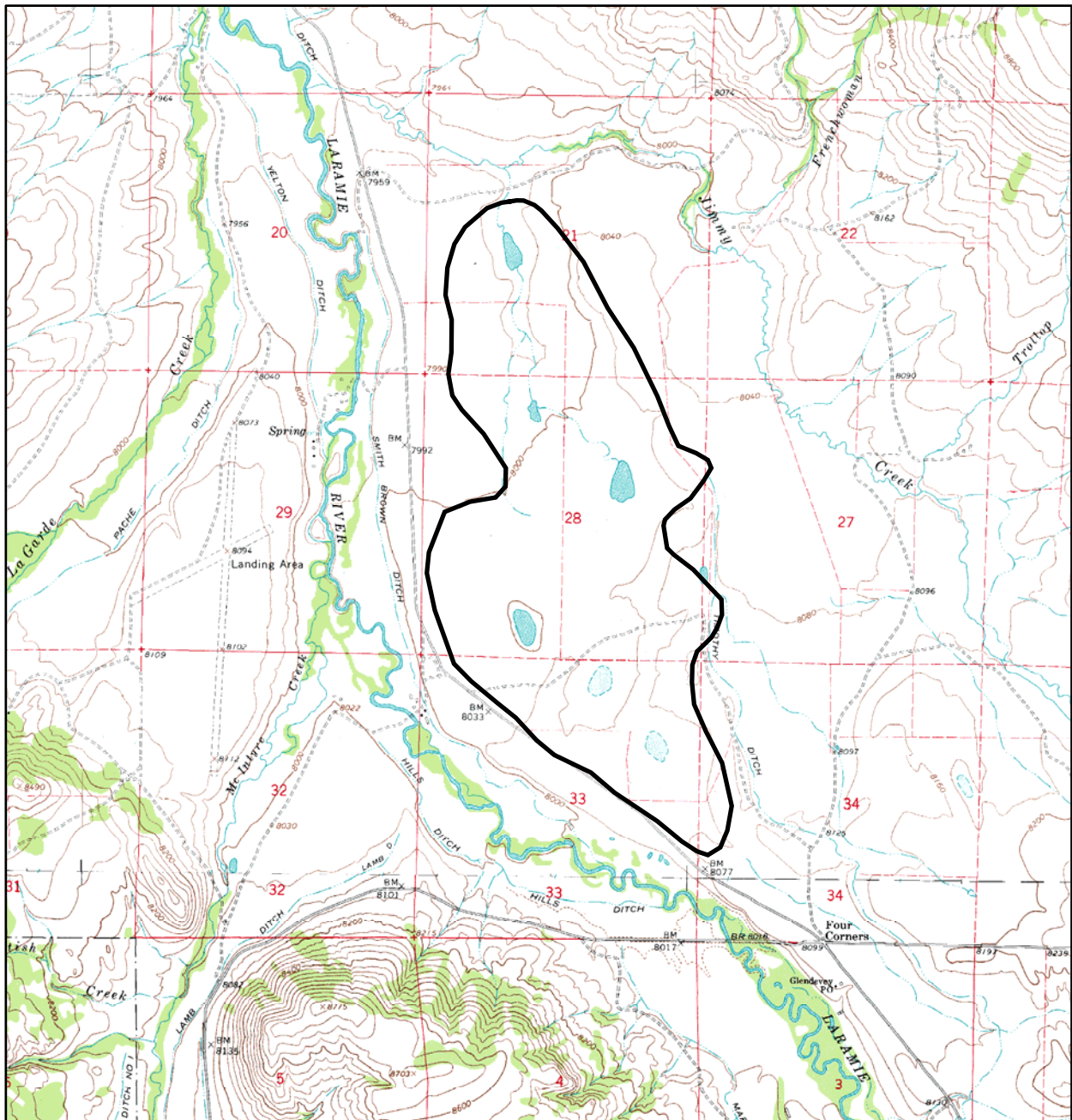
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary encompasses all the ponds on this one large terrace and all contiguous wetlands. A buffer of 300 feet or slightly more is designated to protect the wetlands from direct impacts from vehicles, grazing animals, etc., as well as indirect impacts from water runoff from disturbed areas. The buffer is designed to also provide security for nesting and migrating waterfowl and shorebirds.

**Protection Comments** Privately owned and used for livestock grazing. We are not aware of any formal protection provided to the wetlands. All similar ponds in the vicinity have had their wetland plant communities destroyed by incompatible grazing. Conservation tools such as management agreements or conservation easements could be used to maintain the quality of the site. Protection cannot be considered complete without recognizing that these wetlands may be strongly linked to off-site hydrology, and that hydrologic modifications beyond the site boundary could affect the wetlands on the site.

**Management Comments:** Heavy grazing and trampling of shoreline plant communities will destroy the value of this site. On the other hand, restricted grazing for a few years could revitalize the wetland because the hydrology appears essentially intact. Perhaps one or two ponds could be managed as livestock production areas while greatly reducing grazing around the others.




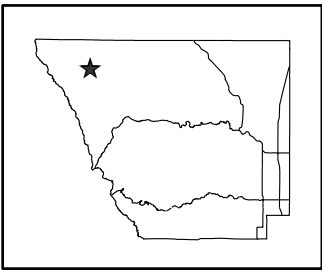
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349          www.cnhp.colostate.edu</p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Crazy Mountain, 40105-H8          Glendevy, 40105-G8</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 77. Terrace Ponds Potential Conservation Area  
 B4: Moderate Biodiversity Significance

## B5 Potential Conservation Areas

### Brannigan Springs

***Biodiversity Rank: B5 (General biodiversity significance)***

This PCA supports good (B-ranked) and fair (C-ranked) occurrences of globally secure wetland plant communities. The wetlands are types that were probably once quite common across the Great Plains portion of Larimer County but uncommon now due to human alteration.

***Protection Urgency Rank: P5 (No urgency)***

The PCA is part of the Soapstone Ranch, recently purchase by the City of Fort Collins as open space.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management issues within the PCA include livestock grazing, recreational access, and non-native invasive plants.

**Location:** This PCA is located just south of the Wyoming border, 5 to 8 miles west of I-25, from Graves Camp to Brannigan Spring.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Round Butte  
T12N R68W Sections 19-21 and 28-30  
T12N R69W Sections 24 and 25

**Size:** 1548 acres (626 ha)

**Elevation:** 6300 – 6530 ft. (1920 – 1990 m)

**General Description** The Brannigan Springs site contains several natural springs dominated by native wetland plant communities. One of these communities represents one of the lowest elevation known occurrences of what is typically a montane and subalpine plant community, which is probably present because of cold air drainage through the area. The springs are relatively alkaline. In several small areas a layer of water issuing forth at the spring supports an unstable mat of vegetation one-half meter thick. Sedimentary bedrock capped by a thin layer of Pleistocene alluvium underlies and surrounds the site. The type of bedrock has resulted in a variegated landscape that is dominated by short and mid grass prairie. The hydrologic regime supporting the seeps and springs appears to be generally unaltered by human modifications.

**Biodiversity Comments:** The wetlands at the Brannigan Springs site probably represent a type of wetland that was once quite common across the Great Plains portion of Larimer County. It is reasonable to assume that many of our current reservoirs were built upon natural marshes and wet meadows, many of which probably contained springs. The Spottlewood Creek, Brannigan Springs, and Jack Springs PCAs are the only natural Great Plains wetlands in Larimer County that can be assumed to be largely representative of pre-settlement conditions. The Brannigan Springs Site contains not only the westernmost Great

Plains spring-fed wet meadows, but also contains a surprisingly low elevation occurrence of a beaked sedge community, which typically grows in the montane and subalpine zones. Most prairie wetland complexes have been altered by heavy cattle grazing, spring development, reservoir construction, or invasion by non-native species.

Natural Heritage element occurrences at the Brannigan Springs PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<i>Carex utriculata</i>	<b>Beaked sedge wetland</b>	<b>G5</b>	<b>S4</b>				<b>B</b>	<b>7/8/97</b>
<i>Catabrosa aquatica-Mimulus spp.</i>	<b>Brookgrass-monkey flower wetland</b>	<b>GU</b>	<b>S3</b>				<b>C</b>	<b>7/8/97</b>

\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

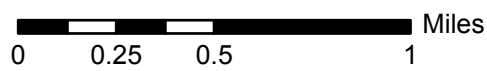
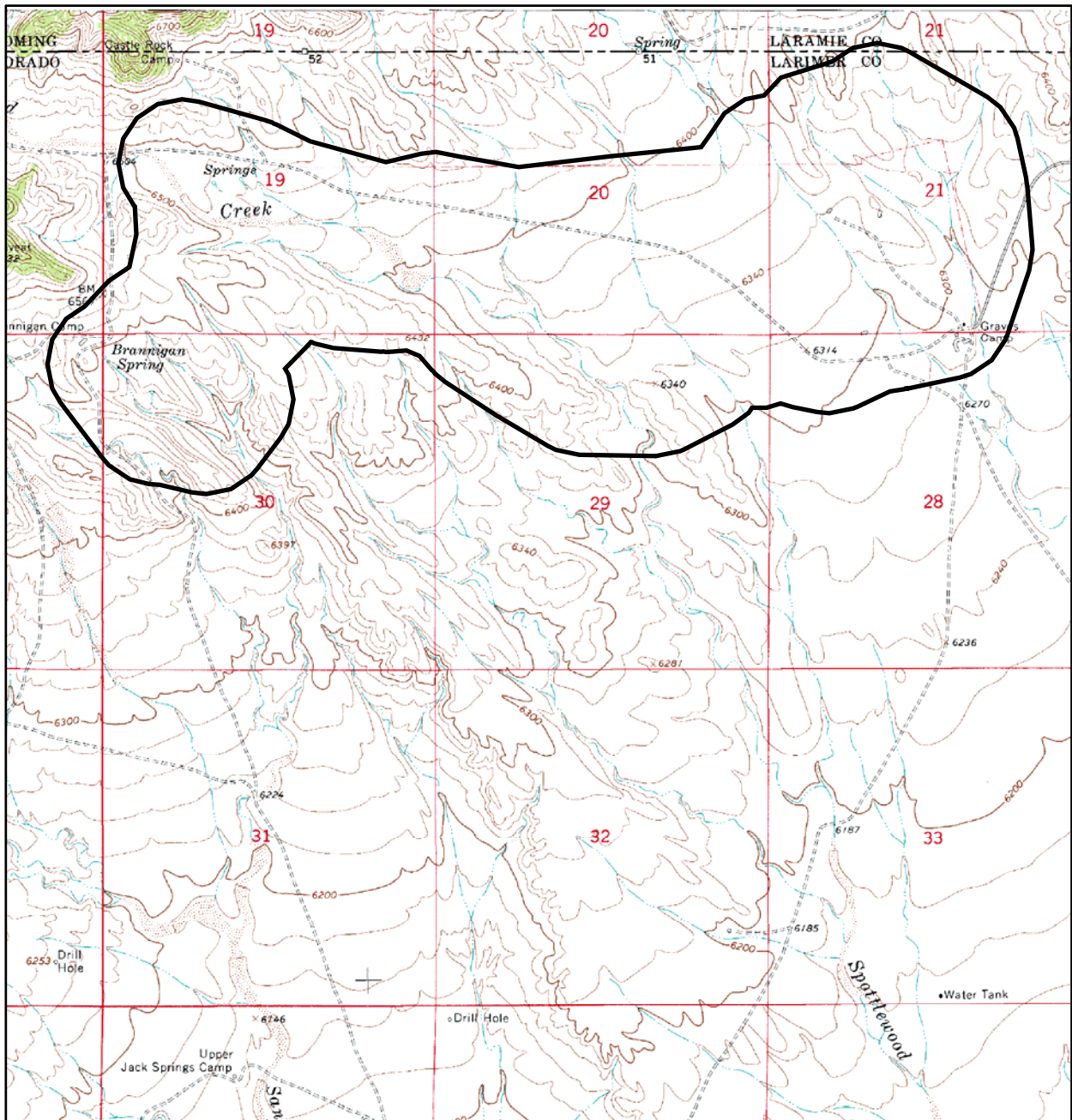
**Boundary Justification:** The PCA contains all the contiguous wetlands and springs as well as a 1000-foot buffer to protect from direct impacts. Keate (2004), Utah Division of Wildlife Resources, indicates a 1000 to 2000-foot buffer as the distance where impacts to associated wildlife may be minimal. Incorporating all the wetlands into one site is useful to protect the values of the wetlands and for more flexible management of the area.

**Protection Comments:** The Soapstone Ranch was purchased by the City of Fort Collins in 2004 as a Natural Area securing its long-term protection from development and subdivision.

**Management Comments:** Management issues within the PCA include livestock grazing, recreational access, and non-native invasive plants. Soapstone Ranch is used for moderate to heavy livestock grazing; as elsewhere, the cattle are especially fond of the wetland and riparian areas. Moderate to heavy grazing is likely to change plant composition in these wetlands. A change in grazing patterns is recommended. Ideally this site would be intensively grazed only in the winter when the ground is frozen, possibly allowing a year's rest every third year. Grazing on frozen ground is preferable because the wet ground of this site is particularly vulnerable to trampling. Other regimes may also work to minimize the detriment to the native plant communities such as a rotational grazing system. With respect to the health of the native plants, mid to late summer are the least favorable times for grazing, because this is the time when plants are most actively producing seed and new shoots.

The recreational trails that will be designed in the coming years should consider the range of potential impacts on the wetland and surrounding grasslands (Colorado Department of Natural Resources 1998).

Monitoring for the presence of invasive species and their early control, especially with an increase in recreational traffic, is recommended. Additionally, activities affecting the ground water to the north of the site could affect the elements on the site.




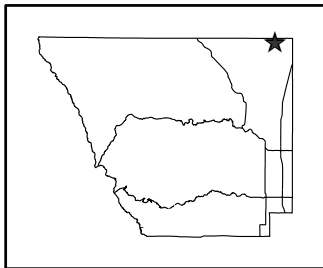
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> PCA Boundary</p> <p>Round Butte, 40105-H1</p> <p>7.5 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 78. Brannigan Springs Potential Conservation Area B5: General Biodiversity Significance

## Jack Springs

***Biodiversity Rank: B5 (General biodiversity significance)***

This PCA supports two fair (C-ranked) occurrences of globally secure but locally vulnerable (G4 S3) wetland plant communities. The wetlands are a type that was probably once quite common across the Great Plains portion of Larimer County but uncommon now due to human alteration.

***Protection Urgency Rank: P5 (No urgency)***

The PCA is part of the Meadow Springs Ranch owned by the City of Fort Collins Utilities and the Soapstone Ranch, recently purchased by the City of Fort Collins as open space.

***Management Urgency Rank: M3 (Moderate urgency)***

Management may be needed in the future to maintain the quality of the element occurrences. Management issues within the PCA include livestock grazing, recreational access, land application of biosolids, and non-native invasive plants.

**Location:** This PCA is located at Jack Springs and along the old railroad grade on the western portion of Meadow Springs Ranch and north onto the Soapstone Ranch. The springs are between Spottlewood Creek and Sand Creek, feeding into Sand Creek.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangle: Round Butte  
T11N R68W Sections 4-9

**Size:** 634 acres (257 ha)

**Elevation:** 5700 – 5800 ft. (1740 – 1770 m)

**General Description:** The Jack Springs site contains several natural springs dominated by native wetland plant communities. The springs are relatively alkaline. In several small areas a layer of water issuing forth at the spring supports an unstable mat of vegetation one-half meter thick. Sedimentary bedrock capped by a thin layer of Pleistocene alluvium underlies and surrounds the site. The type of bedrock has resulted in a variegated landscape that is dominated by short and mid grass prairie. The hydrologic regime supporting the seeps and springs appears to be generally unaltered by human modifications.

The surrounding grasslands are used for moderate to heavy grazing; as elsewhere, the cattle are especially fond of the wetland and riparian areas. Additionally, City of Fort Collins Utilities uses the Meadow Springs Ranch for disposal of biosolids, but the wetland areas are carefully avoided.

**Biodiversity Comments:** This PCA contains examples of globally secure but locally vulnerable imperiled wetland communities. The wetlands at Jack Springs probably represent a type of wetland that was once quite common across the Great Plains portion of Larimer County. It is reasonable to assume that many of our current reservoirs were built upon natural marshes and wet meadows, many of which probably contained springs such as the Jack Springs. Along with the Brannigan Springs and Spottlewood Creek, the Jack



Springs are the only known natural Great Plains wetlands in Larimer County that can be assumed to be largely representative of pre-settlement conditions. Most prairie wetland complexes have been altered by heavy cattle grazing, spring development, reservoir construction, or invasion by non-native species.

Natural Heritage element occurrences at the Jack Springs PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
Plant Communities								
<i>Carex simulata</i>	Analogue sedge wetland	G4	S3				C	6/28/96
<i>Carex nebrascensis</i>	Nebraska sedge wetland	G4	S3				C	6/28/96

\*EO = Element Occurrence

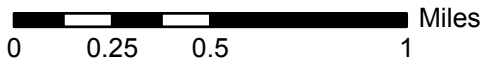
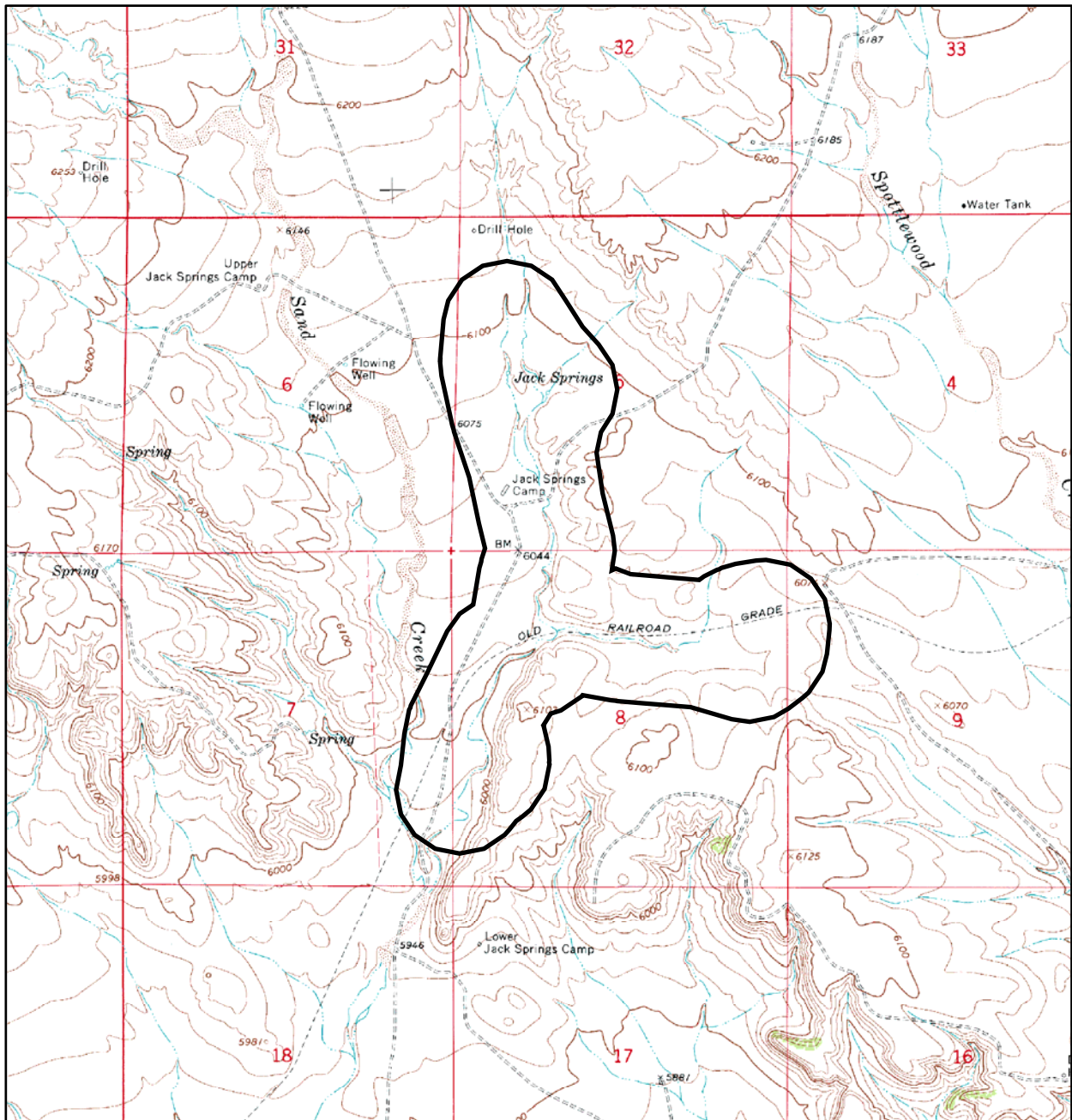
**Boundary Justification:** The PCA contains all the contiguous wetlands and springs as well as a 1000-foot buffer to protect from direct impacts. Keate (2004), Utah Division of Wildlife Resources, indicates a 1000 to 2000-foot buffer as the distance where impacts to associated wildlife may be minimal.

**Protection Comments:** Ownership of the site is shared by the City of Fort Collins Utilities at their Meadow Springs Ranch and the Soapstone Ranch recently purchased by City of Fort Collins as a Natural Area.

**Management Comments:** Management issues within the PCA include livestock grazing, recreation access, land application of biosolids, and non-native invasive plants. Both the Meadow Springs Ranch and Soapstone Ranch are used for moderate to heavy livestock grazing; as elsewhere, the cattle are especially fond of the wetland and riparian areas. Moderate to heavy grazing is likely to change plant composition in these wetlands. A change in grazing patterns is recommended. Ideally this site would be intensively grazed only in the winter when the ground is frozen, possibly allowing a year's rest every third year. Grazing on frozen ground is preferable because the wet ground of this site is particularly vulnerable to trampling. Other regimes may also work to minimize the detriment to the native plant communities such as a rotational grazing system. With respect to the health of the native plants, mid to late summer are the least favorable times for grazing, because this is the time when plants are most actively producing seed and new shoots.

Meadow Springs Ranch is also used for land disposal of biosolids, but the wetland areas are carefully avoided. Soapstone Ranch is developing management plans to determine trail placement for recreational access for the public. The trails should consider the range of potential impacts on the wetland ecosystem (Colorado Department of Natural Resources 1998).

Small amounts of the noxious weed Canada thistle (*Cirsium arvense*) are present in the wetland and have the potential to become more prevalent with time. Additionally, activities affecting the ground water to the north of the site could affect the elements on the site.




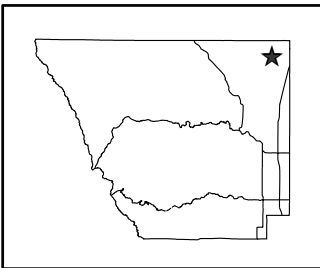
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Figure 79. Jack Springs Potential Conservation Area  
 B5: General Biodiversity Significance

## South Platte River

**Biodiversity Rank: B5 (General biodiversity significance)**

This site supports multiple occurrences of the state rare (G4 S1B, S3N) Bald Eagle.

**Protection Urgency Rank: P3 (Moderate urgency)**

This site is primarily private land along the South Platte River and surrounding reservoirs and lakes.

**Management Urgency Rank: M3 (Moderate urgency)**

Management concerns include disturbance from boating, fishing, and other uses of reservoirs and rivers. Maintenance of mature cottonwoods is also a concern.

**Location:** The site straddles the South Platte River and large, nearby reservoirs from the Colorado-Nebraska border, through Denver to Park County. Interstate 76 runs along the northeastern portion of the site. The site includes several reservoirs in southeastern Larimer County.

**Legal Description:**

U.S.G.S. 7.5-minute quadrangles within Larimer County: Carter Lake, Berthoud, Loveland, and Windsor

**Size:** 241,884 acres (97,887 ha)      **Elevation:** 3510 – 8940 ft. (1070 – 2725 m)

**General Description:** The site is open water and shorelines and includes the mainstem of the South Platte River and surrounding large lakes and reservoirs. The river has been altered by water diversion, development and agriculture. Mature cottonwood trees are present. In addition to Bald Eagles the aquatic resources of the site support occurrences of the Snowy Egret, White Pelican, and Preble's meadow jumping mouse. At mid-elevations towards the west end of the site there are populations of the endangered Pawnee montane skipper butterfly. Within one reservoir there is a historical occurrence of the umbilicate sprite, an uncommon snail. Plains Cottonwood Riparian Woodland (*Populus deltoides* ssp. *monilifera*/*Symphoricarpos occidentalis*), Sandbar Willow/bare ground (*Salix exigua*/Bare Ground), Narrow-leaf Cattail Marsh (*Typha angustifolia*-*Typha latifolia*), Sandhills bulrush marsh (*Scirpus acutus* - *Typha latifolia* - (*Scirpus tabernaemontani*), Montane Riparian Woodland (*Picea pungens*/*Betula occidentalis*) are some of the riparian and wetland communities present in the area. Wild black currant (*Ribes americanum*), ebony spleenwort (*Asplenium platyneuron*), and pale blue-eyed grass (*Sisyrinchium pallidum*) are state rare plants found within the site.

Larimer County reservoirs within this PCA include Fossil Creek Reservoir, Boyd Lake, Horseshoe Lake, Lake Loveland, Lonetree Reservoir, Welch Reservoir, Loveland Reservoir, and Ish Reservoir.

**Biodiversity Comments:** This site supports multiple occurrences of the state rare (G4 S1B) and federally Threatened Bald Eagle.

Natural Heritage element occurrences at the South Platte River PCA.

Element	Common Name	Global Rank	State Rank	Federal Status	State Status	Federal Sensitive	EO* Rank	Last Observed
<b>Plant Communities</b>								
<b><i>Haliaeetus leucocephalus</i></b>	<b>Bald Eagle</b>	<b>G4</b>	<b>S1B, S3N</b>	<b>LT, PDL</b>	<b>T</b>		<b>C</b>	<b>1/23/05</b>
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	1995
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	1995
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	6/10/94
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	1979
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	1979
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	12/72
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G4	S1B, S3N	LT, PDL	T		H	1979

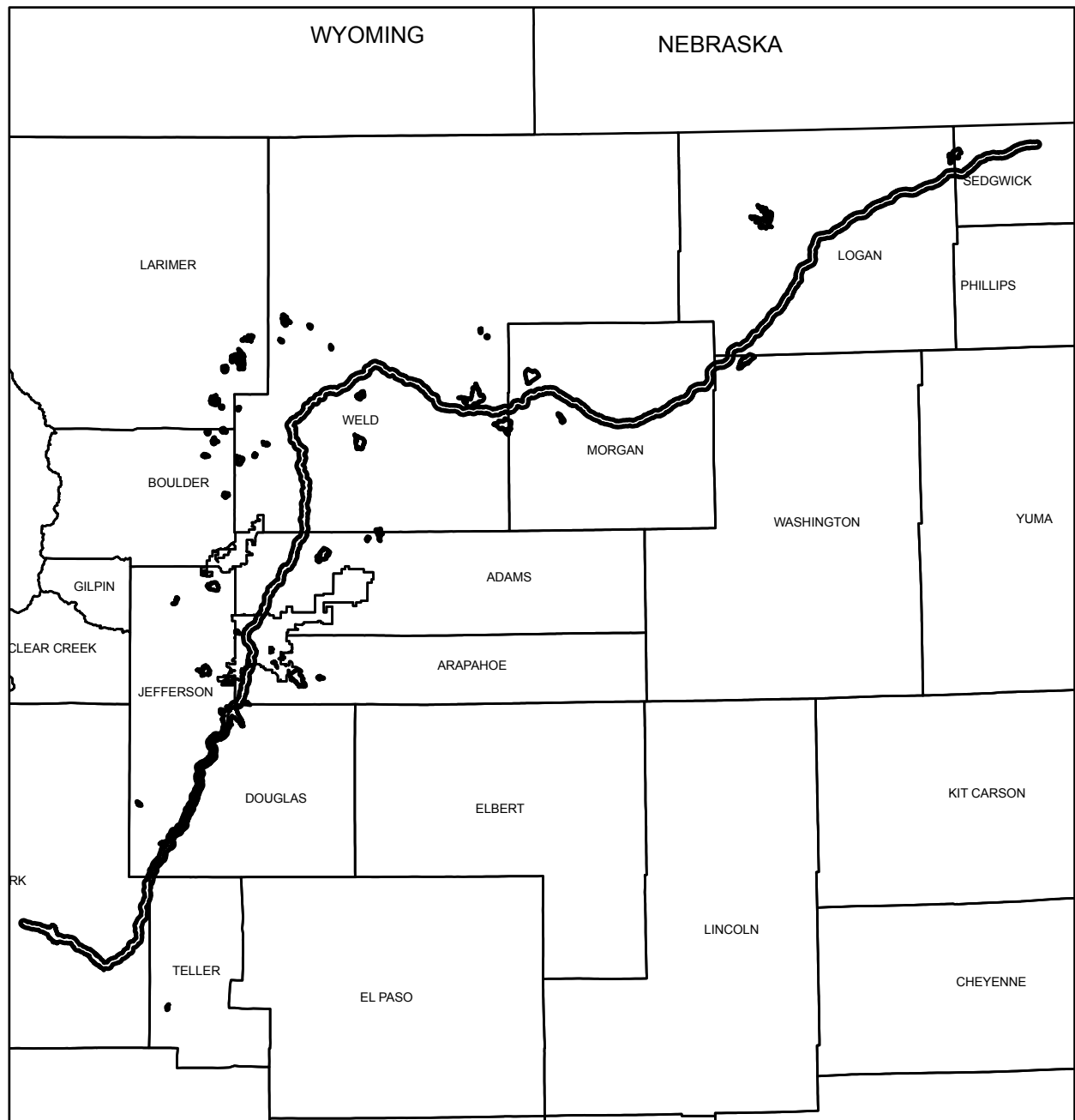
\*EO = Element Occurrence

Note: Bold type indicates the primary element occurrence(s) upon which the Biodiversity rank is based.

**Boundary Justification:** The boundary was drawn primarily for Bald Eagles to include large reservoirs with trees in proximity to the South Platte River and its major drainages. The river was buffered 1/2 mile. In addition, all lakes and reservoirs 100 acres or larger, within 15 miles of the river, were included. This site does not include contiguous land between the river and the lakes and reservoirs.

**Protection Comments:** Ownership of the site is approximately 73% private land, 16% State land, 11% USFS land with trace amounts of BLM land.

**Management Comments:** Maintain cottonwood trees. Reduce disturbance from boating, fishing and ORV use on shorelines during nesting season. Should include adequate nesting, roosting and foraging sites which are all affected by disturbance (CSP Bird Working Group 2004).




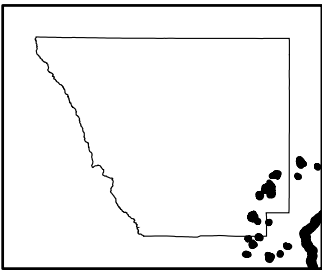
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Figure 80. South Platte River Potential Conservation Area B5: General Biodiversity Significance

## Networks of Conservation Areas

### Laramie Foothills

#### Network of Conservation Areas

**Location:** Larimer County. The southwest corner of the site is approximately 10 miles NNW of Fort Collins (at Teds Place). The site continues north from this point until the Wyoming border. Several county roads that junction with U.S. Highway 287 provide access to eastern and western portions of the site. County Roads 80 and 37 (Red Mountain Road) provide access to eastern portions of the site, while County Road 80C (Cherokee Park Road) provides access to the western portion of the site.

**Size:** 121,288 acres (49,084 ha)    **Elevation:** 5220 – 7458 ft. (1590 – 2270 m)

**Rationale:** This site is designated as a Network of Conservation Areas (NCA) because it delineates a relatively intact landscape containing many smaller sites that are interrelated. While these smaller sites have been separated based on ecological factors such as breaks in the distribution of elements, the designation of the NCA recognizes the importance and value of the larger system in the maintenance and long term viability of the smaller sites. The large scale of this site is necessary to allow for functioning of the driving ecological processes (e.g., fire, drought, herbivory).

Potential Conservation Areas within the Laramie Foothills NCA include Table Mountain Hogback, Boxelder Creek Headwaters, Park Creek Hogback, Horsethief Pass, Phantom Canyon, Owl Canyon, Hook and Moore Glade, Stonewall Creek, Dale Creek, Sheep Mountain near Virginia Dale, and the downstream portion of the North Fork of the Cache la Poudre.

**General Description:** Laramie Foothills is a broad transition zone between the Colorado Piedmont, Southern Rocky Mountains, and the western edge of the Great Plains. The site consists of the foothills along the eastern flank of the Laramie Mountains, the northern extension of the Front Range. The Front Range is a north-south trending mountain range that extends from the Arkansas River northward to the Cache la Poudre River, where it divides into the Laramie Mountains to the east and the Medicine Bow Mountains to the west. Lying within a localized rain shadow, the site consists of extensive mixed-grass prairie grasslands on rolling hills, foothills shrublands on slopes, and scattered ponderosa pine woodlands on rocky outcrops. Historically a rural, isolated region, the area is still dominated by large ranches. Historical sites documenting the Overland Trail, an historic route connecting the Oregon Trail with the South Platte River drainage and the Santa Fe Trail occur within the site.

Bedrock units of the region range from 1.7 billion years (Precambrian metamorphic rocks) to approximately 70 million years old (Cretaceous). More recent surficial deposits are approximately 10,000 years old. The western part of the site consists of Precambrian metamorphic rocks intruded by Silver Plume and Sherman granites. The sedimentary zone to the east consists of a series of rock layers that form north-south trending ridges (hogbacks) and isolated buttes and mesas. This the most extensive example of these features on the Northern Colorado Front Range. East of U.S. Highway 287, the two major

ridge-forming rock units are the Ingleside Formation and the Dakota Group. The north-south trending hogbacks on the far eastern side of the site consist of Niobrara Formation shales. Prominent cliffs consist of the South Platte Formation sandstones and the Lytle Formation at the base of the Dakota Group. Intervening valleys consist of the Fountain, Lykins and Morrison Formations. Sedimentary hogbacks occur east of Highway 287 and are relatively steep in some areas and granitic outcrops occur to the west of the highway. Both support shrublands or woodlands while the rest of the area is mainly mixed grass prairie.

Surface water is sparse and the dominant land use is livestock grazing. Many of the streams and dry draws at the Laramie Foothills Site are deeply eroded and appear to still be actively doing so. Analysis of historic aerial photos indicates that downcutting of the streams around the Horseshoe and Campbell Valley has moved upstream from 75 to 125 feet between 1938 and 1984. The prairie on the Roberts Ranch has been somewhat impacted by years of livestock grazing, although exotics and weedy species seem to be uncommon except in areas that are more frequently disturbed.

Driving ecological processes within the site include fire, herbivory, burrowing animals, landslides, and climate (drought). Bison, likely the dominant herbivore, were extirpated long ago. Agricultural land uses have contributed to fire suppression and have strongly altered other system components through the introduction of alien species, water diversions, and landscape fragmentation.

The plains and foothills between Fort Collins, Colorado and Laramie, Wyoming were used by Native Americans for at least 5,000 years. Buffalo wallows and jumps are not uncommon, suggesting that bison and other ungulates were common in the area. No doubt French and American trappers conducted their business from at least the early 19th century (Lavender 1954). Although the Cheyenne tribes frequented the area until the middle 19th century, by the late 1800's ranching was the primary land use, a use that has continued until today. Relatively small scale mining operations dot the landscape, especially in the sedimentary formations. Where water is abundant, there is generally a haying operation. No doubt such operations utilized native grasses in the past, but now non-native species are almost exclusively used.

The area is quite scenic and has been discovered by the growing population of the Colorado Front Range. The regional economy and developing transportation infrastructure has led to increased development with many ranches being divided into 35-acre parcels. Although the area is still dominated by large ranches, the land use is changing rapidly.

**Biodiversity Significance Comments:** Laramie Foothills is one of Colorado's highest-priority landscape level conservation sites, based on threats and multiple species and communities of concern in need of protection attention (Neely and Kipfer 1995). The site lies at the junction of two ecoregion provinces, Southern Rocky Mountains and the Great Plains-Palouse Dry Steppe. A third ecoregion, the Intermountain semi desert lies north of the site in Wyoming. The site inclusion of three ecoregions may be partly responsible for its rich biological diversity. Laramie Foothills contains one of the most extensive

remaining high-quality foothills ecosystems along the Front Range of Colorado. Several rare or imperiled species as well as exemplary natural community occurrences exist within the Laramie Foothills site. The landscape incorporated into the Laramie Foothills NCA contains several smaller sites that may target protection or management directly toward specific elements. Significant elements included within the NCA and associated PCAs include foothills mountain mahogany shrublands, ponderosa pine woodlands, foothills grasslands, and three Colorado endemic rare plants (Bell's twinpod, Larimer aletes, and Rocky Mountain cinquefoil),

**Boundary Justification:** The site boundary includes all known targeted occurrences and the natural processes that support them. In a few important cases, the processes have been seriously impaired, e.g., seasonal bison grazing and seasonal migrations of large ungulates from the montane systems into the piedmont (usually for the winter). Similarly, fire no doubt played a significant role in the foothills ecosystems, but is now largely eliminated or at least largely controlled. However, we believe that the boundary indicated on the site map will allow the management of such processes in a manner that will emulate the natural processes. The most updated information on this site is found in the preserve design report from the Field Office of The Nature Conservancy (Colorado) (Neely and Kipfer 1995).

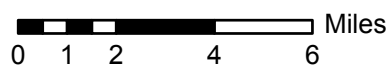
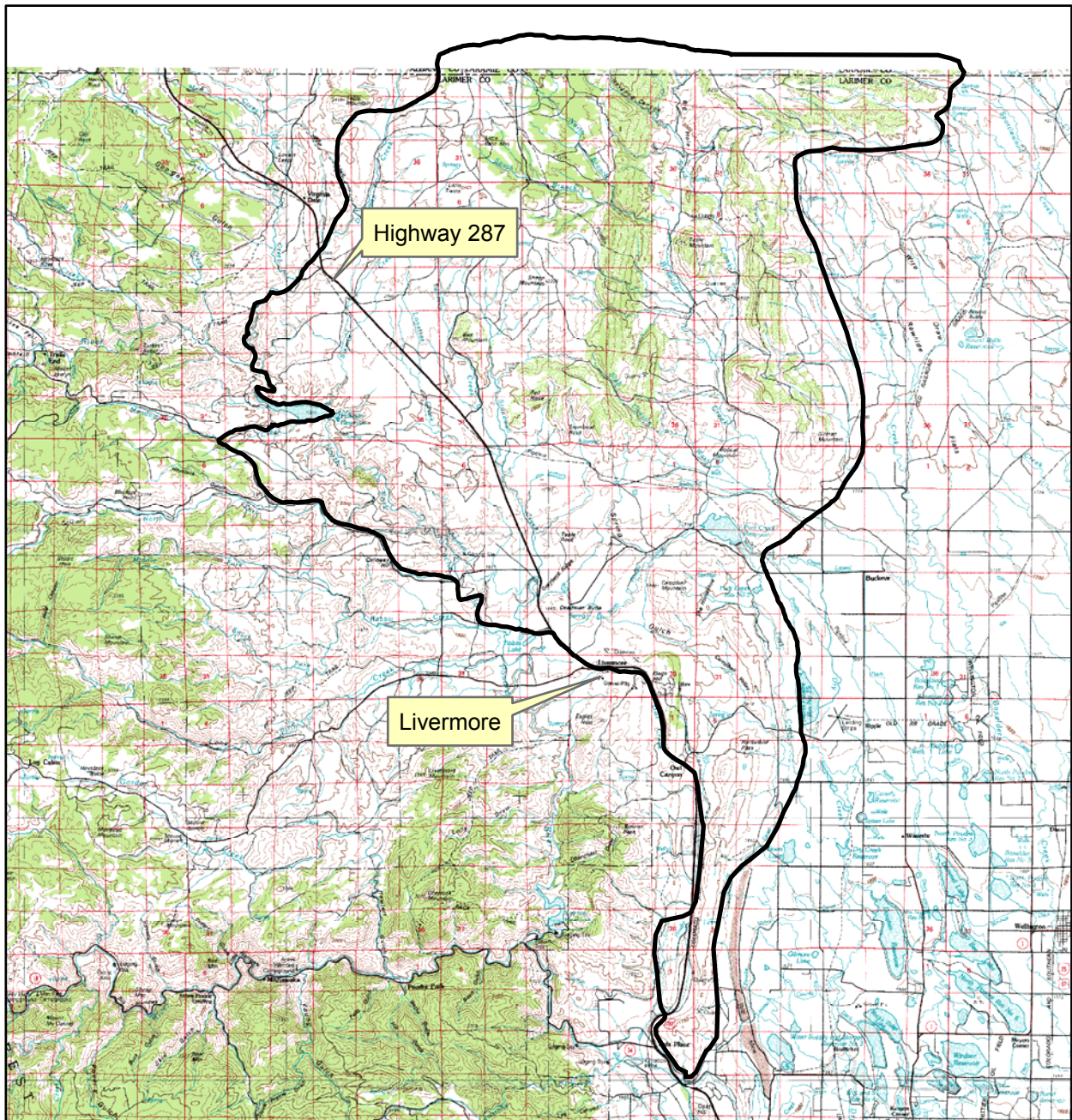
The boundary to the east represents the point on the landscape where sedimentary rock outcrops are no longer exposed and the landscape is dominated by prairie systems. The boundary to the west represents the transition to more dense woodlands and forest, areas that are ecologically similar to much of the U.S. Forest Service land in the county. The southern boundary represents the area where the outcrops of sedimentary hogbacks narrows to the appearance more similar to that of the rest of the Colorado Front Range. The northern boundary is delineated by the Wyoming state line but ecologically would continue for a short distance into Wyoming.

**Protection Comments:** Urban overflow from the Fort Collins area is rapidly fragmenting the site, particularly the southern portion. The area included in this conservation site is largely privately owned. Other significant owners include the Colorado State Land Board, Colorado State University (Maxwell Ranch), The Nature Conservancy (Phantom Canyon Preserve), Larimer County, and the City of Fort Collins.

**Management Comments:** Neely and Kipfer (1995) have identified the most significant management needs. Among these are maintenance of herbivory and control of non-native invasive plants. In addition, fire management could be important. Livestock management is generally adequate in much of the area; however, some lands assuredly need attention. Invasive exotic plant species provide the greatest management threats and include many of Colorado's most noxious species. Cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) are present on the site but not extensive at this time. Further increase of exotic species may decrease the biodiversity significance of the site by altering the native floral and faunal species composition (Bock and Bock 1988). Grazing or fire management could be used as a tool to reduce the dominance of these species and increase the proportion of native species.



Fragmentation could also impact many of the elements. Even low intensity development may limit the use of some management techniques (e.g., fire) that may be essential for the long term persistence of the elements at the site. Management of the site will require increasing the compatibility of ranching activities and protection of key elements. This will involve working with landowners and the Natural Resources Conservation Service to develop and implement livestock management methods and monitoring programs. TNC will also need to work with county extension agents and local landowners to inventory and control noxious weeds. This could involve encouraging graduate students to research weed control practices.




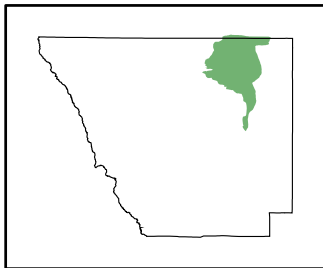
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> NCA Boundary</p> <p>Fort Collins, 40105-E1</p> <p>30 x 60 Minute Digital Raster          Graphic produced by the          U.S. Geological Survey</p>	<p>Location in Larimer County</p> 
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Figure 81. Laramie Foothills  
 Network of Conservation Areas

## **Pawnee Grassland Network of Conservation Areas**

**Location:** This site encompasses Pawnee National Grasslands and surrounding native grassland in northeastern Colorado. The site runs from the Colorado-Nebraska border to the east, just north of the South Platte River, to the e Western High Plains NCA portions of northern Colorado, southeastern Wyoming, and southwestern Nebraska.

**Size:** 1,490,512 acres (603,191 ha)      **Elevation:** 3610–6240 ft. (1100 – 1900 m)

**Rationale:** This site was designated a Network of Conservation Areas (NCA) by the Central Shortgrass Prairie Bird Working Group (2004) because it is a relatively intact landscape containing the highest density of McCown's Longspur in Colorado. Many other declining shortgrass prairie species also occur within the site.

Potential Conservation Areas within the Larimer County portion of the Pawnee Grassland NCA include Rawhide Flats, Rawhide Flats Saltbush, Brannigan Springs, Jack Springs, Spottlewood Creek, and Meadow Springs Ranch.

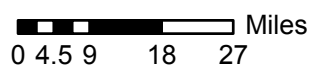
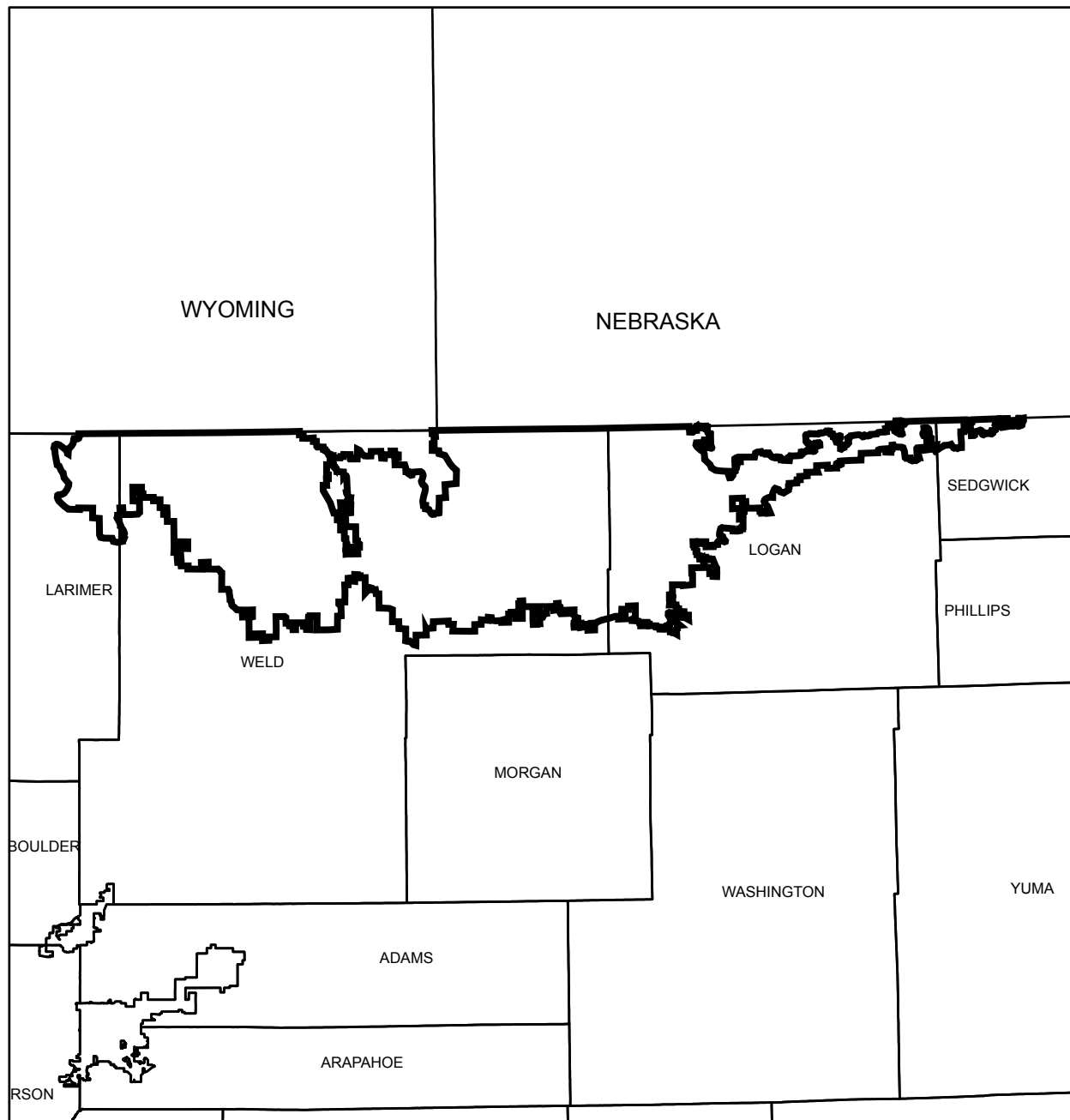
**General Description:** The site is relatively dry and windy prairie in northeastern Colorado. Approximately 83 percent of the site is grassland or mixed grass/forb/cactus/yucca, nine percent agricultural lands, four percent mixed shrub/grass, and trace amounts are bare soil, riparian areas, open water and residential development.

**Biodiversity Significance Comments:** Multiple grassland birds inhabit the site. Mountain Plover, McCown's Longspur, Chestnut-collared Longspur, Long-billed Curlew, Ferruginous Hawk, and Burrowing Owl have all been documented. Numerous black-tailed prairie dog colonies are scattered throughout. Multiple occurrences of swift fox and northern leopard frog are recorded from the NCA as is a single occurrence of the federally Threatened Preble's meadow jumping mouse. There are 19 plant communities of conservation priority recorded from the NCA and seven plant species including Mountain cat's-eye (*Oreocarya cana*), Wyoming feverfew (*Bolophyta alpina*), Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*), plains milkvetch (*Orophaca triphylla*), and dog parsley (*Aletes nuttallii*).

**Boundary Justification:** This NCA was drawn to encompass sites that include relatively natural grasslands (especially shortgrass prairie) for rare grassland birds. Agricultural lands scattered within the natural grasslands were included, but denser agricultural lands to the north, south and west were excluded. The boundary includes unsurveyed areas in northeastern Colorado where habitat looks sufficient, but lack the field surveys necessary to merit a potential conservation area. The boundary stops at the Colorado border, but it is likely that potentially suitable habitat extends to Wyoming and Nebraska. Regardless, this site has the highest density of McCown's Longspur in the state. Boundary was drawn using Landsat ETM+ satellite imagery and 25m Colorado Vegetation Classification data (CDOW).

**Protection Comments:** The site is approximately 79 percent private, 14 percent U.S. Forest Service (Pawnee National Grasslands) and seven percent State land. Development pressures exist in the west. Oil and gas pressures exist in the east. Protection on private land is probably more urgent than on State land. Encourage the use of conservation easements to reduce conversion of native grassland to agricultural cropland.

**Management Comments:** Maintain large, contiguous blocks of native grassland, especially shortgrass prairie. McCown's Longspurs breeding habitat is characterized by shortgrass prairie where vegetation cover is sparse (due to either low soil moisture or grazing), or is interspersed with shrubs or tall grasses (Gillihan et al. 2001). There is great restoration potential in this relatively intact landscape.




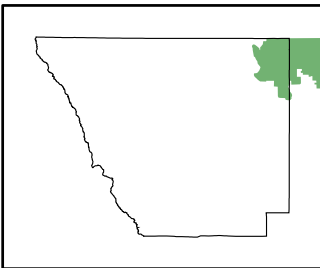
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> NCA Boundary</p>	<p>Location in Larimer County</p> 
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Figure 82. Pawnee Grassland Network of Conservation Areas

## **Western High Plains Network of Conservation Areas**

**Location:** The Western High Plains NCA portions of northern Colorado, southeastern Wyoming, and southwestern Nebraska.

**Size:** 3,810,704 acres (1,542,143 ha)      **Elevation** 4430→6240 ft. (1350→1900 m)

**Rationale:** This site is designated as a Network of Conservation Areas (NCA) because it delineates a relatively intact landscape containing many smaller sites that are interrelated. While these smaller sites have been separated based on ecological factors such as breaks in the distribution of elements, the designation of the NCA recognizes the importance and value of the larger system in the maintenance and long term viability of the smaller sites.

Potential Conservation Areas within the Larimer County portion of the Pawnee Grassland NCA include Rawhide Flats, Rawhide Flats Saltbush, Brannigan Springs, Jack Springs, Spottletwood Creek, and Meadow Springs Ranch.

**General Description:** The Western High Plains NCA includes the best remaining and most extensive areas of shortgrass prairie and associated natural communities in northern Colorado, southeastern Wyoming, and southwestern Nebraska. The area includes Mountain Plover populations and what are believed to be viable populations of swift fox and Ferruginous Hawk. Some of the best remaining prairie streams and their associated fish communities occur in the Western High Plains. Many other vulnerable species and natural communities occur in this landscape. The extensive area and range of included natural variation of this bioregion incorporates all natural processes. Significant portions have been used for agriculture and nearly all for livestock production.

**Biodiversity Significance Comments:** The site contains habitat for Mountain Plover (*Charadrius montanus*) (G2) and many natural communities. The extensive high plains of this site are the best remaining examples of their type. The largest numbers of many prairie endemic bird species breed in abundance on this site. Similarly, many of the more common grasslands species also occur in their best numbers here. Finally, there are many quality examples of natural communities from streams to grasslands, and bluff rim communities.

The Western High Plains Network of Conservation Areas is a priority conservation area for the Great Plains, particularly the central shortgrass zone. In 1993, the Colorado Natural Heritage Program and the Colorado Field Office of The Nature Conservancy promoted the Western High Plains to the Great Plains Initiative (Partnership) as a priority landscape of the Great Plains.

**Boundary Justification:** The NCA includes numerous high plains conservation sites protecting rare plants, the best examples of natural communities, and what are believed to be viable populations of numerous Great Plains endemic animals. The boundary minimizes major highway fragmentation and includes the largest remaining landscapes that support native species and plant communities.

**Protection Comments:** There are competing uses for the area and little planning to accommodate the uses. The Pawnee National Grassland has done the most comprehensive planning. Much of the area is private lands with agricultural or livestock interests. Most of the threats come from land conversion to plowed agriculture and water developments. Some land use issues occur such as overstocking with livestock, prairie dog control, etc.

This landscape is suitable for sustaining landscape level functions as well as a rural agricultural economy. It should be a conservation goal to work with private landowners to achieve conservation objectives. Innovative incentives will be highly useful for achieving some objectives since many of the smaller communities are in severe decline.

The Pawnee National Grassland is currently in federal ownership and managed as public lands. The management of the area is a complicated arrangement with grazing associations. This arrangement has at least maintained many species of prairie animals in good populations (e.g., Mountain Plovers and swift foxes).

**Management Comments:** Management is ongoing in many areas, but with little coordination. The Colorado Division of Wildlife works with many landowners, but there is little information on their efforts. We believe that there is adequate time to conduct the necessary management, but that there are identifiable needs now.

The entire landscape has two primary uses: cropland and grazing land. Much of the area was plowed historically, but climatic conditions make for unpredictable crops. Livestock grazing has always dominated the landscape since Europeans inhabited the region. However, where ground water is available, center-pivot farming is widespread.

Cattle and horses are the dominant mammals of the Western High Plains. There are relatively few other exotic animals. However, there are many invasive exotic plants on the plains, not the least of which are smooth brome, Japanese brome, and cheatgrass. Perhaps of equal significance is the number of trees planted in the prairie where they would not normally grow. Such trees are generally used around houses or as windrows and snow fences.

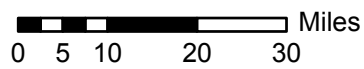
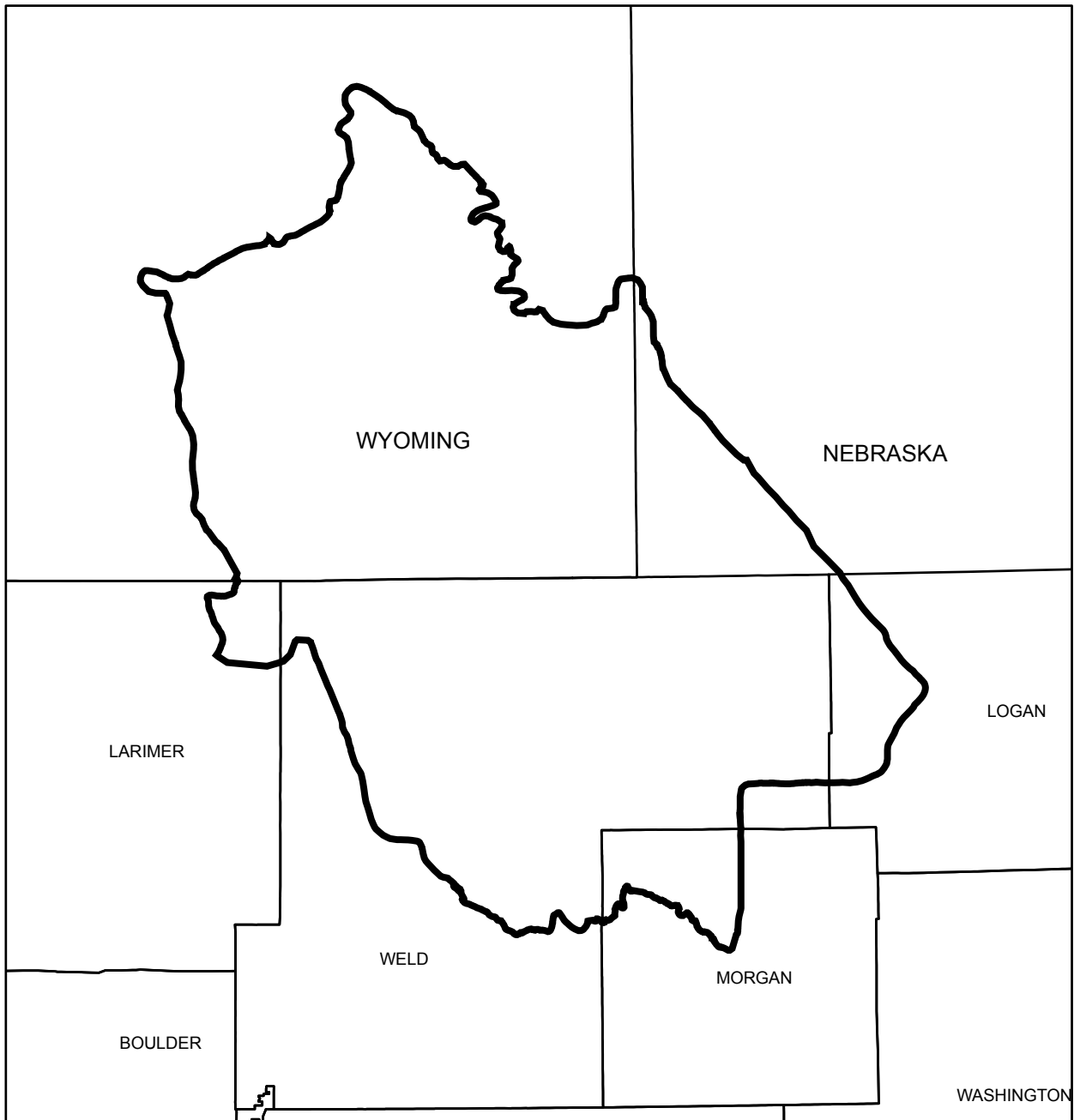
Most offsite considerations are those that drive the regional economy. Transportation has become so efficient that rural communities are no longer very isolated. The regional economy is heavily based on agriculture, but also on ecotourism. Numerous visitors to the Pawnee National Grasslands contribute to the local economies. One of the most important regional influences is that of water demand. The developing Front Range of Colorado is short of water. Any available surface or ground water is avidly sought after by local, regional, and state governments as well as by private interests.

Management prescriptions to the grasslands should incorporate more natural grazing patterns. Such patterns would include allowing for a mosaic of plant associations. For example, the sandhills tallgrass grasslands should not be managed in the same way as

shortgrass prairie. Riparian habitats are in extremely serious condition, but there is little information on what constitutes a natural system.

The Pawnee National Grassland protects a large area. Still, the entire grassland is only a small portion of the greater ecosystem. There is a need to manage extensive areas outside of the federal lands. This can only be done through willing partnerships. The management of the Grasslands is hampered by numerous political battles over management prescriptions, hunting, and oil/gas leasing. Finally, the area of National Grassland could sustain many more prairie dog colonies than currently exist, but there is not sympathy from adjacent landowners.






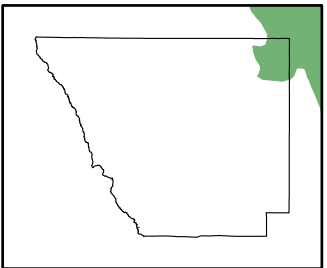
<p>Colorado Natural Heritage Program          Colorado State University          254 General Services Building          Fort Collins, CO 80523</p> <p>Ph (970) 491-1309          Fax (970) 491-3349  <a href="http://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a></p> <p>Map Date: 3/25/2005</p>	<p><b>Legend</b></p> <p> NCA Boundary</p>	<p>Location in Larimer County</p> 
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Figure 83. Western High Plains Network of Conservation Areas

# NATURAL HISTORY INFORMATION FOR SELECTED SPECIES

## Plants

### *Aletes humilis* (Larimer Aletes)

Taxonomy  
Class: Dicotyledoneae  
Order: Apiales  
Family: Apiaceae  
Genus: *Aletes*

Taxonomic comments: Looks like *A. acaulis*. *A. acaulis* forms loose clumps, with flowers taller than the leaves (Spackman *et al.* 1997).

CNHP Ranking: G2G3 S2S3

State/Federal Status: None.



CNHP photo



Colorado Distribution

Phenology: Flowers March to June,  
Fruits May to July.

A perennial herb that forms low mounds of leathery leaves 2-10 cm high, and produces clusters of small yellow flowers.

Habitat Comments: On and around large, west and north-facing cliffs of Silver Plume granite. In cracks in massive rocks and in adjacent thin soils of decomposed granite. Also in pine duff under ponderosa pines (Spackman *et al.* 1997). Elev. 6500-8700 ft.

Global Range: There are 40 occurrences in a restricted area of Colorado; one historical (1902) occurrence from Wyoming near the Colorado-Wyoming border (Moore and Friedley 2004a).

State Range: Boulder and Larimer counties

Distribution/Abundance: Populations are small to moderate with the number of individuals ranging from 50 to at least 1,000 (Moore and Friedley 2004a). Estimated number of individuals rangewide is about 27,000 (Moore and Friedley 2004a).

Known Threats and Management Issues: The plants are probably somewhat protected by their inaccessible habitat; perhaps the greatest threat is inadvertent destruction by hikers and rock climbers. The potential for known invasives negatively impacting *Aletes* is negligible, but due to the narrow distribution of this plant, a proactive measure would be monitoring for new or “unknown” invasives within *Aletes* populations near developments. Monitoring could be simply looking for non-natives and documenting the presence of *Aletes*.

Potential Conservation Areas that support *Aletes humilis*:

Bull Creek	Dale Creek	Phantom Canyon
Cap Rock Preserve	Haystack Rock	Turkey Roost
Cherokee Park	Lone Pine Creek North	
Cherokee Park South	Lovers Leap	

## *Besseya wyomingensis* (Wyoming Kittentails)

### Taxonomy

Class: Dicotyledoneae

Order: Scrophulariales

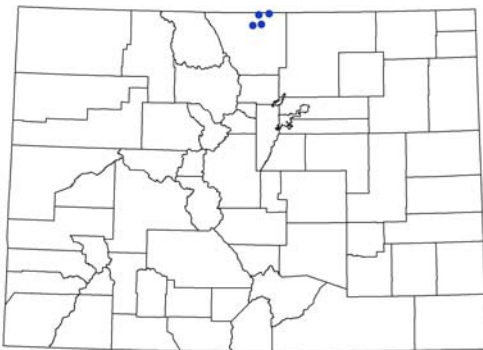
Family: Scrophulariaceae

Genus: *Besseya*

Taxonomic comments: synonyms *Besseya cinerea*

CNHP Ranking: G5 S1

State/Federal Status: None.



Colorado Distribution

from northern Larimer County.

Phenology: Flowering time: April-July.

Habitat Comments: Occurs on open slopes from the foothills to high elevations, high plains and drier mountains; from Alberta and Montana west to eastern Idaho, east to South Dakota and Nebraska. Elev. 6500-7000 ft.

Global Range: Common in Wyoming and Nebraska. Also occurs in Montana, Idaho, South Dakota, Utah, and three Canadian provinces (British Columbia, Alberta, Saskatchewan) (NatureServe 2005).

State Range: It is uncommon in Colorado where it is at the extreme southern periphery of its global range. Only known

Distribution/Abundance: Individual populations number in the thousands of individuals and are widely distributed across a variety of common habitat types. Widespread and very abundant in Wyoming.

Known Threats and Management Issues: Habitat for this species in Wyoming is largely secure from most threats, with the exception of foothills communities in fast-growing suburban areas which may be vulnerable to habitat conversion.

Potential Conservation Areas that support *Besseya wyomingensis*:

Phantom Canyon

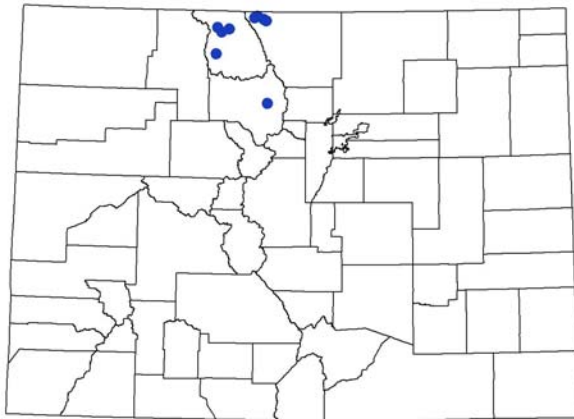
## *Eriogonum exilifolium* (Dropleaf Buckwheat)

Taxonomy  
Class: Dicotyledoneae  
Order: Polygonales  
Family: Polygonaceae  
Genus: *Eriogonum*

Taxonomic comments: Similar species: *Eriogonum pauciflorum* (*E. exilifolium* has narrower leaves and different geographic range).

CNHP Ranking: G3 S2

State/Federal Status: USFS sensitive.



Colorado Distribution



photo by G. Doyle

Phenology: Flowering and fruiting in mid June to late August.

Habitat Comments: Hills, plains, and sagebrush flats. Occurs on semi-bare and sandy-clay soils gumbo flats, white shaley-gypsum ridges, red clay hills, and limestone outcrops in cushion plant- bunchgrass communities. Elev. 6900-8600 feet (Fertig 2000a).

Global Range: A regional endemic of northcentral Colorado and southeastern Wyoming.

State Range: Larimer, Jackson, Grand Counties.

Distribution/Abundance: A regional endemic of Larimer, Jackson, and Grand counties in Colorado and Carbon and Albany counties in Wyoming (Anderson 2004a). Locally common.

Known Threats and Management Issues: Threats include oil, coalbed methane, and gas development, range improvements, off-road vehicle use and other recreation, secondary effects of grazing, road building and management, residential and commercial development, reservoir creation, coal mining, non-native species invasion, and effects of small population size (Anderson 2004a). Individual plants appear to do well with some disturbance (such as on road cuts exposing bare soil) (Fertig 2000a).

Potential Conservation Areas that support *Eriogonum exilifolium* :  
Laramie River Valley Shale Outcrops

## *Gaura neomexicana* ssp. *coloradensis* (Colorado Butterfly Plant)

Taxonomy  
Class: Dicotyledoneae  
Order: Myrtales  
Family: Onagraceae  
Genus: *Gaura*

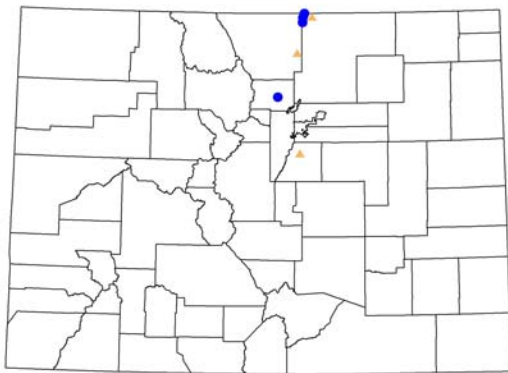
Taxonomic comments: Possibility that it may become recognized at species level.

CNHP Ranking: G3T2 S1

State/Federal Status: Listed as federally threatened



photo by G. Doyle



Colorado Distribution  
(triangles represent historic occurrences)

Phenology: Flowering June-September. Fruiting July-October.

Perennial herb with one to several reddish, pubescent stems 50-80 cm tall (Spackman *et al.* 1997).

Habitat Comments: Subirrigated, alluvial soils on level or slightly sloping floodplains and drainage bottoms. Colonies are often found in low depressions or along bends in wide, meandering stream channels, a short distance upslope of the actual channel. Elev. 5000-6400 feet. (Spackman *et al.* 1997, Fertig 2000b).

Global Range: Laramie County, Wyoming, western Kimball County, Nebraska, and Weld and Boulder counties in northcentral CO.

State Range: Weld and Boulder counties. Historically, this taxon was also known from Larimer and Douglas counties in CO, but these populations are thought to be extirpated.

Distribution/Abundance: Population fluctuations inherent to biennial taxa. Locally abundant to sparse.

Known Threats and Management Issues: Periodic disturbance events are necessary to maintain suitable habitat, control competing vegetation, and open bare ground for seedling establishment (Fertig 2000b). On agricultural lands, herbicide spraying, grazing by cattle and horses, haying and mowing, water development, conversion of rangeland to cultivation, competition from exotic plants, and loss of habitat to urban expansion are also threats.

Potential Conservation Areas that support *Gaura neomexicana* ssp. *coloradensis* :  
Meadow Springs Ranch

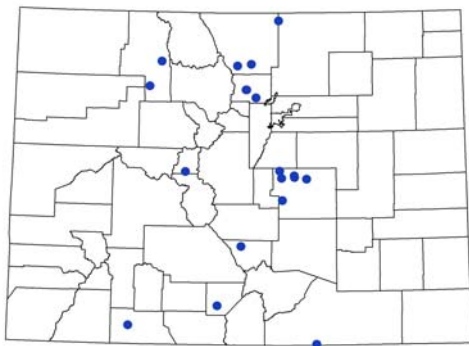
## *Liatris ligulistylis* (Strap-style Gayfeather)

Taxonomy  
Class: Dicotyledoneae  
Order: Asterales  
Family: Asteraceae  
Genus: *Liatris*

Taxonomic comments: None

CNHP Ranking: G5? S1S2

State/Federal Status: None.



Colorado Distribution



photo by G. Doyle

Phenology: Flowers July to September.

Habitat Comments: Open, often moist sites. At base of slopes or in the low grasslands bordering wetlands.

Global Range: U.S: Colorado, Connecticut, Illinois, Iowa, Minnesota, Montana, New Mexico, North Dakota, South Dakota, Wisconsin, Wyoming. Canada: Alberta, Manitoba, Saskatchewan.

State Range: Widely scattered in wetlands.

Distribution/Abundance: Globally common. Rare in Colorado.

Known Threats and Management Issues: Hydrologic alteration of wetlands, grazing. Sheep will consume round-headed blazing star but it seems to be mostly avoided by cattle and so persists under moderate grazing pressure in most pastures (Kantrud 1995).

Potential Conservation Areas that support *Liatris ligulistylis* :

Meadow Springs Ranch

Additional occurrences in Rocky Mountain National Park (not included in this report)

## *Oligoneuron album* (Prairie Goldenrod)

### Taxonomy

Class: Dicotyledoneae

Order: Asterales

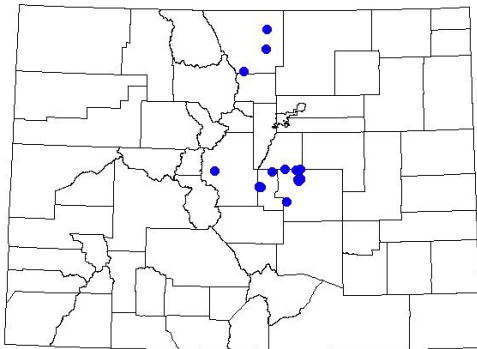
Family: Asteraceae

Genus: *Oligoneuron*

Taxonomic Comments: formerly *Unamia alba* and *Solidago ptarmicoides*.

CNHP Ranking: G5 S2S3

State/Federal Status: None.



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, pers. comm.). In Colorado, it ranges from 7500 to 9300 ft 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 *Oligoneuron album*:

Horsetooth Reservoir Hogback (historic)

Owl Canyon (historic)

## *Oonopsis wardii* (Ward's Goldenweed)

### Taxonomy

Class: Dicotyledoneae

Order: Asterales

Family: Asteraceae

Genus: *Oonopsis*

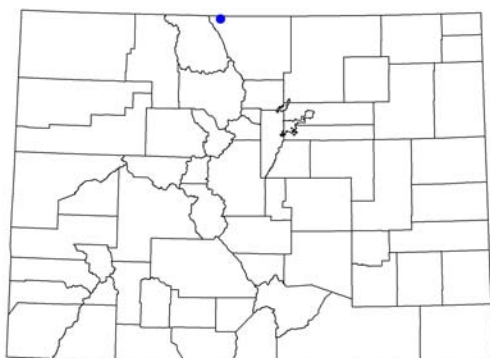
Taxonomic comments: Has been treated in the past as *Haplopappus fremontii* ssp. *wardii*. Similar species: *Haplopappus multicaulis*

CNHP Ranking: G2 S1

State/Federal Status: None.



photo by G. Doyle



Colorado Distribution

Phenology: Flowers and fruits from late July to late September (Fertig 2000c)..

A perennial herb, up to 4 dm tall, with alternate, entire leaves, the blades narrow and 2-10 cm long. Usually 4 or more small yellow flower heads (lacking ray flowers) are produced on each stem

Habitat Comments: Typically found on selenium- rich shale-clay slopes, barren plains, and disturbed roadsides, usually in areas with low vegetative cover (20-50%) and little competition from other plants. (Fertig 2000c) Elev. 5460-7200 feet.

Global Range: Endemic to Laramie and Shirley Basins of Wyoming and the Casper Arch region in Albany, Carbon, and Natrona counties, Wyoming. (Fertig 2000c) and Laramie River Valley in Larimer County, Colorado.

State Range: Laramie River Valley, Larimer County.

Distribution/Abundance: Known from about 12 occurrences in Wyoming, 9 of that have been discovered or relocated since 1977 (Fertig 2000c) and 1 occurrence in Larimer County Colorado.

Known Threats and Management Issues: Threats low, possibly only threat is herbicide spraying in roadside areas (Fertig 2000c).

Potential Conservation Areas that support *Oonopsis wardii* :  
Laramie River Valley Shale Outcrops



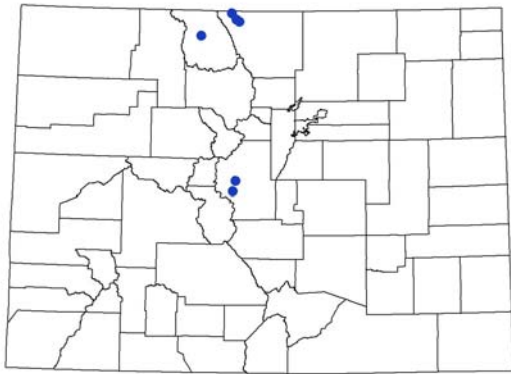
## *Packera debilis* (Rocky Mountain Ragwort)

Taxonomy  
Class: Dicotyledoneae  
Order: Asterales  
Family: Asteraceae  
Genus: *Packera*

Taxonomic comments: synonym *Senecio debilis*.  
Similar to *Packera pauciflora*.

CNHP Ranking: G4 S1

State/Federal Status: None.



Colorado Distribution



photo by G. Doyle

Phenology: July and August (Cronquist *et al.* 1994). Rayless yellow flowered composite.

Habitat Comments: Occurs in moist or wet, usually somewhat alkaline meadows, from the valleys in middle elevations in the mountains (Cronquist *et al.* 1994). One record for Colorado was from alkaline soils (Weber and Wittmann 2001). Idaho records are in wet meadows (pers. comm. Michael Mancuso Idaho CDC 1999). Wyoming Natural Diversity Datacenter (WYNDD) reports that this species occurs in bog or fen habitats (pers. comm. Walt Fertig WYNDD 1999). Elev. 8000.

Global Range: There are at least 40 locations and many more are expected from Colorado, Oregon, Idaho, Wyoming, and Montana

State Range: Park, Larimer, and Jackson counties. Specimens from Park County originally identified as *Packera pauciflora*.

Distribution/Abundance: sparse to abundant.

Known Threats and Management Issues: Livestock grazing is a common practice in montane wetlands; the effect from grazing is unknown..

Potential Conservation Areas that support Packera debilis:

Jimmy Creek at Frenchwoman Creek  
Lower Jimmy Creek Spring

***Penstemon laricifolius* ssp. *exilifolius* (Larch-leaf Beardtongue)**

**Taxonomy**

Class: Dicotyledoneae

Order: Scrophulariales

Family: Scrophulariaceae

Genus: *Penstemon*

**Taxonomic comments:** Questionably distinct from the typical subspecies, according to Walt Fertig (pers. comm.).

**CNHP Ranking:** G4T2Q S2

**State/Federal Status:** USFS sensitive.



Colorado Distribution



photo by G. Doyle

**Phenology:** Flower June to August . Fruiting in August.

**Habitat Comments:** Dry, stony plains, ridges, and slopes. 7000-9000 ft (Harrington 1954). In Laramie River Valley, appears to be ubiquitous in shrublands and barrens.

**Global Range:** Five counties in Wyoming (S2 in Wyoming) (Wyoming Natural Diversity Database) and Larimer County in Colorado.

**State Range:** Larimer River Valley in Larimer County.

**Distribution/Abundance:** Locally abundant to scattered. Widespread in Laramie River Valley.

**Known Threats and Management Issues:** Threats not well documented but potentially include residential development, invasion of non-native species, and recreation.

**Potential Conservation Areas that support *Penstemon laricifolius* ssp. *exilifolius* :**

Chimney Rock

Lower Laramie River Valley

## *Phacelia formosula* (North Park Phacelia)

### Taxonomy

Class: Dicotyledoneae

Order: Solanales

Family: Hydrophyllaceae

Genus: *Phacelia*

Taxonomic comments: Appears to be closely related to *P. glandulosa*, but can be distinguished from that species by its usually much-branched, erect to spreading habit, less exerted stamens and style, darker seeds, narrower calyx lobes, and more pubescence style (Peterson and Wiley-Eberle 1986).

CNHP Ranking: G1 S1

State/Federal Status: Listed as federally endangered.



photo by R. Scully

Note: The Larimer County *Phacelia* has yet to be confirmed. Duane Atwood, BYU currently considers the Larimer County plants to be either *P. formosula* or a newly discovered species (Duane Atwood pers. comm. 2004).

Phenology: Flowering late June-October in favorable years. Fruiting July-November (Coles pers. comm. 1994).

A biennial herb, 1.5-2.2 dm high, with deeply divided, leaves and bearing violet-purple flowers in a coiled, scorpion tail-like cluster.



Colorado Distribution

Habitat Comments: Barren, raw exposures of the

Coalmont Formation in North Park, a rusty-colored sandy substrate. Barren, raw exposures of the Niobrara Formation in the Laramie River Valley. In both regions, the species grows most abundantly on the steepest, most sparsely vegetated, and most erodable slopes, such as on the sides of deeply cut ravines.

Global Range: A narrow endemic of an area known as North Park in northern Colorado and recently discovered in Laramie River Valley, Larimer County.

State Range: North Park in Jackson County; Lower Laramie River Valley in Larimer County.

Distribution/Abundance: In North Park, eight populations are known (only 2 of them substantial) with a total of less than 8000 individuals and annually fluctuating populations sizes. In Laramie River Valley, two substantial (over 1000 individuals) and one smaller population.

Known Threats and Management Issues: Coal extraction, off-road vehicle enthusiasts and domestic cattle grazing are also threats. Monitoring and recovery efforts in North Park are being undertaken by cooperating agencies including the BLM the USFWS.

Potential Conservation Areas that support *Phacelia formosula* :

Laramie River Valley Shale Outcrops

## *Physaria bellii* (Bell's Twinpod)

### Taxonomy

Class: Dicotyledoneae

Order: Capparales

Family: Brassicaceae

Genus: *Physaria*

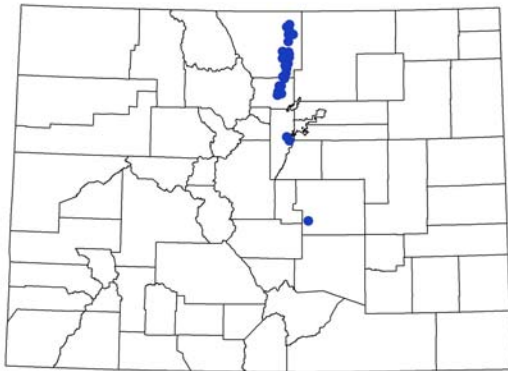
Taxonomic comments: Looks like *P. vitulifora* which has larger, fiddle shaped leaves as opposed to obovate leaves in *P. obcordata* (pers. comm. Coles 1994).

CNHP Ranking: G2 S2

State/Federal Status: None.



photo by G.. Doyle



Colorado Distribution

Phenology: Flowers May through June, fruits July and August.

A perennial herb with semi-prostrate flowering stems, 5-12.5 cm long, radiating from a basal rosette of silvery-green leaves so that the rosette is often encircled with yellow flowers.

Habitat Comments: Limestones and limey shales of the Niobrara and Pierre formations. Often found where the rock has been exposed by road cuts, and along natural outcrops, such as ridge crests. Also described as loose, gray shale washes, slopes of hogbacks, sloping down to grassy meadows containing some scattered seeps (Peterson and

Harmon 1981). Recently documented on a range of red hogback forming sandstone formations including Fountain/Ingleside and Lykins. Most abundant in sparsely vegetated areas such as eroding rivulets. Elev. 5200-5700 feet.

Global Range: Hogbacks along northern Front Range of Colorado.

State Range: Larimer, Boulder, and Jefferson counties. One 1912 record from El Paso County.

Distribution/Abundance: There are 28 extant documented occurrences with a total of approximately one million individual plants. Locally common.

Known Threats and Management Issues: Current threats include limestone mining, suburban expansion along the Front Range and road construction (Peterson and Harmon 1981). Also, invasion of habitat by non-native species.

Potential Conservation Areas that support *Physaria bellii* :

Bobcat Ridge Hogback  
Dixon Creek  
Hertha Reservoir Ridge  
Hidden Valley Hogback

Indian Creek Hogback  
Little Thompson River at Meadow Hollow  
Park Creek Hogback  
Redstone Creek Cliffs

## *Potentilla ambigens* (Southern Rocky Mountain Cinquefoil)

### Taxonomy

Class: Dicotyledoneae

Order: Rosales

Family: Rosaceae

Genus: *Potentilla*

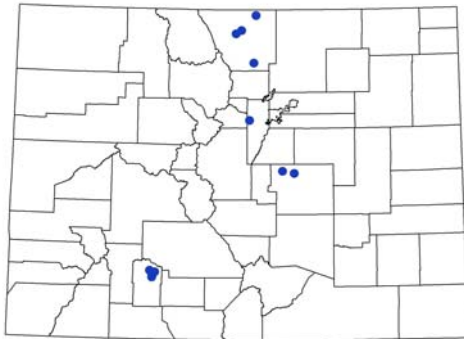
Taxonomic comments: Resembles a gigantic *P. hippiana* var *hippiana*.

CNHP Ranking: G3 S1S2

State/Federal Status: None.



photo by R. Rondeau



Colorado Distribution

Phenology: Flowers in mid- to late July, fruits in August (Anderson 2004b).

Large perennial herbs.

Habitat Comments: The sparse information available about this species indicates that it occurs in dry open shrublands or grasslands at middle elevations in the mountains. At least one occurrence grows on gravelly soil, and another occurs on a roadside. May occur in montane woods, although most Colorado populations are on grassy or colluvium slopes (Rondeau pers. comm. 1999).

Global Range: This species occurs very disjunctly throughout three states. It appears most common in New Mexico, although it is not well documented in collections at the University of New Mexico herbarium. In Colorado, the species has a very patchy distribution, and it has not been recorded in Wyoming since 1900.

State Range: Very patchy distribution. Largest populations are in Larimer and Mineral counties.

Distribution/Abundance: 13 extant occurrences in Colorado. Sparse to locally abundant.

Known Threats and Management Issues: Threats include off-road vehicle use and other recreation, residential and commercial development, secondary impacts of grazing, road construction and management, hydrologic alteration, and non-native species invasion (Anderson 2004b).

Potential Conservation Areas that support *Potentilla ambigens*:

Rattlesnake Park

Scout Camp Meadows

additional occurrences in and near Rocky Mountain National Park

## *Potentilla rupincola* (Rocky Mountain Cinquefoil)

### Taxonomy

Class: Dicotyledoneae

Order: Rosales

Family: Rosaceae

Genus: *Potentilla*

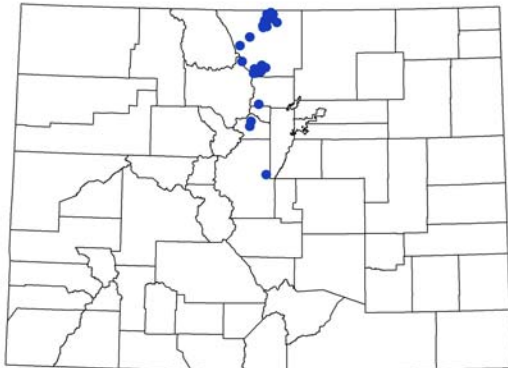
Taxonomic comments: Weber and Wittman (2001) recognize the full species *Potentilla rupincola*, as does Kartesz (1999); others (including Kartesz (1994)) recognize *P. effusa* var. *rupincola*. Distinguished from *P. effusa* var. *effusa* by glabrous leaf surface.

CNHP Ranking: G2 S2

State/Federal Status: USFS sensitive.



photo by D.G. Anderson



Colorado Distribution

Phenology: According to herbarium specimen collections, flowering occurs from mid-June until late August.

Habitat Comments: Granite and gravel soils. Steep, often granite outcroppings on shelves or niches of cliffs, well drained areas. Gravelly soils. Often associated with ponderosa pine or limber pine. May occur with *Aletes humilis*. Elev. 6,900 ft. - 10,500 ft.

Global Range: Colorado endemic.

State Range: Colorado endemic, Larimer and Park Counties; historical herbarium specimens from Boulder and Clear Creek Counties (CNHP 2005).

Distribution/Abundance: *Potentilla rupincola* is known from 23 occurrences with a total population size estimated to be approximately 36,000 individuals (Anderson 2004c).

Known Threats and Management Issues: Threats include exotic species invasion, residential and commercial development, secondary impacts of grazing, right-of-way management, off-road vehicle use and other recreation, and effects of population size (Anderson 2004c). Fourteen of the 23 occurrences are located in areas where they have some degree of protective land status (USFS, NPS, TNC) (Anderson 2004c).

### Potential Conservation Areas that support *Potentilla rupincola* :

Bull Creek	Phantom Canyon
Cap Rock Preserve	Lovers Leap
Hermit Park	Turkey Roost
Lone Pine Creek North	

## *Sisyrinchium pallidum* (Pale Blue-Eyed Grass)

### Taxonomy

Class: Monocotyledoneae

Order: Liliales

Family: Iridaceae

Genus: *Sisyrinchium*

Taxonomic comments: Impossible to distinguish from other species of *Sisyrinchium* except in flower (pers. comm. Coles 1994).

CNHP Ranking: G2G3 S2

State/Federal Status: BLM sensitive.

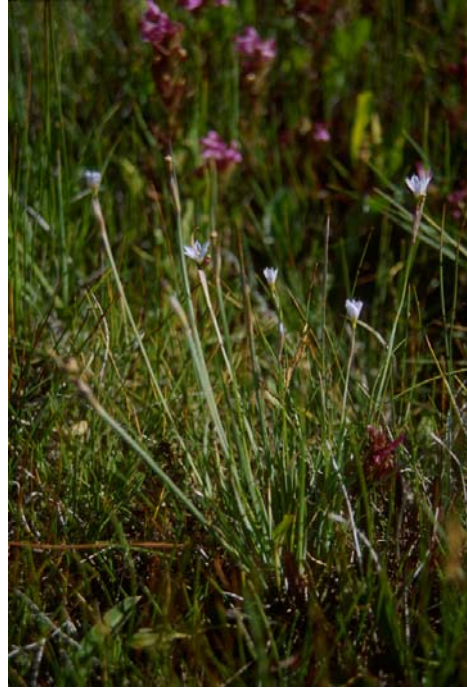
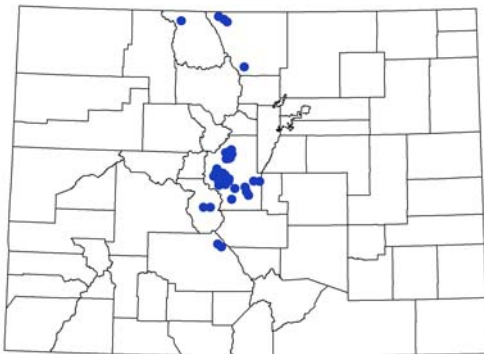


photo by S. Spackman



Colorado Distribution

Phenology: Flowering occurs mid June through mid July and likely depends on annual growing conditions, especially the availability of water. Mature fruits are present from near the end of June into early August (Hartman 1992).

A perennial herb with pale-blue flowers that occurs in montane, wetland communities.

Habitat Comments: Wet, poorly drained meadows, streambanks, roadside ditches, and irrigated hay meadows where standing water is available through the early growing season.

Global Range: Regional endemic of central Colorado and southeastern Wyoming.

State Range: Chaffee, Jackson, Larimer, Park, Saguache counties.

Distribution/Abundance: There are 66 known occurrences (Moore and Friedley 2004b). Estimates of number of individuals are about 10,000 for Colorado and 300,000 for Wyoming (Moore and Friedley 2004b). Locally abundant within this relatively small geographic area and is actually increasing in Wyoming due to the creation of suitable habitat from flood-irrigation of hay meadows.

Known Threats and Management Issues: The majority of occurrences are located on private lands (Moore and Friedley 2004b). The plant is vulnerable based on its limited global distribution and the fragility of the wetland habitats in which it occurs (Moore and Friedley 2004b). Threats include road improvement, changes in irrigation practices, residential development, cattle grazing, peat mining, and recreational activities, as well as activities that drain wetlands (Moore and Friedley 2004b).

Potential Conservation Areas that support *Sisyrinchium pallidum* :

Jimmy Creek at Frenchwoman Creek

Lower Jimmy Creek Spring

## *Spiranthes diluvialis* (Ute Ladies' Tresses)

### Taxonomy

Class: Monocotyledoneae

Order: Orchidales

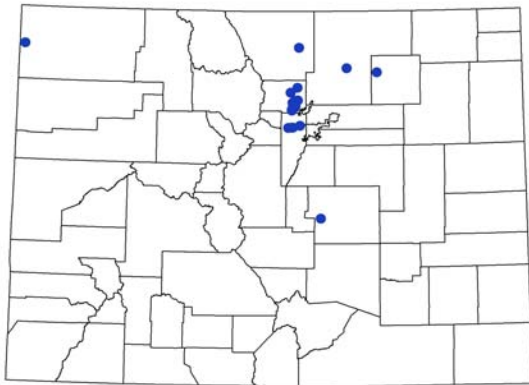
Family: Orchidaceae

Genus: *Spiranthes*

Taxonomic comments: The similar species *Spiranthes romanzoffiana* has deeply constricted lip petals, more densely congested and shorter spikes, and occurs at higher elevations (Spackman *et al.* 1997).

CNHP Ranking: G2 S2

State/Federal Status: Listed as federally threatened.



Colorado Distribution



photo by G. Doyle

Phenology: Blooms mainly from late July through September. Plants probably do not flower every year (Fertig 2001)

Habitat Comments: Moist to very wet meadows along streams or in abandoned stream meanders that still retain ample ground water. Also near springs, seeps, and lakeshores. 1800-6800 ft. elevation (Fertig 2001).

Global Range: Western Nebraska, southeastern Wyoming, northcentral Colorado, southern Utah, east-central Idaho, southwestern Montana, and central Washington (Moseley 1998). A historical population is known from south-central Nevada.

State Range: Boulder, Jefferson, Larimer, and Moffat counties. Historic (1800's) occurrences in El Paso, Morgan, and Weld counties.

Distribution/Abundance: Currently, the largest documented population - with about 5500 plants - is in Colorado. The century-old Nevada collection has not been relocated, and several historic populations in Utah and Colorado are presumed extirpated.

Known Threats and Management Issues: Threatened by many forms of water developments, intense domestic livestock grazing, haying, exotic species invasion, fragmentation and urbanization in particular.

Potential Conservation Areas that support *Spiranthes diluvialis*:

Claymore Lake South



## Birds

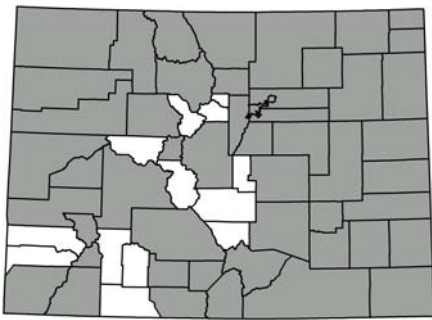
### *Athene cunicularia* (Burrowing Owl)

Taxonomy  
Class: Aves  
Order: Strigiformes  
Family: Strigidae  
Genus: *Athene*

Taxonomic Comments: Formerly known as *Speotyto cunicularia*. As many as 18 subspecies are recognized.

CNHP Ranking: G4 S4B (Watchlisted species)

State/Federal Status: USFS sensitive; listed as state threatened (Colorado).



*Burrowing Owl breeding distribution in Colorado (adapted from Andrews and Righter 1992)*

Photo © by Don Baccus  
dhogaza@pacifier.com

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), collisions with vehicles (Bent 1938, Haug and Oliphant 1987, Millsap and Bear 1988), and losses on wintering grounds (McDonald *et al.* 2004) 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*:  
Rawhide Flats

## ***Buteo regalis* (Ferruginous Hawk)**

Taxonomy:

Class: Aves

Order: Falconiformes

Family: Accipitridae

Genus: *Buteo*

Taxonomic Comments: There are no subspecies documented for this species.

CNHP Rank: G4 S3B,S4N

State/Federal Status: USFS sensitive, BLM sensitive, state species of special concern (Colorado).

Distribution: Global range: This species winters in the southern United States and the northern interior parts of Mexico (Bechard and Schmutz 1995). State range: About 1,200 birds winter in Colorado (Johnsgard 1990), comprising about twenty percent of the total winter population in the United States (Andrews and Righter 1992). Fairly common winter resident but a rare to uncommon summer resident on eastern plains (Andrews and Righter 1992).

Habitat Comments: The Ferruginous Hawk prefers open grasslands, shrublands and deserts (Bechard and Schmutz 1995). Breeding pairs nest in isolated trees, on rock outcrops, structures such as windmills and power poles, or on the ground. Before the elimination of bison (*Bison bison*) in the west, its nests were often partially constructed of bison bones and wool (Bechard and Schmutz 1995). Winter populations concentrate around prairie dog towns (Andrews and Righter 1992).

Known Threats and Management Issues: Local population declines are attributed to the effects of cultivation, grazing, poisoning of small mammals, mining, and fire in nesting habitats (Bechard and Schmutz 1995). Colorado's breeding population is considered vulnerable (S3B) based on human reduction of the primary winter prey base (prairie dog colonies), small population size, and human encroachment into available habitat (CNHP 1997).

Potential Conservation Areas that support *Buteo regalis*:

Rawhide Flats

## *Calcarius mccownii* (McCown's Longspur)

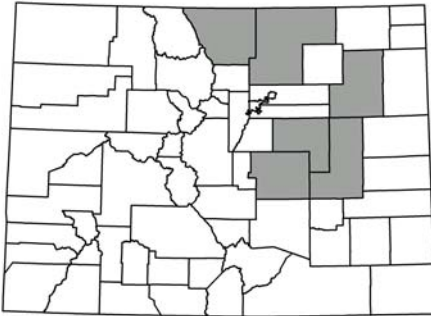
### Taxonomy

Class: Aves  
Order: Passeriformes  
Family: Emberizidae  
Genus: *Calcarius*

Taxonomic Comments: No subspecies described.

CNHP Ranking: G5 S2B

State/Federal Status: USFS sensitive.



*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).

Note: See Sedgwick (2004) for summary information on Chestnut-collared Longspur

Potential Conservation Areas supporting *Calcarius mccownii*:  
Rawhide Flats

## *Charadrius montanus* (Mountain Plover)

### Taxonomy

Class: Aves  
Order: Charadriiformes  
Family: Charadriidae  
Genus: *Charadrius*

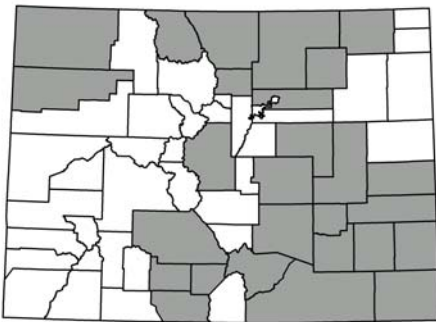
Taxonomic Comments: Formerly known as *Eupoda montana*.

CNHP Ranking: G2 S2B

State/Federal Status: USFS sensitive; BLM sensitive; state species of special concern (Colorado). Proposed for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service in 1999, but withdrawn in 2003 (Dinsmore 2003).



Photo by M. B. Wunder



*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 1996a), 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 1996a). 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*:  
Rawhide Flats

## *Falco peregrinus anatum* (American Peregrine Falcon)

Taxonomy  
Class: Aves  
Order: Falconiformes  
Family: Falconidae  
Genus: *Falco*

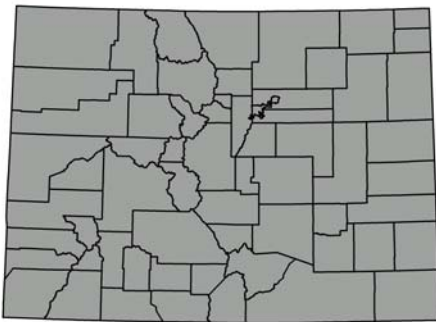
Taxonomic Comments: Three of the approximately 20 recognized subspecies occur in North America (Brown and Amadon 1968); only *Falco peregrinus anatum* (the American Peregrine Falcon) occurs in Colorado (U.S. Fish and Wildlife Service 1984).

CNHP Ranking: G4T3 S2B

State/Federal Status: USFS sensitive; state species of special concern (Colorado); removed from federal endangered species list in August 1999.



Photo courtesy USFWS



*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 4500 to over 9000 ft (1388 to 2776 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 to 1965, 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 Rosseneau 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*:**  
Occur on USFS and NPS lands, not included in this report

## *Haliaeetus leucocephalus* (Bald Eagle)

### Taxonomy

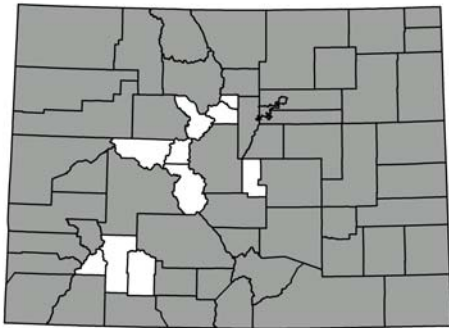
Class: Aves  
Order: Falconiformes  
Family: Accipitridae  
Genus: *Haliaeetus*

Taxonomic Comments: None.

CNHP Ranking: G4 S1B, S3N

State/Federal Status: Listed as federally threatened., proposed for delisting; listed as threatened in state of Colorado.

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 (McCullough 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*:

Fossil Creek Reservoir  
South Platte River

## Mammals

### *Corynorhinus townsendii pallescens* (Townsend's Big-eared Bat)

#### Taxonomy

Class: Mammalia

Order: Chiroptera

Family: Vespertilionidae

Genus: *Corynorhinus*

Taxonomic Comments: The generic name was recently changed from *Plecotus* to *Corynorhinus*.

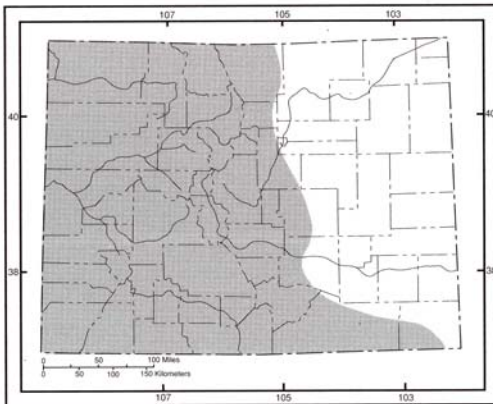
CNHP Ranking: G4T4 S2

State/Federal Status: BLM sensitive; USFS sensitive; species of special concern (Colorado).



state

Photo by J. Siemers



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 9500 ft (2930 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*:  
Owl Canyon

## *Cynomys ludovicianus* (Black-tailed Prairie Dog)

### Taxonomy

Class: Mammalia  
Order: Rodentia  
Family: Sciuridae  
Genus: *Cynomys*

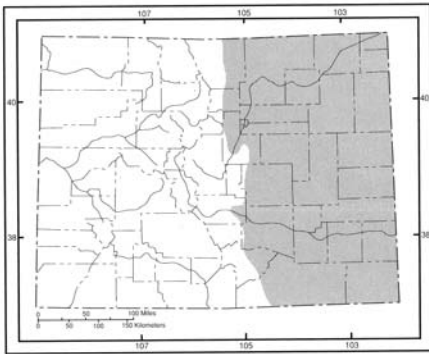
Taxonomic Comments: Of the two recognized subspecies, only one occurs in Colorado (*Cynomys ludovicianus ludovicianus*).

CNHP Ranking: G4 S4

State/Federal Status: USFS sensitive; state species of special concern (Colorado).



photo by R. Rondeau



*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 (e.g., 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*:  
Rawhide Flats

## *Vulpes velox* (Swift Fox)

Taxonomy  
Class: Mammalia  
Order: Carnivora  
Family: Canidae  
Genus: *Vulpes*

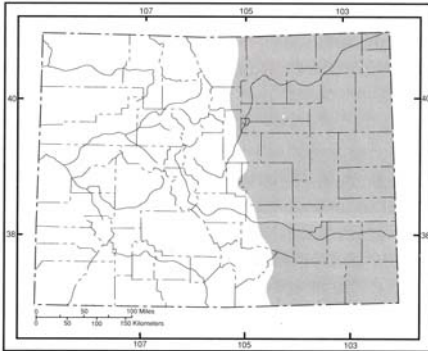
Taxonomic Comments: Some taxonomists consider swift foxes and kit foxes (*Vulpes macrotis*) to be distinct subspecies within a single species which they designate *Vulpes velox*. We follow the more common classification in which these two foxes are regarded as distinct species.

CNHP Ranking: G3 S3

State/Federal Status: USFS sensitive; state species of special concern (Colorado).



Photo by J. P. Gionfriddo



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). Swift fox populations plummeted during the last half of the 18<sup>th</sup> century and the early 19<sup>th</sup> century as a consequence of widespread and indiscriminate poisoning that targeted wolves (*Canus lupus*) (Stephens and Anderson 2005). Other 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*:  
Rawhide Flats



## *Zapus hudsonius preblei* (Preble's Meadow Jumping Mouse)

### Taxonomy

Class: Mammalia  
Order: Rodentia  
Family: Zapodidae  
Genus: *Zapus*

Taxonomic Comments: Some taxonomists use the family name "Dipodidae" instead of "Zapodidae."

CNHP Ranking: G5T2 S1

State/Federal Status: Listed as federally threatened (proposed for delisting); listed as state threatened (Colorado).



Photo by P. Schuerman



*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 (Kruttsch 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*:

- Big Thompson River
- Cache la Poudre River
- North Fork of the Cache la Poudre River

## Amphibians

### *Bufo boreas boreas* (Boreal Toad)

Taxonomy:  
Class: Amphibia  
Order: Anura  
Family: Bufonidae  
Genus: *Bufo*

Taxonomic Comments: Prior to the 1990s, morphological, biogeochemical, and vocal differences were noted between toads of the *Bufo boreas* complex in the southern Rocky Mountains and those in the Pacific Northwest (Burger and Bragg 1947, Hubbard 1972). Goebel (1996) described *Bufo boreas* in the southern Rocky Mountains as genetically distinct from those in the Pacific Northwest. These differences may warrant recognition as one or more distinct species. Until this change is formally accepted, Hammerson (1999) has offered the common name of Mountain Toad for the interim, and suggests that the Latin name may become *Bufo pictus*. For the purposes of this report, we are referring all naming to boreal toad (*Bufo boreas boreas*).

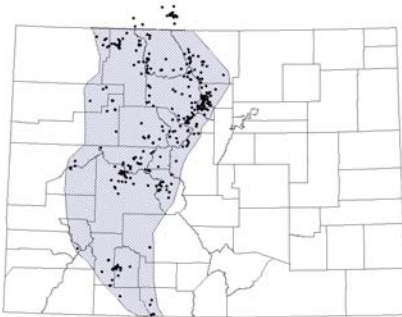


photo by G. Doyle

CNHP Ranking: G4T1Q S1

State/Federal Status: USFWS candidate for listing (warranted but precluded), USFS sensitive, listed as state endangered (Colorado).

Habitat Comments: The boreal toad breeds in still or slowly moving water such as can be found in marshes, ponds, and lakes. Successful breeding generally requires permanent or semipermanent water sources. Post breeding, one may find the boreal toad in more terrestrial environments. Though they still tend to linger near water in damp environments, some females will use drier, more densely vegetated areas. Rocks, logs and rodent burrows provide cover while away from water during periods of inactivity (Hammerson 1999).



Distribution: The southern Rocky Mountain population of boreal toads is likely distinct from other populations (A. Goebel, unpubl. data). Although relationships among populations of this toad are not resolved, recent genetic evaluations suggest that the southern Rocky Mountain population ranges from southern Idaho to New Mexico (Goettl 1997; Steve Corn pers. comm.; A. Goebel unpubl. data). In Colorado, this species occurs throughout the mountains above approximately 8,000 feet in elevation. There are approximately 206 historical localities for the boreal toad in Colorado, while currently there are just 35 known active breeding sites.

Important Life History Characteristics: Boreal toads are long-lived, reaching ages of nine years or more (Campbell 1976). Reproductive maturity does not occur until age four in males and six in females (Carey 1976). Other important considerations include sensitivity to toxicants, relatively short breeding season (starting as the winter snowpack begins to thaw), and slow metabolic rates of the larvae (Hammerson 1999).

Known Threats and Management Issues: Presently, only three to four healthy populations remain across the entire range, comprised of less than 40 high priority breeding sites (Steve Corn, pers. comm.; Lauren Livo, pers. comm.). Based on the small numbers of egg masses, it is estimated that there are currently fewer than

1,000 breeding adults. Although there is an abundance of “protected” habitat, populations have declined precipitously or disappeared over the past 20 years, and continue to do so (Goettl 1997). The reasons for this decline are varied and largely unknown and the factors important to the persistence of this species are not well understood.

Potential Conservation Areas that support *Bufo boreas*:

Panhandle Creek

Trout Creek at Sheep Creek

Plus PCAS in Rocky Mountain National Park not included in this report

## Fish

### *Oncorhynchus clarki stomias* (Greenback Cutthroat Trout)

#### Taxonomy

Class: Osteichthyes  
Order: Salmoniformes  
Family: Salmonidae  
Genus: *Oncorhynchus*

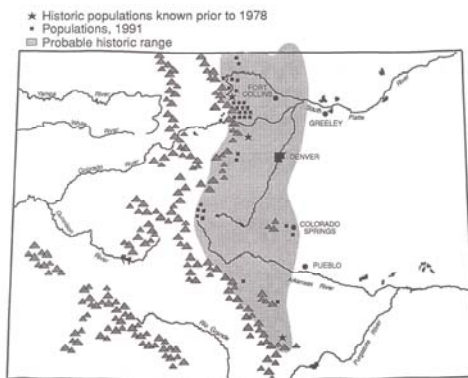
Taxonomic Comments: Greenback cutthroat trout are closely related to Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*). Greenback cutthroat trout hybridize with various species and subspecies of the genus *Oncorhynchus* and therefore local cutthroat populations can range in appearance from "pure-looking" to obvious hybrids (U.S. Fish and Wildlife Service 1998).



Photo by J. Woodling

CNHP Ranking: G4T2T3 S2

State/Federal Status: Listed as federally threatened and state (Colorado) 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*:  
USFS and NPS lands, not included in this report

## Invertebrates – Butterflies and Moths

### *Amblyscirtes simius* (Simius Roadside Skipper)

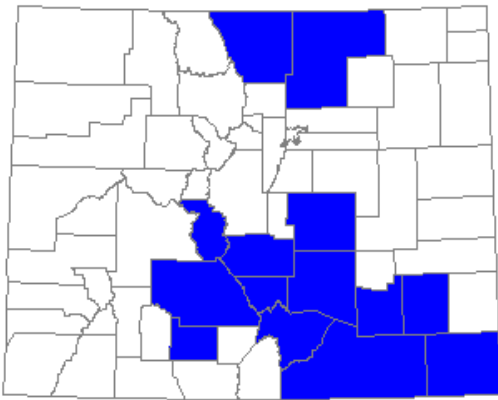
#### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperidae  
Genus: “*Amblyscirtes*”

Taxonomic Comments: No subspecies reported for this species (Miller and Brown 1981). May belong in a separate genus because of mating habits and genitalic differences uncharacteristic for the genus *Amblyscirtes* (Scott 1986).

CNHP Rank: G4 S3

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: In shortgrass prairie, ranges from southern Saskatchewan south to Sonora, Mexico, through Montana, Wyoming, Colorado, Arizona, New Mexico, and Texas (Scott 1986, Ferris and Brown 1981). State range: Known from 14 counties in Colorado (Opler *et al.* 2004): Baca, Bent, Chaffee, Custer, El Paso, Fremont, Huerfano, Larimer, Las Animas, Otero, Pueblo, Rio Grande, Saguache, and Weld.

Habitat Comments: The Simius roadside skipper occupies shortgrass and mixed-grass prairie and open pinyon-juniper or ponderosa pine woodland up to 2800m (9000 ft.) (Scott 1986, Ferris and Brown 1981). This species occurs in hilly prairie, and there seems to be a correlation with shaley substrates (Stanford pers, comm.).

Phenology: *Adult stage*: In the Rocky Mountain region, the flight period begins in late-May and continues through July, depending on elevation and latitude (Scott 1986, Ferris and Brown 1981). The adult stage occupies from five to seven days in nature, depending on the weather, and current moisture conditions. This species is usually uncommon, but may swarm briefly in wetter years (Ferris and Brown 1981). Males are usually active very early in the day. In sunny, calm weather, males perch on hilltops and small prairie prominence to await females, usually from 7:30 to 10:30 in the morning (Scott 1986, Ferris and Brown 1981). *Early stages*: The eggs are laid singly under the leaves of the hostplant (Scott 1986). Very little documentation was encountered regarding the early stages of this species.

Larval Hostplant: The known hostplant is blue grama (*Bouteloua gracilis*) (Scott 1986).

Adult Food Sources: Adults sip nectar of many flowers, including blue beardstongue (*Penstemon* sp.) (Scott 1986), possibly prickly pear cactus (*Opuntia* sp.) (Opler and Krizek 1984).

Known Threats and Management Issues: Existing threats include conversion of habitat for housing developments, mismanagement of grazing regimes, or agricultural use resulting in habitat fragmentation and reduction in good cover of hostplant.

Potential Conservation Areas supporting *Amblyscirtes simius*:  
Horsetooth Reservoir Hogbacks

## *Atrytone arogos* (Arogos Skipper)

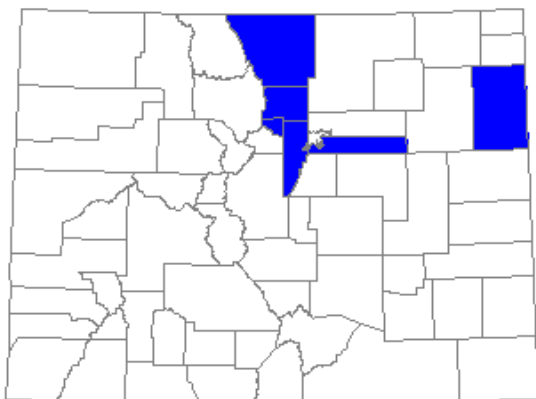
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperiidae  
Genus: *Atrytone*

Taxonomic Comments: Most authors recognize two subspecies: *arogos* formerly Atlantic and Gulf coastal plains from New York to Florida and Louisiana and *iowa* of the Great Plains, with subspecies *iowa* demonstrating reduced dark markings (Ferris and Brown 1981). Colorado populations are subspecies *iowa*.

CNHP Ranking: G3G4 S2

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)



photo by Phyllis Pineda

Distribution: Global range: The Arogos skipper occupies a patchy range from Long Island south along the Piedmont and coastal plain to peninsular Florida and west along the Gulf to eastern Texas. A separate group of populations occurs on the prairies from southern Minnesota and adjacent Wisconsin west to eastern Wyoming and south to Missouri, Oklahoma, and northeastern Colorado (Opler and Krizek 1984). State range: Known only from the northern lower Front Range and extreme northeastern Colorado in six counties (Opler *et al.* 2004): Arapahoe, Boulder, Gilpin, Jefferson, Larimer, and Yuma.

Habitat Comments: Maximum elevation: 1890m (6200 ft). May be encountered in relatively undisturbed sloping mixed- and tallgrass prairie meadows (Ferris and Brown 1981).

Phenology: Short flight with emergence of adults beginning in late-June through mid-July near the foothills, a week or two earlier eastward on the plains. Males perch on flowers and tall grasses to await females, mainly in the afternoon when thunderclouds have developed. In sunny morning hours when most butterflies are active, Arogos skipper individuals are difficult to find except on flowers (Ferris and Brown 1981).

Larval Hostplant: Big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), possibly switch grass (*Panicum* spp.) (Scott 1986).

Known Threats and Management Issues: Prairie habitats have been severely altered by agricultural conversion, urban development, fire suppression, and mismanagement of livestock grazing. These threats continue to impact prairie habitat fragments (Panzer 1988). Introduced grasses and other forbs, i.e., smooth brome (*Bromus inermis*), cheat grass (*Bromus tectorum*) and knapweed (*Centaurea* spp.) threaten to invade existing prairie habitats. Additionally, increased tree density negatively affects the quality of suitable habitat.

Potential Conservation Areas supporting *Atrytone arogos*:  
Horsetooth Reservoir Hogbacks

## *Atrytonopsis hianna* (Dusted skipper)

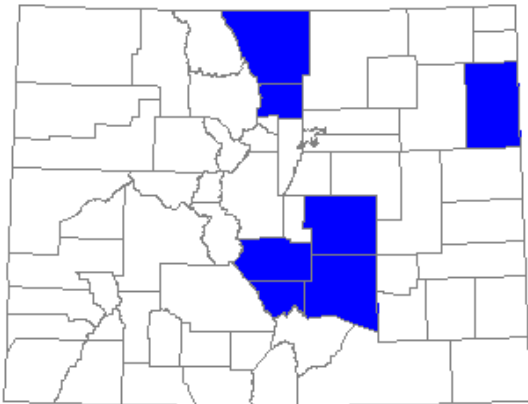
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperiidae  
Genus: *Atrytonopsis*

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.



Colorado Distribution (Opler *et al.* 2004)

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 seven Colorado counties (Opler *et al.* 2004): Boulder, Custer, El Paso, Fremont, Larimer, Pueblo, and Yuma.

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 1615 to 2195m (5300 to 7200 ft). 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 hiana*:  
Horsetooth Reservoir Hogbacks



## *Boloria selene sabulocollis* (Sandhill Fritillary)

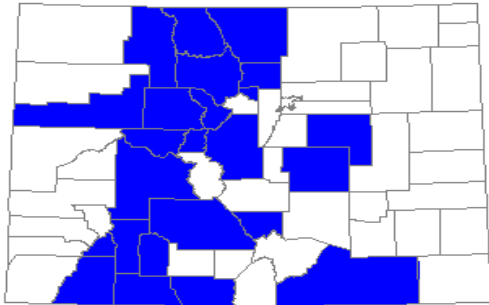
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Nymphalidae  
Genus: *Boloria*

Taxonomic Comments: There are seven recognized subspecies of *Boloria selene* in North America: *myrina*, *nebraskensis*, *sabulocollis*, *tollandensis*, *albequina*, *atrocostalis*, and *terraenovae*. Subspecies *sabulocollis*, the Sandhill Fritillary, has more dusting of yellow scales on the cinnamon-brown ground color on the underside of the hindwing than do other subspecies.

CNHP Rank: G5T2 S1S2

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: The silver-bordered Fritillary, *Boloria selene*, is Holarctic in distribution. In North America it occurs from Central Alaska southeast through Canada south of the taiga; northern United States from central Washington south along Rocky Mountains to northern New Mexico; east to Illinois, Virginia, and Maryland. Subspecies *sabulocollis*, Koehler's Fritillary, was described in 1977 to identify the populations ranging from western Nebraska into the prairie region of northeastern Colorado, western South Dakota, and extreme southwestern North Dakota (Koehler 1977). State range: Subspecies *sabulocollis* is known from only one county in Colorado: Larimer. These include paratypes taken by R. E. Stanford at Timnath Marsh in 1972 and 1973 (from a population now believe extirpated) and at Summerland Park in June 1998. Subspecies *tollandensis* is known from 25 counties in Colorado (Opler *et al.* 2004). In western Larimer county *tollandensis* populations are believed to intergrade with *sabulocollis* populations (Koehler 1977).

Habitat Comments: The subspecies *sabulocollis* probably represents a relict of more extensive populations that were associated with the formerly more extensive coniferous forests of the western Great Plains, now existing as remnants such as the Black Hills, Pine Ridge, Cheyenne Ridge, etc (Koehler 1977). Colonies in western Nebraska are situated at the marshy edges of lakes and adjacent wet meadows in the sandhills region (Koehler 1977); in South Dakota they are found in wet meadows of the Black Hills and the south-central portion of the state (Marrone 2002).

Phenology: Two flights: peak flights in late June-July and August. Dates extend from early May to early September. Overwinters as a partially grown caterpillar (Marrone 2002). Males patrol along marsh edges and wet meadow in search of females. Favorite nectar sources are composite flowers, including goldenrod and black-eyed susans.

Larval Hostplant: Violets, including *Viola glabella* and *V. nephrophylla* (Opler *et al.* 2004), and *Viola papilionaceae* in Larimer County (Ferris and Brown 1981).

Known Threats and Management Issues: Threats to habitat include cropland conversion of wet meadows in prairie habitats, weedy invasions, and suburban development, all resulting in habitat destruction and fragmentation.

Potential Conservation Areas supporting *Boloria selene sabulocollis*:  
none

## *Callophrys mossii schryveri* (Moss' Elfin)

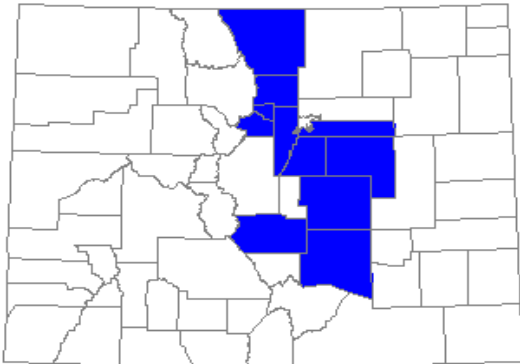
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Lycaenidae  
Genus: *Callophrys*

Taxonomic Comments: Formerly in the genus *Incisalia*. The *mossii* complex is separated from the *fortis* complex due to its preference for stonecrop (*Sedum* spp.) as a larval hostplant. Subspecies *schryveri* occurs in Colorado (Ferris and Brown 1981). *C. mossii schryveri*'s range is restricted to the Rocky Mountain region. *Callophrys mossii schryveri* contrasts with species *C. mossii* in that it is smaller, has a lighter dorsal color in the male; and more contrasting ventral hindwing markings (Scott 1986).

CNHP Rank: G4T3 S2S3

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: The *mossii* complex is confined to the northwestern portion of the United States and southwestern Canada extending south to central California and to east-central Colorado (Stanford and Opler 1993, Ferris and Brown 1981). State range: Foothills and lower montane canyons between 1828 and 2438m (6000 to 8000 ft) (Ferris and Brown 1981). Known from eleven counties in the Colorado Rocky Mountain region (Opler *et al.* 2004): Arapahoe, Boulder, Clear Creek, Douglas, Elbert, El Paso, Fremont, Gilpin, Jefferson, Larimer, and Pueblo.

Habitat Comments: Elevational range is between 1828 and 2438m (6000 to 8000 ft). Occupies suitable

habitat in Transition to lower Canadian Zone wooded canyons containing the hostplant (Scott 1986). Canyons with steep rocky slopes, mossy bare summits and ridges, brushy foothill ravines, sagebrush hillsides and flats (Pyle 1981).

Phenology: One brood. Flies from February to June depending on locality (Pyle 1981). It is one of the first non-hibernating butterflies to appear in the spring (Ferris and Brown 1981). Stays close to the hostplant, flying erratically and close to the ground, often in inaccessible areas. Males come to damp earth, perching on low shrubs or ground, females are more reclusive and remain higher up on slopes (Pyle 1981). Adults are local, moving an average of only 50m for males and 52m for females over a lifetime (Scott 1986). Males perch all day on shrubs in gulches and on slopes to await females (Scott 1986).

Larval Hostplant: Stonecrop (*Sedum lanceolatum*).

Known Threats and Management Issues: The greatest current threats are extensive urbanization and alteration of habitat. Noxious exotic plants, recreational development, and water development continue to threaten lower foothill canyons (even on public lands). The absence of fire and increased tree density may negatively impact hostplant.

Potential Conservation Areas supporting *Callophrys mossii schryveri*:

Bobcat Canyons  
Horsetooth Reservoir Hogbacks  
Phantom Canyon

## *Celastrina humulus* (Hops Feeding Azure)

### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Lycaenidae  
Genus: *Celastrina*

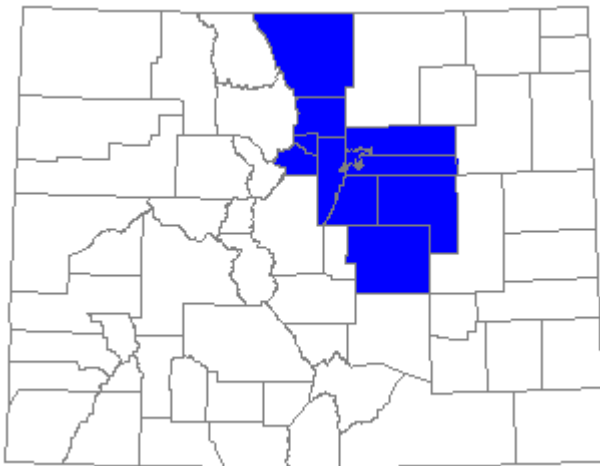
Taxonomic Comments: Formally described in 1998, this is the species incorrectly referred to as "form" *neglectamajor* from Colorado. Wright is a leading expert on this genus and the authors make a solid case for this as a valid taxon, although the authors note it could possibly end up as a subspecies of some eastern species (Scott and Wright 1998). This species appeared in earlier CNHP reports as *Celastrina* sp.1.

CNHP Rank: G2G3 S2

State/Federal Status: None.



Photo by Phyllis Pineda



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: Foothills of eastern Colorado Rockies (Wright 1995). State range: Probably endemic to the Front Range of Colorado (Opler pers. comm.). Documented from eleven Front Range counties in Colorado (Opler *et al.* 2004): Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, El Paso, Elbert, Gilpin, Jefferson, and Larimer.

Habitat Comments: Minimum elevation: 1615m (5300 ft). Typical habitats are mountain canyons and valleys that contain permanent water and contain wild hops (*Humulus lupulus*) (Wright 1998) found clambering over shrubs and rocky slopes in canyons and foothills (Weber 1976).

Larval Hostplant: Wild hops (*Humulus*

*lupulus*).

Phenology: Adult flight: Single brood, emerging late May to June; rarely found through mid-July (Wright 1995, Opler pers. comm.). Larval hostplant is wild hops (*Humulus lupulus*).

Known Threats and Management Issues: Extensive urbanization and alteration of habitat is a major threat. Noxious exotic plants, recreational development and water development also continue to threaten lower foothill canyons (even on public lands). Its formal description may increase collecting pressure (Opler pers. comm.). Management should include control of noxious weeds and control tree density. Hostplant is a disturbance tolerant plant requiring open, sunny areas within canyon habitats. There is some concern that collection of the flowers (for beer brewing purposes) may affect larval food supply.

Potential Conservation Areas supporting *Celastrina humulus*:  
Horsetooth Reservoir Hogbacks

## *Coloradia luski* (Lusk's Pinemoth)

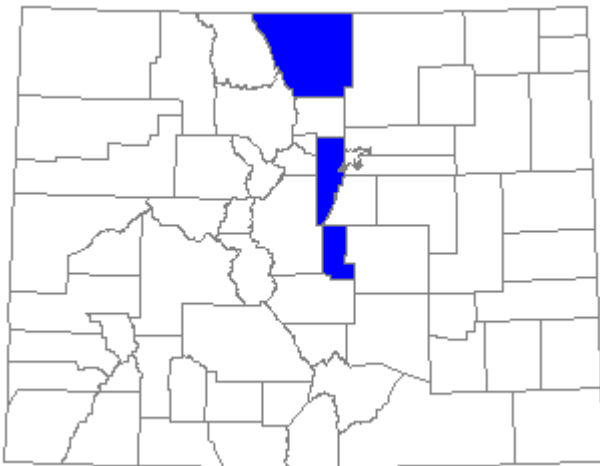
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Saturniidae  
Genus: *Coloradia*

Taxonomic Comments: Adult coloration is variable but there are no named subspecies.

CNHP Rank: G4 S1?

State/Federal Status: None.



Colorado Distribution (Opler 2004)

Distribution: Global range: Mountains in Arizona, New Mexico, Colorado, and Sonora, Mexico. State range: Known from three counties in north central Colorado: Larimer, Jefferson, and Teller (Opler 2004).

Habitat Comments: Pine forests at 6000-7500 ft. elevation.

Phenology: One brood from June-August. Adults do not feed. Females lay batches of eggs at the base of pine needles; the eggs hatch in about 3 weeks. Young caterpillars are gregarious, with 3-5 caterpillars feeding together on the same pine needle. Older caterpillars feed alone. Caterpillars spin loose cocoons under the soil surface in which they pupate and overwinter (Opler 2004).

Larval Hostplant: Probably ponderosa pine (*Pinus ponderosa*) and other pines.

Known Threats and Management Issues: Ponderosa pine habitat is threatened by catastrophic fires (e.g., Hayman Fire, Bobcat Fire) and encroachment from housing development.

Potential Conservation Areas supporting *Coloradia luski*:  
none

## *Erynnis martialis* (Mottled Duskywing)

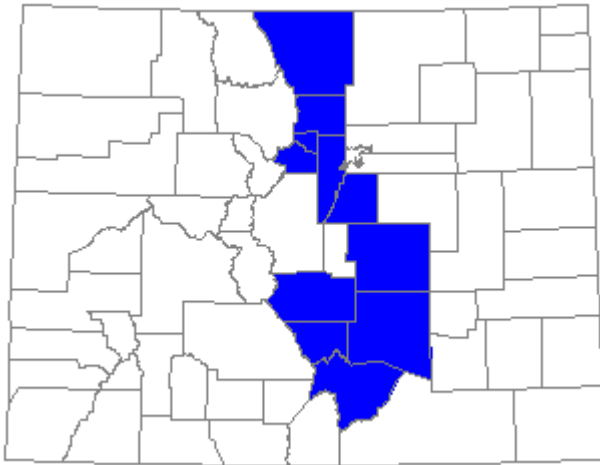
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperiidae  
Genus: *Erynnis*

Taxonomic Comments: No subspecies are listed for this species (Miller and Brown 1981). The second phenotype of the afranius duskywing (*Erynnis afranius*) is often mistaken for *E. martialis*; fortunately, the two almost never occupy the same habitat simultaneously (Ferris and Brown 1981).

CNHP Ranking: G3G4 S2S3

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: Eastern United States from Massachusetts and New York west across Ontario and the Great Lakes states to Minnesota and western Iowa, then south to Georgia, the Gulf states, and central Texas (Opler and Krizek 1984). West to eastern Nebraska, eastern Kansas, the Ozarks, and disjunct isolated populations in the eastern foothills of the Rocky Mountains in central Colorado, and in the Black Hills (Opler 1994, Stanford and Opler 1993, Opler and Krizek 1984, Ferris and Brown 1981). State range: Front Range foothills from to 3000m (8200 ft) (Ferris and Brown 1981). Reported from eleven counties (Opler *et al.* 2004): Boulder, Clear Creek, Custer, Douglas, El Paso, Fremont, Gilpin, Huerfano, Jefferson, Larimer, Pueblo.

Habitat Comments: Elevational range: 1371 to 3000m (4500 to 8200 ft). Usually confined to hilly country containing its hostplant buckbrush (*Ceanothus* spp.) (Opler and Krizek 1984). Inhabits shrubby foothills with stands of mahogany (*Cercocarpus* spp.) and buckbrush (*Ceanothus* spp.) and oak woodlands (Ferris and Brown 1981). Also, wooded uplands; open woods and thickets; clumps of vegetation on plains (Pyle 1981).

Phenology: One flight mid May-June in Colorado; two flights throughout the rest of the range (Scott 1986, Opler and Krizek 1984). Males perch on hilltops (Ferris and Brown 1981). Seldom abundant (Pyle 1981).

Larval Hostplant: Shrub Rhamnaceae, including *Ceanothus americanus*, *herbaceus*, *fendleri*; adults sip nectar of flowers, including *Ceanothus* spp. (Scott 1986).

Known Threats and Management Issues: Foothills habitats at risk of loss by anthropogenic alteration, including: fire suppression, habitat fragmentation, and urban development.

Potential Conservation Areas supporting *Erynnis martialis*:  
Horsetooth Reservoir Hogbacks

## *Euphilotes rita coloradensis* (Colorado Blue)

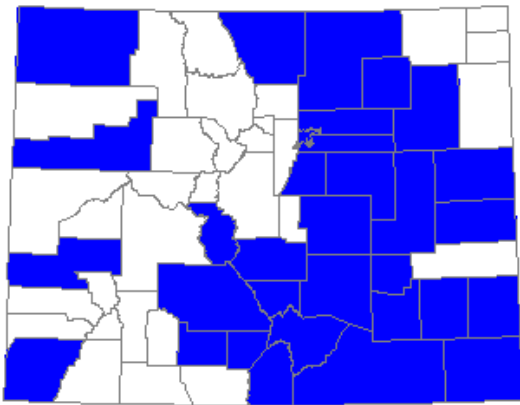
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Lycaenidae  
Genus: *Euphilotes*

Taxonomic Comments: There are four recognized subspecies of *Euphilotes rita* in North America: *rita*, *coloradensis*, *spaldingi*, and *mattoni* (Miller and Brown 1981).

CNHP Rank: G3G4T2T3 S2

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: The buckwheat blue, *Euphilotes rita* is distributed exclusively in the southwestern United States, from the Mojave Desert of southern California to New Mexico and northward from Nevada to Utah, northern New Mexico, and southern Wyoming. State range: Subspecies *coloradensis* distributed from eastern Colorado (east of the divide) north to south-central Wyoming (Scott 1986). Known from 27 counties east of the Continental Divide in Colorado (Opler *et al.* 2004): Adams, Alamosa, Arapahoe, Baca, Bent, Chaffee, Cheyenne, Costilla, Crowley, Custer, Denver, Douglas, El Paso, Elbert, Fremont, Kit Carson, Larimer, Las Animas, Lincoln, Morgan, Otero, Prowers, Pueblo, Rio Grande, Saguache, Washington, Weld. (Subspecies *rita* is known from four counties west of the Divide in Colorado: Garfield, Moffett,

Montezuma, and Montrose).

Habitat Comments: This subspecies is encountered in Upper Sonoran Desert and plateau country and in undisturbed prairies from 1524 to 2133m in elevation (5000 to 7000 ft.) (Ferris and Brown 1981). Found in undisturbed prairie sites where the food plant, bushy eriogonum, (*Eriogonum effusum*) grows abundantly (Stanford pers. comm). Habitats require light to moderate grazing by wildlife or cattle.

Phenology: One flight, mostly August (Scott 1986). Brood coincides with blooming of hostplant. Adults nectar exclusively on larval hostplant and are most easily encountered there (Stanford pers. comm).

Larval Hostplant: Bushy eriogonum (*Eriogonum effusum*).

Known Threats and Management Issues: Threats to habitat include cropland conversion of prairie habitat, removal of grazing regimes, weedy invasions, and suburban development, all resulting in habitat fragmentation. Grazing levels need to be determined to maintain habitat quality.

Potential Conservation Areas supporting *Euphilotes rita coloradensis*:  
none

## *Euphyes bimacula* (Two-Spotted Skipper)

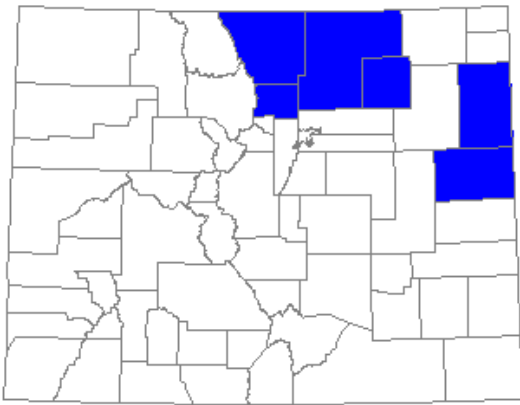
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperiidae  
Genus: *Euphyes*

Taxonomic Comments: Two subspecies are provisionally recognized in North America: *acanootus* and *illinois* (Miller and Brown 1981). Colorado populations are assigned provisionally to the subspecies *illinois*. The western populations are larger and brighter above than eastern populations, but more dull gray beneath with prominent veins on ventral-hindwing (Ferris and Brown 1981).

CNHP Rank: G4 S2

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: From New England and Ontario south to Virginia and westward to Wisconsin, Iowa, Nebraska and northeast Colorado (Ferris and Brown 1981). State range: Known from six counties in northeastern Colorado: Larimer, Boulder, Weld, Morgan, Yuma, and Kit Carson (Opler *et al.* 2004).

Habitat Comments: This species is a post-glacial relict inhabiting bogs, marshes, pond edges and adjacent fields, and sedge meadows containing *Carex* spp. (Ferris and Brown 1981, Pyle 1981).

Phenology: Short flight from late June through mid-July (Ferris and Brown 1981). Males await females while perched on tall stalks in open sedge marshes and are extremely wary. Both sexes visit flowers (Ferris and Brown 1981).

Larval Hostplant: Hairyfruit sedge (*Carex trichocarpa*) (Scott 1986); Nebraska sedge (*Carex nebrascensis*) (Stanford pers. comm.).

Known Threats and Management Issues: Development of wetlands for hay, pasture, cropland, livestock watering holes or reservoirs are the most serious threats to this skipper. Additionally, aggressive exotic plants, such as Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*) and common teasel (*Dipascus sylvestris*) negatively impact suitable habitat by displacing native vegetation in these meadows.

Potential Conservation Areas supporting *Euphyes bimacula*:  
none

## *Hesperia ottoe* (Ottoe Skipper)

### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Hesperiidae  
Genus: *Hesperia*

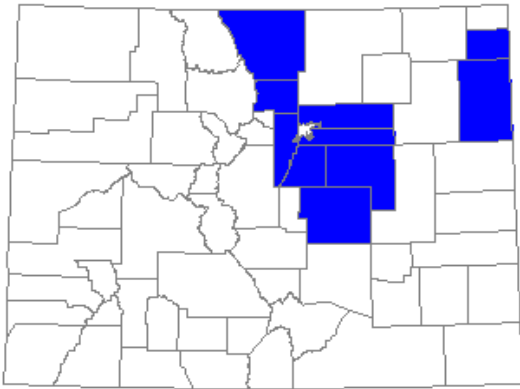
Taxonomic Comments: No subspecies reported (Miller and Brown 1981). Western populations of this species average paler in color on the upperside compared to more eastern populations, but this coloring can be variable (Scott 1986).

CNHP Ranking: G3G4 S2

State/Federal Status: USFS sensitive.



Photo by Phyllis M. Pineda



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: Great Plains range extends from southern Manitoba south to northern Texas, and northeastward to the Great Lakes Regions (Scott 1986, Ferris and Brown 1981). State range: Base of the Front Range from El Paso County north to Larimer County, and a few records from the eastern plains of Colorado. Apparently a Front Range disjunct restricted to mid- and tallgrass prairies. Known from ten counties in Colorado (Opler *et al.* 2004): Adams, Arapahoe, Boulder, Douglas, Elbert, El Paso, Jefferson, Larimer, Phillips, and Yuma.

Habitat Comments: In Colorado, this species occupies mid- to tallgrass undisturbed prairies or high quality grazed prairie on the plains and Front Range foothills, especially gently sloping meadows below 1920m in elevation (6300 ft). Avoids weedy conditions (Scott 1986, Ferris and Brown 1981, Pyle 1981).

Phenology: The Ottoe skipper has one brood per year, with adults flying from mid-June through early August, reaching peak abundance in early July (Sedman and Hess 1985, Opler and Krizek 1984). The adult males begin to emerge before the females. Emergence is extended over a two-week period in late-June through mid-July, with females offset by about a week. Life span for adults is about 19 days in nature. Males perch on flowers or low plants during warm daylight hours when seeking mates (Dana 1991).

Larval Hostplants: Big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and side oats grama (*Bouteloua curtipendula*) (Scott 1986).

Known Threats and Management Issues: Declines are likely due to continued destruction of prairie habitat by conversion to cropland and urban developments. Additionally, along the Colorado Front Range, increased loss of its disjunct habitat may be attributed to increased tree density into former prairie habitat, due in part to fire suppression.

Potential Conservation Areas supporting *Hesperia ottoe*:

Horsetooth Reservoir Hogbacks



## *Pachysphinx modesta* (Modest Sphinx)

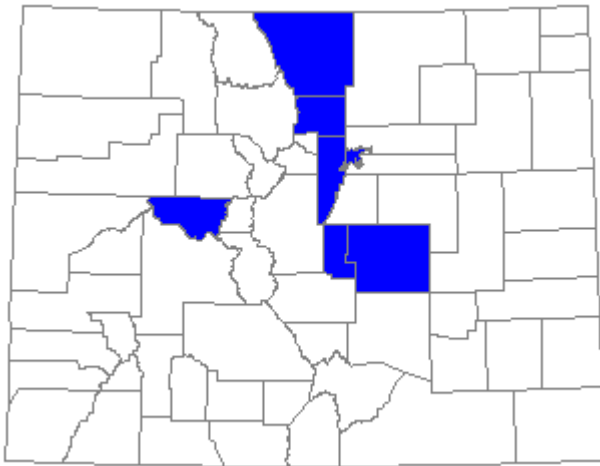
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Sphingidae  
Genus: *Pachysphinx*

Taxonomic Comments: No subspecies have been described.

CNHP Rank: G4G5 S3?

State/Federal Status: None.



Colorado Distribution (Opler 2004)

Distribution: Global range: Maine south to north Florida; west to Washington, Oregon, Utah, New Mexico, and Texas. Also found in Baja California Norte. State range: Known from seven counties in north central Colorado: Larimer, Boulder, Denver, El Paso, Jefferson, Pitkin, and Teller (Opler 2004).

Habitat Comments: Riparian areas and moist mountainsides.

Phenology: One brood in the north (and Colorado) from June-July; two broods in the south from May-September. Adults do not feed. Females lay eggs on leaves of the hostplants, and the eggs hatch in about 9 days. Fully grown caterpillars pupate and overwinter in shallow burrows in the ground (Opler 2004).

Larval Hostplant: Poplar, aspen, and cottonwood (*Populus*) and willow (*Salix*).

Known Threats and Management Issues: Habitat destruction of riparian forests and streamside erosion.

Potential Conservation Areas supporting *Pachysphinx modesta*:  
none

## *Paratrytone snowi* (Snow's skipper)

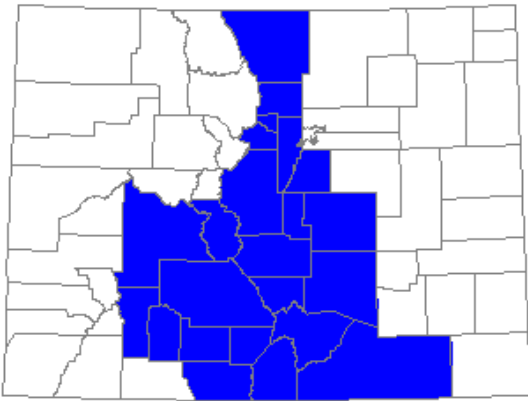
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: HesperIIDae  
Genus: *Paratrytone*

Taxonomic Comments: Burns (1992) moved *snowi* into the genus *Paratrytone* (from the genus *Ochlodes*) based on female and male genitalic characters. Rocky Mountain specimens are typical *snowi*; a subspecies with larger spots occurs in central Mexico (Ferris and Brown 1981).

CNHP Rank: G5 S3 (Watchlisted species)

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: Restricted to the central and southern Rocky Mountains south to Puebla, Mexico, with records from Arizona, New Mexico, Colorado, SE Wyoming, and 2 to 6 (taxonomic question) states in Mexico (Stanford and Opler 1993, Ferris and Brown 1981). State range: Known from 23 counties in Colorado (Opler *et al.* 2004): Alamosa, Boulder, Chaffee, Clear Creek, Conejos, Costilla, Custer, Douglas, El Paso, Fremont, Gilpin, Gunnison, Hinsdale, Huerfano, Jefferson, Larimer, Las Animas, Mineral, Park, Pueblo, Rio Grande, Saguache, and Teller.

Habitat Comments: Elevational range is 2072 to 2926m (6800 to 9600 ft). Snow's skipper inhabits upper Transition to Montane woodlands, especially the upper edge of ponderosa pine forest (Scott

1986) and riparian habitats in pine forests (Ferris and Brown 1981). In some areas of Colorado, it is known to frequent wet montane meadows (Emmel *et al.* 1992). It is usually encountered in gulches and ravine bottoms in sunny openings.

Phenology: Flies in mid-July to early-August in most areas; July in northern Colorado (Scott 1986). Males perch all day in narrow dry gullies to await females, and court there and elsewhere at flowers (Scott 1986). Horsemint (*Monarda* spp. especially *fistulosa*) is a favored nectar source (Ferris and Brown 1981).

Larval Hostplant: Pine dropseed (*Blepharoneuron tricholepis*) is the known hostplant. J. Scott has observed attempted oviposition on mountain muhly (*Muhlenbergia montana*) in southern Colorado (Ferris and Brown 1981).

Known Threats and Management Issues: This species prefers a high quality, open woodland. Preferred habitats are at risk due to deforestation for timber harvest, or increased tree density. Increased tree density may be attributed to a successional response to fire suppression; this potentially increases the threat of large-scale fires, possibly destroying suitable habitat.

Potential Conservation Areas supporting *Paratrytone snowi*:  
none

## *Polites origenes* (Cross-line skipper)

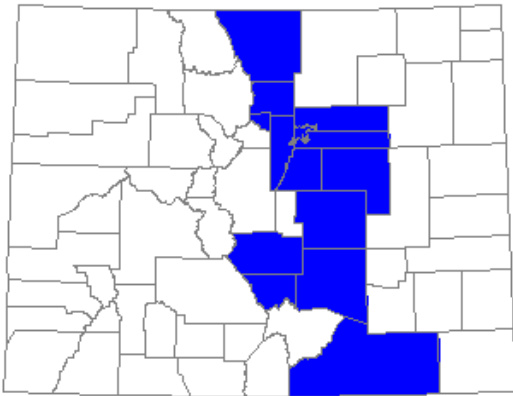
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: HesperIIDae  
Genus: *Polites*

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 male 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.



Colorado Distribution (Opler *et al.* 2004)

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 14 counties in Colorado (Opler *et al.* 2004): Adams, Arapahoe, Boulder, Custer, Denver, Douglas, El Paso, Elbert, Fremont, Gilpin, Jefferson, Larimer, Las Animas, Pueblo.

Habitat Comments: Elevational range: 1645 to 2316m in Colorado (5400 to 7600 ft). 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 recorded as purpletop (*Tridens flavus*), little bluestem (*Schizachyrium scoparius*), and other grasses (Opler *et al.* 2004).

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 *Polites origenes*:

Horsetooth Reservoir Hogbacks

## *Polites rhesus* (Rhesus skipper)

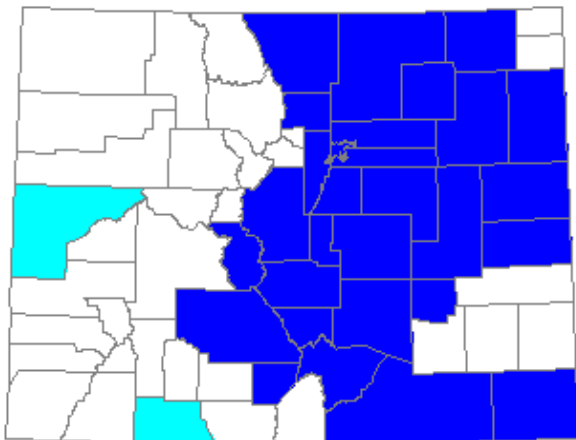
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: HesperIIDae  
Genus: *Polites*

Taxonomic Comments: No subspecies reported (Ferris and Brown 1981). Examination of genitalic characteristics indicate that this species, and its sister species *P. carus*, should be included in the genus *Polites*. This moves both species of the genus *Yvretta* to *Polites*, thus creating the *Yvretta* group within the genus *Polites* (Burns 1994).

CNHP Ranking: G4 S2S3

State/Federal Status: none



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: In short- grass prairie, this species ranges from southern Canada (Saskatchewan and Alberta) in a fairly narrow strip through the western Great Plains and southern Rocky Mountains of the United States (Stanford and Opler 1993), to the high mountains of Central Mexico (Burns 1994). State Range: Known from 29 counties in Colorado (Opler *et al.* 2004): Adams, Alamosa, Arapahoe, Baca, Chaffee, Cheyenne, Crowley, Custer, Denver, Douglas, El Paso, Elbert, Fremont, Huerfano, Jefferson, Larimer, Las Animas, Morgan, Park, Pueblo, Saguache, Teller, Washington, Weld, and Yuma, with unconfirmed records in two others (Archuleta and Mesa).

Habitat Comments: Upper Sonoran to lower Canadian zone shortgrass and mixed-grass prairie habitats (Scott 1986); records from 1150 to

2850m (3800 to 9300 ft) (Ferris and Brown 1981).

Phenology: One flight, mostly May, and late-May to mid-June at higher altitudes (Scott 1986); mid-June in South Park (Ferris and Brown 1981). Rare in most years, but in wet seasons it may swarm over prairies and congregate on blossoms of prostrate milk vetch species (*Astragalus* spp.) (Ferris and Brown 1981). Males will perch during sunny warm mornings on hilltops to await females. Adults will sip nectar of flowers, especially Drummond's milkvetch (*A. drummondii*) (Scott 1986).

Larval Hostplant: Blue grama (*Bouteloua gracilis*).

Known Threats and Management Issues: Existing threats are fragmentation of habitat by conversion to agricultural use, or by mismanagement of grazing regimes, possibly reducing cover of hostplant.

Potential Conservation Areas supporting *Polites rhesus*:  
none

## *Satyroides eurydice fumosa* (Smokey Eyed Brown)

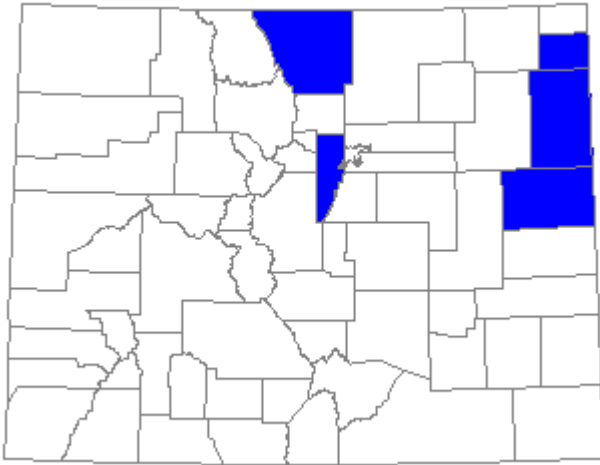
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Nymphalidae: Satyrinae  
Genus: *Satyroides*

Taxonomic Comments: Two subspecies are recognized: the nominate subspecies in the east, and *S. e. fumosa* in the west. At one time thought to be a separate species, *fumosa* is now believed to be a subspecies of *S. eurydice* that has darker wings than the nominate subspecies.

CNHP Rank: G5T3T4 S1

State/Federal Status: None.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: *Satyroides eurydice* is found throughout the northeastern quarter of the US northwestward as far as Great Slave Lake, Northwest Territories. Subspecies *fumosa* is known from NE Colorado, western Nebraska, western South Dakota, and SW Minnesota. State range: Subspecies *fumosa* is known from five counties in Colorado (Opler *et al.* 2004): Jefferson, Kit Carson, Larimer, Phillips, and Yuma.

Habitat Comments: Nowhere common, and with widely scattered populations. Favors sedge meadows, edges of marshes and springs, slow moving springs, and cord grass swales in tallgrass prairie. Adults feed on sap, bird droppings, and occasionally flower nectar (Marrone 2002; Opler *et al.* 2004).

Phenology: One flight, June-August, with a peak in July. Overwinters as a partially grown caterpillar. The Smokey-Eyed Brown is a weak flyer over and within low plant growth; it does not stray far from sedges and it perches often (Marrone 2002).

Larval Hostplant: Various sedges (*Carex stricta*, *C. lupulina*, *C. bromoides*, and *C. trichocarpa*).

Known Threats and Management Issues: Threats to habitat include cropland conversion of wet meadows in prairie habitats, weedy invasions, and suburban development, all resulting in habitat destruction and fragmentation.

Potential Conservation Areas supporting *Satyroides eurydice fumosa*  
none

## *Speyeria idalia* (Regal Fritillary)

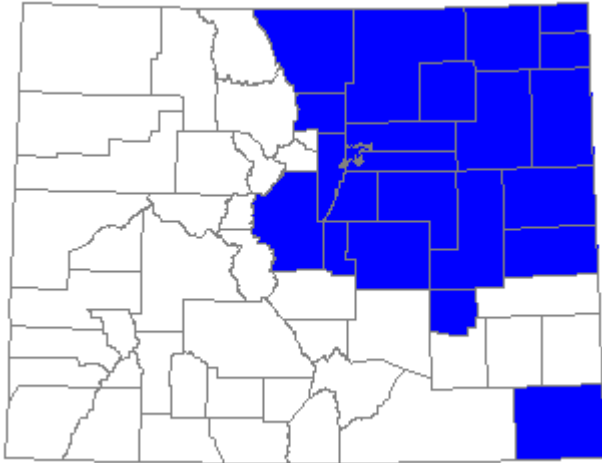
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: Nymphalidae  
Genus: *Speyeria*

Taxonomic Comments: No subspecies are recognized in this large, distinctive, and formerly widespread, species.

CNHP Rank: G3 S1

State/Federal Status: USFS sensitive.



Colorado Distribution (Opler *et al.* 2004)

Distribution: Global range: Historically the range extended from New Brunswick to southern lower Michigan, Manitoba, and eastern Montana and in Appalachians to northern Georgia. It suffered a drastic loss of range in the 1980's, especially since 1987. Populations are known to be historic or extirpated in all six New England states, eastern Canada (Ontario, Quebec, New Brunswick, New Jersey, West Virginia, Ohio, and Michigan. Status is unknown in Virginia but extant (1993-94); apparently reliable reports for North Carolina in 1994 (Swengel and Swengel 1994) and western Arkansas in 2000 (Gary N. Ross, pers. comm.). State range: One confirmed colony in Kit Carson County (Stanford pers. comm.); one fresh individual observed in appropriate habitat in Boulder County. Sightings of worn individuals outside of breeding season known

from 21 other Colorado counties (Opler *et al.* 2004): Adams, Arapahoe, Baca, Cheyenne, Crowley, Denver, Douglas, Elbert, El Paso, Jefferson, Larimer, Lincoln, Logan, Morgan, Park, Phillips, Sedgewick, Teller, Washington, Weld, and Yuma.

Habitat Comments: Tall-grass prairie and other open sites, including damp meadows, marshes, wet fields, and mountain pastures.

Phenology: One brood from mid-June to early September. Females do not lay many eggs until August. Males patrol all day to seek females. Unfed first-stage larvae hibernate.

Larval Hostplant: Violets, including *Viola pedatifida*.

Known Threats and Management Issues: Threats to habitat include cropland conversion of wet meadows in prairie habitats, weedy invasions, and suburban development, all resulting in habitat destruction and fragmentation. Rapid decline in many areas over the past three decades is not well understood.

Potential Conservation Areas supporting *Speyeria idalia*:  
None.

## *Stinga morrisoni* (Morrison's skipper)

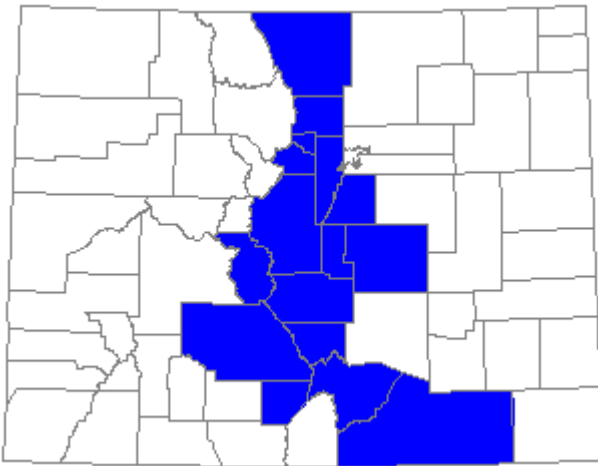
### Taxonomy:

Class: Insecta  
Order: Lepidoptera  
Family: HesperIIDae  
Genus: *Stinga*

Taxonomic Comments: A monotypic genus.

CNHP Ranking: G4G5 S3S4

State/Federal Status: none



Colorado Distribution (Opler *et al* 2004)

Distribution: Global range: Along the Colorado Front Range from the Wyoming border south through Colorado, into New Mexico, Arizona, and Texas. State range: From Larimer County southward. Known from 16 counties in Colorado (Opler *et al.* 2004): Alamosa, Boulder, Chaffee, Clear Creek, Custer, Douglas, El Paso, Fremont, Gilpin, Huerfano, Jefferson, Larimer, Las Animas, Park, Saguache, and Teller.

Habitat Comments: Occupies open pinyon and ponderosa pine foothills in the upper Sonoran, below 2926m (9600 ft) (Scott 1986). May have an association with crumbly granitic soils (R. Stanford pers. comm.).

Phenology: One flight, May through Mid-June in the Colorado Foothills. Late-May

through early-July at higher altitudes (Scott 1986). Uncommon to locally common in most years. Males perch all day on hilltops, usually next to shrubs or trees, to await females.

Larval Hostplant: Not well known; blue grama (*Bouteloua gracilis*) or little blue stem (*Schizachyrium scoparium*) is suspected by habitat association (Ferris and Brown 1981).

Known Threats and Management Issues: Species' habitat is rapidly being developed from Colorado Springs to Fort Collins; low elevations along the Colorado Front Range Foothills are especially favored for development. Fire suppression, habitat fragmentation, and weedy invasions also affect quality of habitat. Historically threatened by logging.

Potential Conservation Areas supporting *Stinga morrisonii*:  
none

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