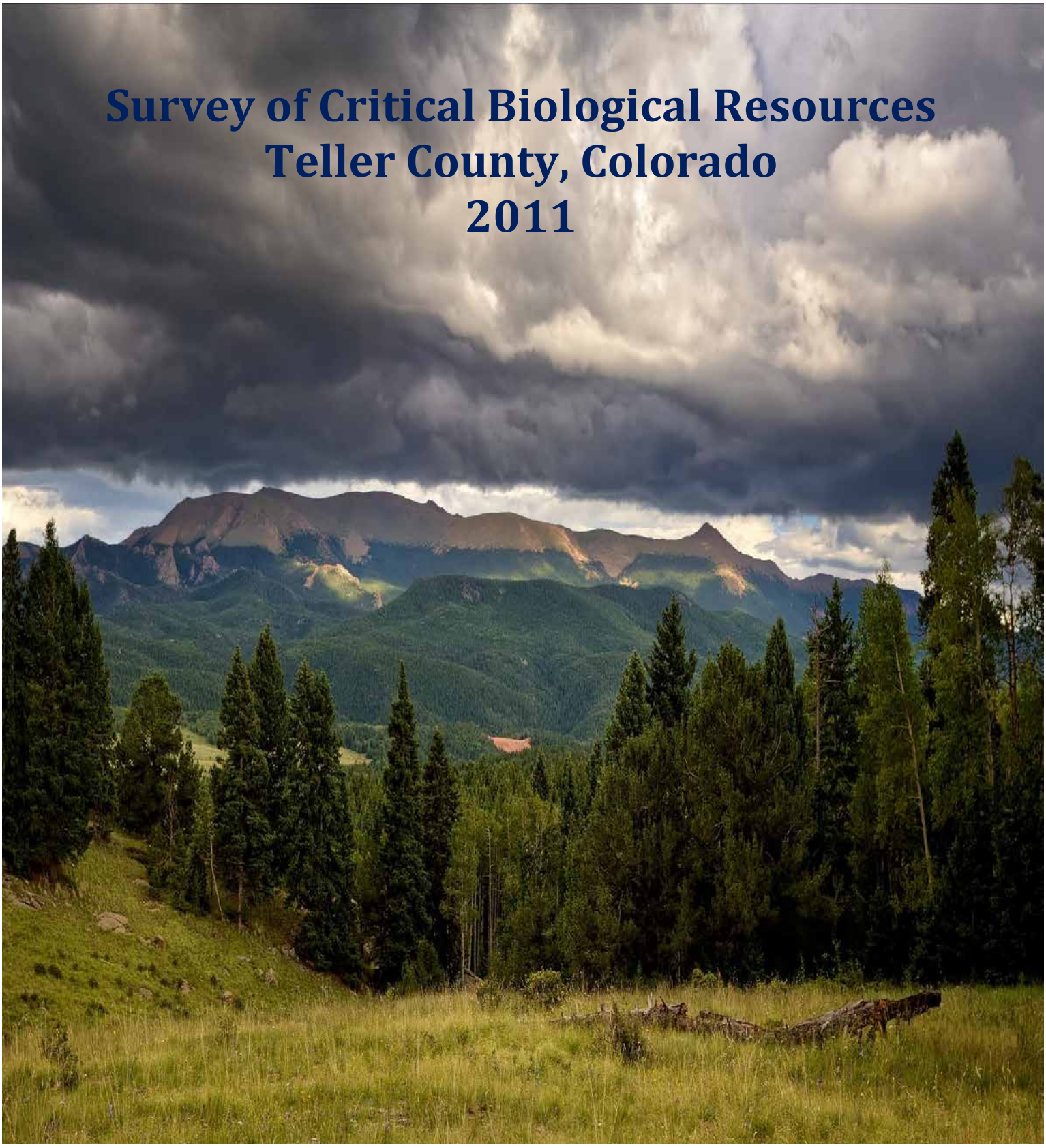
Survey of Critical Biological Resources
Teller County, Colorado
2011



Natural Heritage Program
COLORADO

Colorado State University

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Survey of Critical Biological Resources
Teller County, Colorado

2011

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EXECUTIVE SUMMARY

In 2010, Teller County contracted with Colorado State University and the Colorado Natural Heritage Program (CNHP) to survey for critical biological resources in Teller County with funding provided by Teller County, Great Outdoors Colorado, Bureau of Land Management, and the Coalition for the Upper South Platte. A wetland and riparian survey was conducted concurrently with funding provided by the U.S. Environmental Protection Agency, Region 8 Wetland Program Development Grant. The purpose of this project was to provide a scientific data resource for managers, planners, and the citizens of Teller County for conducting proactive landscape planning. This document should be considered a tool for managing lands that support rare, imperiled and/or sensitive plants, animals, and significant plant habitats.

The goal of the project was to systematically identify the locations of rare species and significant habitats. Additionally, the original paper topographic National Wetland Inventory maps were digitized in accordance with the U.S. Fish and Wildlife Wetland Inventory protocol. This project provides an additional data resource for the Teller County Strategic Plan (2009) and the Growth Management Plan or Master Plan for Teller County (Teller County and City of Woodland Park Planning Departments 1990). The Strategic Plan emphasizes that the quality of life of the County's citizens be a priority. One of the Strategic Plan's objectives is a continued support of conservation easements as an option to maximize health and enjoyment of the County residents and visitors. The Growth Management Plan is a culmination of a joint effort among Teller County, City of Woodland Park, University of Colorado at Denver, and Arizona State University (Larsen et al. 1991a, Larsen et al. 1991b, Steiner 2008) to provide for planned and orderly development within the County and cooperating cities, towns, and unincorporated areas, while balancing basic human needs of a changing population and maintaining a healthy environment for future generations (Larsen et al. 1991a, Larsen et al. 1991b). One of the main goals of this planning effort was to direct future growth to appropriate places while avoiding sensitive ecological habitats such as wetlands, stream corridors, flood prone areas, and alpine tundra (Steiner 2008). CNHP approached this survey of critical biological resource with these environmentally sensitive areas as a priority.

In April 2010, CNHP and its stakeholders identified potential survey areas for significant plants, animals, wetland and upland habitats. Areas that were expected to contain significant elements were delineated as "Targeted Inventory Areas" (TIAs). These areas were prioritized for field survey 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. Summer field surveys were conducted within the TIAs and those areas found to contain significant elements were delineated as sites or "Potential Conservation Areas" (PCAs). A PCA is designed to represent CNHP's best estimate of the primary area supporting the long-term survival of targeted species, subspecies and natural plant communities.

Results of the survey confirm that there are many areas with outstanding to high biological significance in Teller County. There are several rare plants and animals that depend on these areas for survival. Altogether, 23 rare or imperiled plant species, 7 rare or imperiled

animal species, and 45 wetland and upland plant communities of concern were documented in Teller County. Despite a very successful and productive field season, it is likely that some elements that are present in the County were not documented, due to either lack of access, phenology (reproductive timing) of species or time constraints.

CNHP has identified 49 Potential Conservation Areas (PCAs) in Teller County. Of the 49 PCAs presented in this report, one is of outstanding biodiversity significance (B1), 9 are of very high significance (B2), 16 are of high significance (B3), 18 are of moderate biodiversity (B4), and five are of general biodiversity significance (B5). These PCAs represent the best examples of targeted species and plant communities and their ecological processes observed on the private and public lands that were visited. The PCA ranked with Outstanding Biodiversity Significance (B1) is Pikes Peak where the only globally critically imperiled population of the Pikes Peak spring parsley (*Oreoxis humilis*) (G1S1) is found. Additionally Pikes Peak PCA supports one of the best known occurrences of a regional endemic, James' telesonix (*Telesonix jamesii*) (G2S2) and a concentration of numerous state rare alpine species such as Rocky Mountain columbine (*Aquilegia saximontana*) (G3S3), alpine bluebells (*Mertensia alpina*) (G4?S1), and several good occurrences of significant alpine habitat. The Bison Creek PCA (B2) contains excellent occurrences of the globally and State imperiled (G2S2) James' telesonix (*Telesonix jamesii*). James' telesonix is considered to be only in Colorado and New Mexico scattered sporadically on granite tors of the easternmost mountains. The Seven Lakes PCA (B3) is drawn for a concentration of several significant wetland elements; an historical occurrence (1902) of the spiny-spore quillwort (*Isoetes setacea* ssp. *muricata*) (G5? T5?S2) was re-discovered and a County record for mud sedge (*Carex limosa*) (G5S2) was documented in a fen (groundwater-fed peatland). The High Park site (B3) is drawn for one of the best known occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*) (G5S5). This occurrence is within the montane portion of the species population range, which occupies south-central Colorado and north-central New Mexico. The montane population of the Gunnison prairie dog is designated as a candidate population by the U.S. Fish and Wildlife Service under the Endangered Species Act due to threats from habitat loss and disease. Several state rare plants were documented for the first time in the County. These plants include: autumn willow (*Salix serissima*) (G4S1), longstem water-wort (*Elatine triandra*) (G5S1), and birdbill day-flower (*Commelina dianthifolia*) (G5S1).

Teller County is truly unique with an amazing richness of rare fauna and flora well worth preserving for future generations. The diversity of species and plant communities that range from alpine tundra to ancient bristlecone pine forests to badlands and hoodoos to the fossil beds of Florissant National Monument substantiate the important contribution of the County to the biodiversity of both Colorado and the World. Overall, the concentration and quality of imperiled species and habitats attest to the fact that conservation efforts in Teller County will have both statewide and global significance. The final report and PCAs of the survey will be provided to the stakeholders and will be available to the public on the CNHP website (www.cnhp.colostate.edu).

ACKNOWLEDGEMENTS

The Colorado Natural Heritage Program would like to acknowledge and sincerely thank the following individuals and organizations for their financial and/or administrative assistance in completing this project: Sheryl Decker (Teller County), Dave Gilbert (Royal Gorge Field Office, BLM), Kathleen Staks (GOCO), and Jill Minter (U.S. Environmental Protection Agency, Region 8). We would also like to acknowledge Carol Ekarius and her staff (Coalition of the Upper South Platte) for their financial and logistic support as well as their commitment to the natural resources of the State and Teller County.

This project would not have been successful without the help of many dedicated individuals who participated in the stakeholders group, thanks to: Josh Tenneson, Amanda Hill, and Nathan Moyer (Palmer Land Trust), Leon Kott (NRCS), Mark Platten (CSU Extension), Steve Olson and Matt Schweich (San Isabel National Forest), Rick Wilson (Florissant Fossil Beds National Monument), Tonya Sharp and Casey Cooley (CDOW), George Maentz, and last but certainly not least Tass Kelso, botany professor at Colorado College, and her outstanding students, Adam Freierman and Kristen Pearson, who were valuable field assistants.

Our thanks go to all of the helpful and concerned landowners of Teller County who participated in the survey.

Special thanks to Kenny, Marlene, Anna, Theo, and Molly Funk of the John Wesley Ranch for the very fine accommodations during the summer.

Thanks to our staff and work-studies at Colorado Natural Heritage Program who processed data and/or researched sections: Jodie Bell, Jill Handwerk, Karin Decker, Jeremy Siemers, John Sovell, Amy Lavender, Jessica Parker; as well as Dave Anderson, Joanna Lemly, and Katie Dykgreve for reviewing the report, and finally to Mary Olivas, Tracey Castaneda, and Carmen Morales at CSU, who kept the accounts in order.

Funding for this project was provided by Great Outdoors Colorado, US Environmental Protection, Region 8, Wetland Program Grant, Coalition of the Upper South Platte, and Bureau of Land Management.

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INTRODUCTION

Teller County is located in east central Colorado, 20 miles west of Colorado Springs. Its mountainous terrain ranges in elevation from approximately 6,700 to 12,800 feet and includes the western slope of Pikes Peak. The County is at the intersection of four watersheds: Upper South Platte River, South Platte River Headwaters, Fountain Creek, and Upper Arkansas River (Figure 1). Until this survey, Teller County was the only County that had not been surveyed by CNHP within these watersheds (see Figures 1 and 2). All of these watersheds are crucial to Colorado's water resources, as they are the primary water supply for the Front Range and eastern plains. The County's economy has seen a shift in the past twenty years from an agriculture and mining base towards tourism, gaming, and recreation. Teller County is on the verge of a great growth wave. The mountain environment of the County is becoming very attractive for second home owners and as a weekend get-away for urban Front Range dwellers.

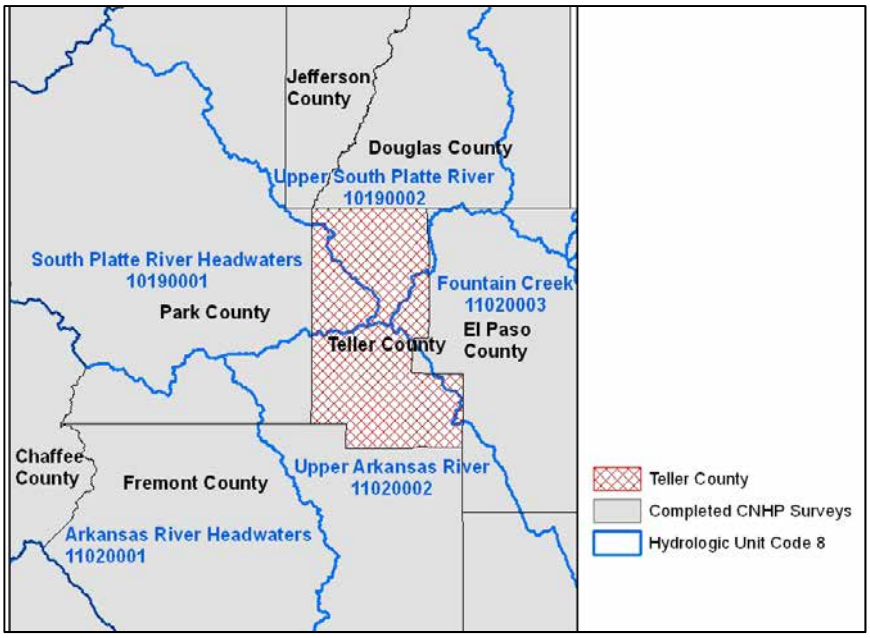


Figure 1. Teller County location in HUC watersheds.

The County is also a popular destination for fishing, hiking, hunting, wildlife viewing, and gaming. Contiguous habitats, especially wetland and riparian areas, span the diverse elevation zones, providing essential water, habitat and food sources for wildlife, birds, and plants, as well as for people. Pro-active and informed land planning decisions are necessary so that the unique natural resources, rural, and agricultural character of Teller County are preserved. There is an essential need to retain the intrinsic values of the landscape that provide both economic assets and environmental qualities for both County residents and visitors. The Colorado Natural Heritage Program (CNHP) approached this project with the intent of addressing this need. CNHP is a research unit within the Warner College of Natural Resources at Colorado State University. CNHP is a multi-disciplinary team of scientists, information managers, and conservation planners that gathers and analyzes comprehensive information on rare, threatened, and endangered species and significant plant communities of Colorado. CNHP is the state's primary, comprehensive, biological diversity data center, gathering information and field observations to help develop statewide conservation priorities. CNHP is a member of NatureServe, an international network of conservation data centers that use the Biological and Conservation Data System developed by The Nature Conservancy. There are 85 conservation data centers, including one in each of the 50 United States. Information collected by the Heritage Programs

throughout the globe provides a means to protect species before the need for legal endangerment status arises. Methods used to conduct this *Survey of Critical Biological Resources in Teller County* were those employed worldwide throughout Natural Heritage Programs and Conservation Data Centers. CNHP's 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 *Survey of Critical Biological Resources in Teller County*, including wetland and riparian areas, is part of the ongoing biological surveys of Colorado counties conducted by CNHP since 1992. To date, similar surveys have been conducted in all or parts of 37 Colorado counties (Figure 2). In 2010 Teller County contracted with Colorado State University and CNHP to identify biologically significant areas within Teller County. Identification of sites containing natural heritage resources will allow conservation of these resources for future generations, enabling proactive planning to avoid land use conflicts in the future.

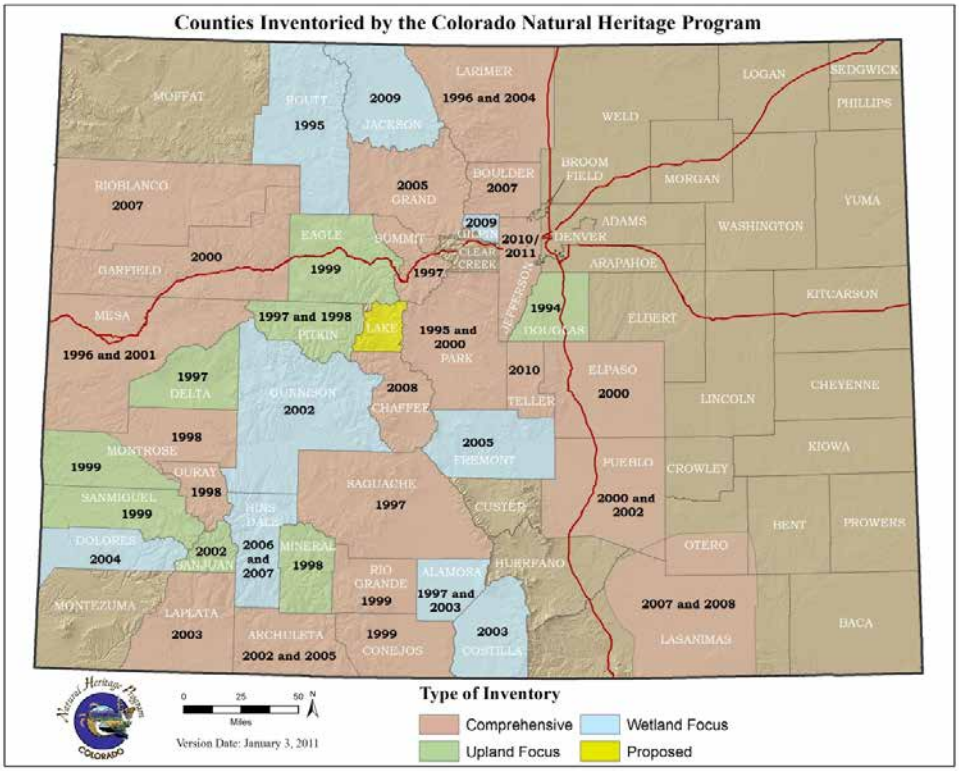


Figure 2. Status map for CNHP Survey of Biological Resources (as of 02/2011).

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); and
- 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 of delineating PCAs 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. 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.

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. These PCA 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 planned activities are compatible with protection of natural heritage resources and sensitive species. Please note that these boundaries are based primarily on CNHP's 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 to achieve sustainability.

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. Sites are prioritized according to their biodiversity significance rank, or "B-rank," which ranges from B1 (outstanding significance) to B5 (general or statewide significance). Biodiversity 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). The B1-B3 sites are the highest priorities for conservation actions (due to limited resources, only the B1-B3 PCAs are presented in the report). Based on current knowledge, the sites in this report represent areas that CNHP recommends for protection in order to preserve the natural heritage of Teller County. In addition to presenting prioritized PCAs, this report also includes a section with summaries of selected plants, animals, and plant communities that are known to occur within the PCAs.

WETLAND DEFINITIONS, MAPPING, REGULATIONS, AND ASSESSMENT

Wetland Definitions

The federal regulatory definition of a jurisdictional wetland is found in the regulations used by the U.S. Army Corps of Engineers (Corps) for the implementation of a dredge and fill permit system required by Section 404 of the Clean Water Act Amendments (Mitsch and Gosselink 2007). According to the Corps, wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." For Corps programs, a wetland boundary must be determined according to the mandatory technical criteria described in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987). In order for an area to be classified as a jurisdictional wetland (i.e., a wetland subject to federal regulations), it must have all three of the following criteria: (1) wetland plants; (2) wetland hydrology; and (3) hydric soils.

The U.S. Fish and Wildlife Service defines wetlands from an ecological point of view. Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) maintains that "wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water." Wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (wetland plants); (2) the substrate is predominantly un-drained hydric soil; and/or (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

CNHP adheres to the wetland definition used by the U.S. Fish and Wildlife Service, because it recognizes that some wetlands may display many of the attributes of wetlands without exhibiting all three characteristics required to fulfill the Corps' criteria. For example, riparian areas, which often do not meet all three of the Corps' criteria, perform many of the same functions as other wetland types, including maintenance of water quality, storage of floodwaters, and enhancement of biodiversity, especially in the western United States (National Research Council 1995). Thus, the U.S. Fish and Wildlife Service wetland definition is more suitable to CNHP's objective of identifying ecologically significant wetlands.

Wetland Regulation in Colorado

Wetlands in Colorado are currently regulated under the authority of the Clean Water Act. A permit issued by the Corps is required before placing fill in a wetland and before dredging, ditching, or channelizing a wetland. The Clean Water Act exempts certain filling activities, such as normal agricultural activities.

The 404(b)(1) guidelines, prepared by the Environmental Protection Agency in consultation with the Corps, are the federal environmental regulations for evaluating

projects that will impact wetlands. Under these guidelines, the Corps is required to determine if alternatives exist for minimizing or eliminating impacts to wetlands. When unavoidable impacts occur, the Corps requires mitigation of the impacts. Mitigation may involve creation or restoration of similar wetlands in order to achieve an overall goal of no net loss of wetland area.

Colorado's state government has developed no additional guidelines or regulations concerning the management, conservation, and protection of wetlands, however a few county and municipal governments have, including the City and County of Boulder, Summit County, and San Miguel County.

Wetland Mapping in Colorado

National Wetland Inventory Maps

In the late 1970s, the U.S. Fish and Wildlife Service began an inventory of the extent and types of the nation's wetlands. Basic mapping units for the U.S. National Wetlands Inventory (NWI) were provided by the Cowardin et al. (1979) classification system. Photo-interpretation and field reconnaissance were used to refine wetland boundaries according to the wetland classification system. In Colorado, maps east of the 106th parallel were created using 1970s black and white aerial photography. Maps west of the 106th parallel were created in the early 1980s using color aerial photography. The majority of maps produced for Colorado, however, were created as paper maps and not available as digital polygon data appropriate for use in a GIS format. Converting existing NWI maps for Teller County from paper to digital data was conducted as part of the Wetland Survey and Assessment for Teller County, a project funded by the Environmental Protection Agency, Region 8 and was completed prior to the summer field season.

The Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) describes ecological taxa, arranges them in a system useful to resource managers, furnishes units for mapping and provides uniformity of concepts and terms. Ecological systems form the highest level of the classification hierarchy; five are defined for the United States—Marine, Estuarine, Riverine, Lacustrine and Palustrine (non-tidal). The next level of the classification indicates the life form of the dominant vegetation. Eight predominant system and life forms combinations are identified for Teller County:

(1) Laucustrine Limnetic (L1)—freshwater lakes, deeper water zone, supports non-rooted plants, plant and animal plankton;
(2) Lacustrine Littoral (L2)—freshwater lakes, shallow water zone, supports rooted plants and bottom dwelling animals;
(3) Riverine Upper Perennial (R3)—river and stream channels;
(4) Palustrine Emergent Wetland (PEM)—vegetated wetlands dominated by emergent herbaceous flowering plants;
(5) Palustrine Scrub-Shrub Wetland, (PSS)—vegetated wetlands dominated by woody vegetation > 6 m tall;
(6) Palustrine Forested Wetland (PFO)—vegetated wetlands dominated by woody vegetation that is 6m > tall;

(7) Palustrine Unconsolidated Bottom (PUB)—shallow water wetlands with vegetative cover less than 30% (open ponds); and
(8) Palustrine Unconsolidated Shore (PUS)—shoreline wetlands with vegetative cover less than 30%.

Wetland Functions and Ecological Services

Wetland functions are natural processes of wetlands that continue regardless of their perceived value to humans (Novitzki et al. 1996). These functions include;

- storage of water;
- transformation of nutrients;
- growth of living matter; and
- diversity of wetland plants.

Ecological services are the wetland functions that are valued by society (Millennium Ecosystem Assessment 2005). For example, biogeochemical cycling (which includes retention and supply) is an ecological function whereas nutrient removal/retention is an ecological service to society. Also, overbank flooding/subsurface water storage is an ecological function whereas flood abatement/flood-flow alteration is an important ecological service.

Ecological services are typically the value people place on wetlands that is the primary factor determining whether a wetland remains intact or is converted for some other use (National Audubon Society 1993). The actual value attached to any given function or value listed above depends on the needs and perceptions of society (National Research Council 1995).

Wetland Condition Assessment

For the Teller County Wetland Survey and past county wetland survey and assessment projects, CNHP utilized a qualitative, descriptive functional assessment based on the best professional judgment of CNHP ecologists while incorporating some of the principles of the hydrogeomorphic (HGM) assessment method. The assessment was used to provide a rapid determination of each wetland's functional integrity. This functional assessment method used various qualitative indicators of structure, composition, and land use to represent and estimate the degree to which a function was being performed. This, as well as most functional assessments, requires the following assumptions: (1) the combination of variables adequately represents the function and (2) their combination results in an estimated "amount" of the function being performed. The result is that most functional assessments are not rapid and do not directly measure functions (Cole 2006).

Condition assessments are 'holistic' in that they consider ecological integrity to be an "integrating super-function" (Fennessy et al. 2004). Condition assessments or ecological integrity assessments provide insight into the integrity of a wetland's natural ecological functions that are directly related to the underlying integrity of biotic and abiotic processes. In other words, a wetland with excellent ecological integrity will perform all of its functions at full levels expected for its wetland class or type. Ecological integrity assessments are simply concerned with measuring the condition of the wetland and

assume that ecological functions follow a similar trend. This assumption may not be true for all functions, especially ecological services or those functions which provide specific societal value. For example, ecological services such as flood abatement or water quality improvement may still be performed even if ecological integrity has been compromised. However, given that one of CNHP's goals was to identify and prioritize ecologically significant wetlands it is more appropriate t to focus the assessment on ecological integrity or condition of each wetland rather than specific ecological functions, services or values.

The element occurrence rank (see Methodology Section, Table 4) used by CNHP is a rapid assessment of the condition of on-site and adjacent biotic and abiotic processes that support and maintain the element. This method was used to assess wetland condition for this report. Recently, NatureServe and CNHP (Faber-Langendoen et al. 2005) revised this method making it more transparent and repeatable. The Vegetation Index of Biotic Integrity (VIBI) (Lemly and Rocchio 2009; Rocchio 2007) evaluates the biotic integrity of a wetland by measuring attributes of the plant composition known to respond to human disturbance. The Ecological Integrity Assessments Scorecards (Scorecard) is a conditional assessment of wetlands that identifies biotic and abiotic metrics to measure integrity (Rocchio 2006).

Middle Beaver Creek. Photo:A. Shaw

Arctic gentian (*Gentianodes algida*). Photo: A. Shaw

PROJECT BACKGROUND

Location of the Study Area

Teller County, named for Henry M. Teller who served as a U.S. Senator and Secretary of Interior, is one of Colorado's smaller counties, encompassing some 559 square miles (1,448 km^2) in central Colorado (Figure 3). Teller County is bordered by Douglas County on the north, El Paso County to the east, Fremont County to the south, and Park County on the west. It was formed from portions of El Paso and Fremont County in 1899. The County wraps around the western flank of Colorado's best known "fourteener" - Pikes Peak. A conspicuous notch in the eastern boundary leaves possession of the famous summit to neighboring El Paso County. Elevations in the County range from about 6,720 feet (2,050 m) where Fourmile Creek leaves the County at the southern boundary to about 12,800 ft. (3,900 m) on the west flank of Pikes Peak at the eastern border. North and west of Pikes Peak, the gently sloping pediment of the Rampart Range forms the bulk of the County's terrain between the Front Range and the intermountain park of South Park.

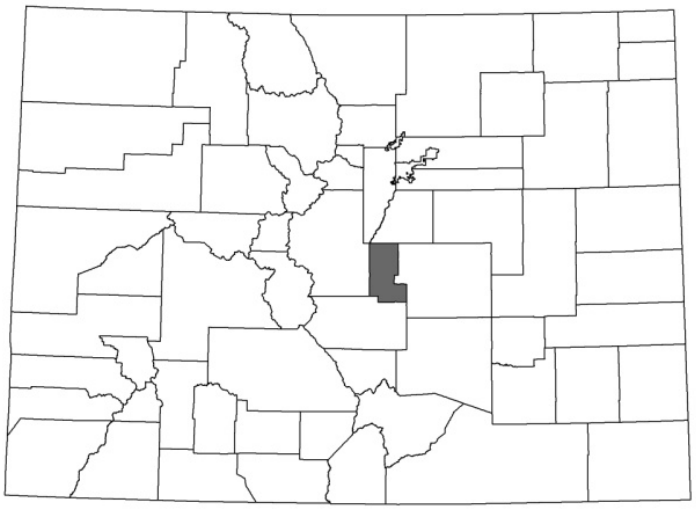


Figure 3. Location of Teller County in Colorado.

Ecoregions

Teller County is situated at the eastern edge of the Southern Rocky Mountain ecoregion as defined by The Nature Conservancy (TNC 1997, modified from Bailey 1995) (Figure 4). The Southern Rocky Mountain ecoregion includes the north-south trending mountain ranges with their intervening valleys and parks from southern Wyoming to northern New Mexico, while in Colorado, there are more westerly mountain ranges and high plateaus. The major ecological zones are alpine, subalpine, upper montane, lower montane and foothill (Neely et al. 2001).

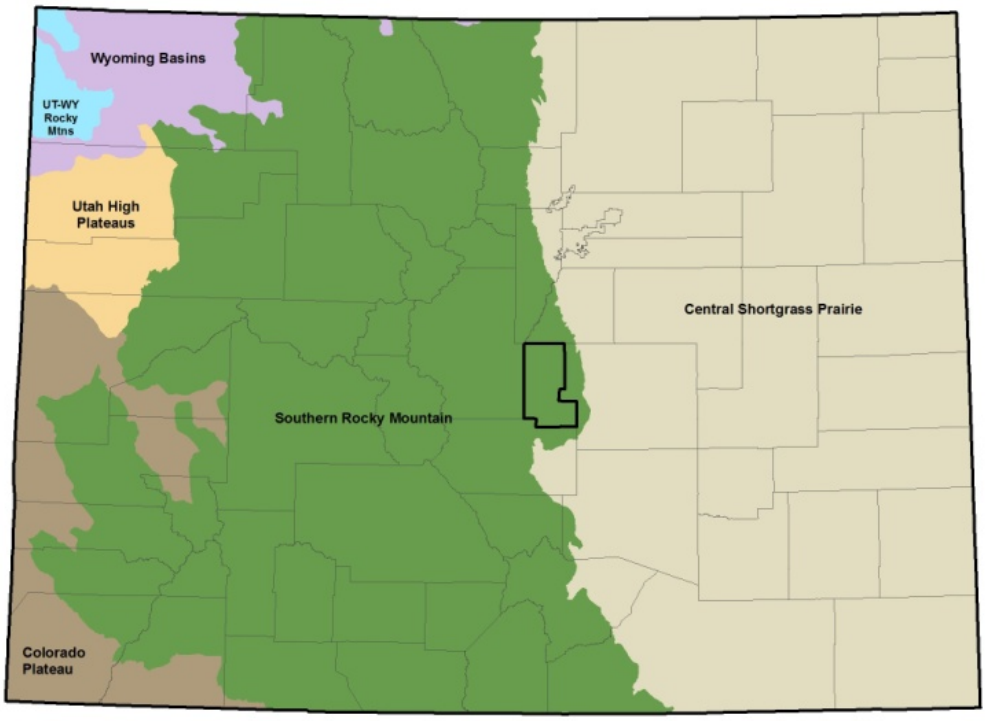


Figure 4. Teller County in relation to the Southern Rocky Mountain Ecoregion

Hydrology

Teller County sits between the headwaters of Colorado's two major east slope rivers, the South Platte and the Arkansas (Figure 5).

Teller County falls within four 8-digit Hydrologic Unit Codes (HUC-8).

1. South Platte River Headwaters watershed includes Twin and Grape creeks;
2. Upper South Platte River watershed includes Rule, Trout, Turkey and West creeks;
3. Fountain Creek watershed includes North Cheyenne and Upper Fountain creeks;
4. Upper Arkansas River watershed includes Hay, Barnard, Cripple, Millsap, Fourmile, Dry, Eightmile, and West, Middle, and East Beaver creeks.

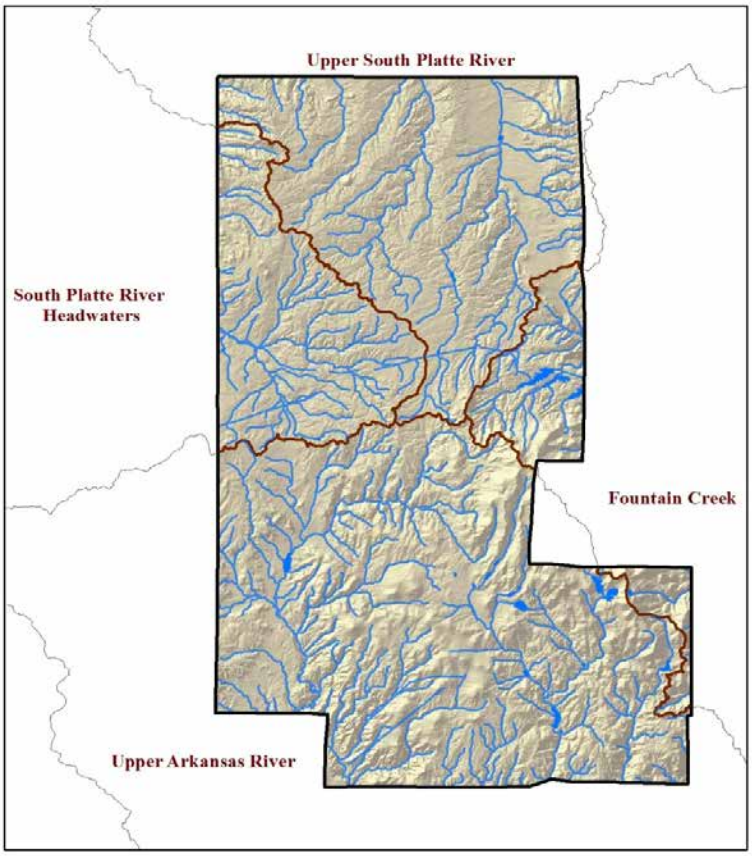


Figure 5. Major watersheds in Teller County.

Reservoirs in Teller County are relatively small, with no federal water storage projects. North and South Catamount Reservoirs, Crystal Creek Reservoir, Mason Reservoir (No. 4), McReynolds Reservoir (No. 5), and Penrose-Rosemont Reservoir provide drinking water to the City of Colorado Springs. Bison Reservoir is a water source for the City of Victor. Skaguay Reservoir is owned by the Colorado Division of Wildlife as part of the Beaver Creek State Wildlife Area. Wrights Reservoir is privately owned by the Pisgah Reservoir and Ditch Company. All the reservoirs listed are located within the Arkansas River Basin, as there are no sizable reservoirs within Teller County's portion of the South Platte River Basin (CWCB 2006a, 2006b). Teller County was the 5th lowest County in water withdrawals in Colorado in 2005, with total withdrawals of 6.42 Mgal/day or 7.20 thousand acre-ft/yr (Ivahnenko and Flynn 2010). The sectors with the greatest water withdrawals in Teller County were crop irrigation, public supply, and industrial uses (Ivahnenko and Flynn 2010).

Aquifers and Water Quality

Teller County's aquifers are primarily unconfined Precambrian crystalline-rock aquifers with seasonally fluctuating water levels. These aquifers are composed of a network of rock

fractures and possess limited water storage capacity, generally less than 1% porosity. Recharge of crystalline-rock aquifers is primarily from snowmelt and is highly localized (e.g. within 200 yards of a well). Recharge is limited by the vast majority (84%) of precipitation being lost to the atmosphere via evapotranspiration (Topper et al. 2003). A study of Teller County water quality found that septic systems had contaminated groundwater due to the poor filtering ability of crystalline-rock aquifers (Martin et al. 2002). The only waterway in Teller County currently classified by the Environmental Protection Agency as impaired water is Trout Creek, due to excess sediment (US EPA 2010).

Geology

Precambrian substrates dominate the geology of Teller County (Figure 6). The Pikes Peak batholith extends across most of Teller County from the northern border to the southern flanks of Pikes Peak. Older granitic and metamorphic rocks form most of the remainder of the County in the south and southwest. Where the Ute Pass Fault extends north from Woodland Park, dividing the Rampart and Front Range, Paleozoic formations are exposed

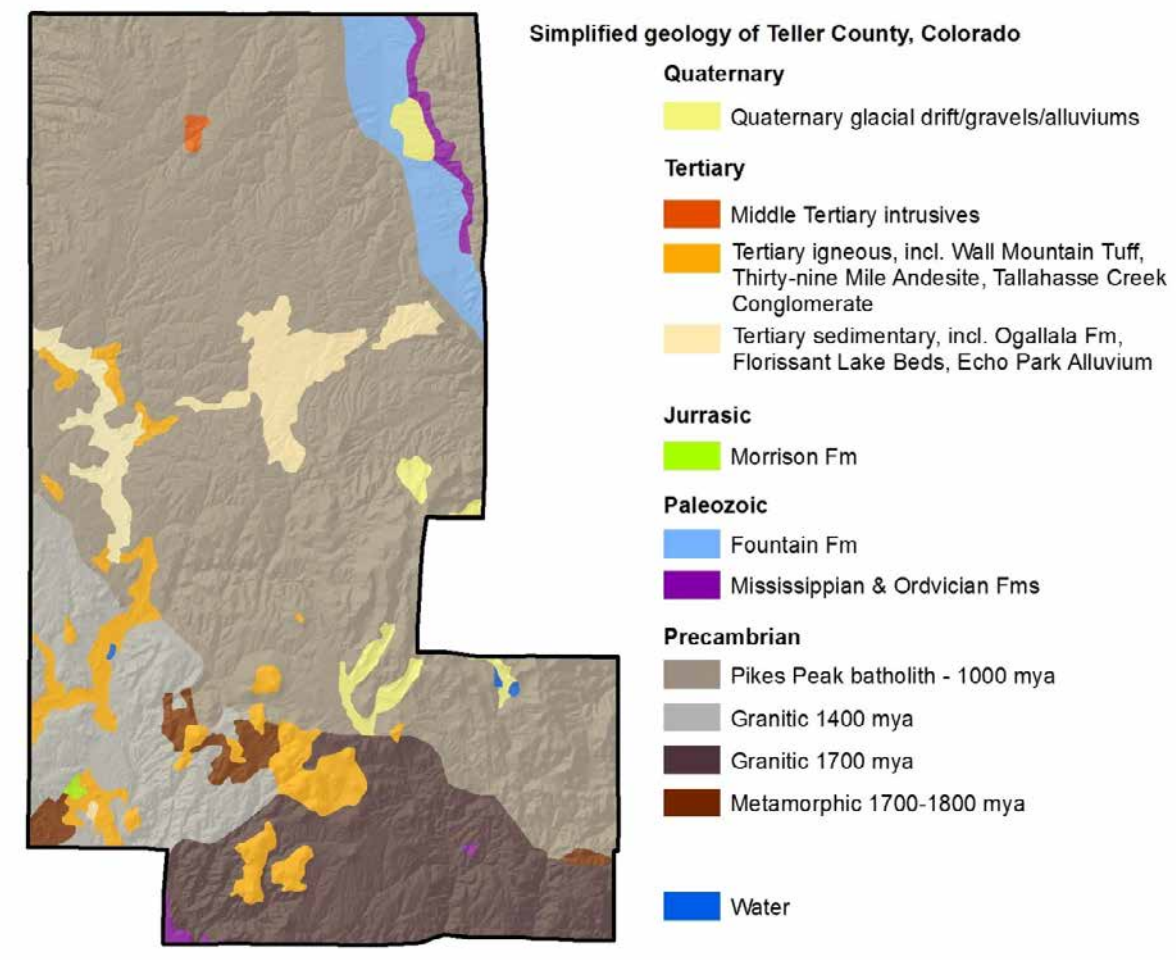


Figure 6. Geology of Teller County.

including the Fountain Formation. The other Mesozoic periods (Triassic and Cretaceous) are essentially unrepresented in Teller County. Tertiary sediments are exposed around Divide and Florissant, where late Eocene lake deposits hold a famous collection of fossil plant and insect remains. Igneous outcrops of Tertiary age are represented in the southwestern portion of the County. At Signal Butte an isolated intrusive cone rises from the area between Phantom and Trail Creeks. Quaternary age glacial deposits complete the remainder of Teller County's surficial geology, and are especially prominent in valleys descending from the summit of Pikes Peak.

One of the geologic highlights of Teller County is the Florissant Fossil Beds National Monument. The monument protects an unusual collection of fossil remains, including enormous petrified redwood stumps, one of the most diverse collections of insect fossils in the world, as well as many other important specimens of both plants and animals. These fossils were preserved in lake sediments that formed when the Florissant Valley was repeatedly dammed by a series of lahars (large volcanic mudflows) from the Guffy volcanic complex some 18 miles southwest of the monument in Park County. One of these mudflows buried the redwood trees whose petrified stumps are a primary visitor attraction at the monument. Other lahars blocked streamflow through the ancient valley and created Eocene Lake Florissant. Most of the fossils are preserved in the erosional and volcanic sediments deposited in this lake, these lake shales are the source of the extraordinarily well-preserved plant and insect fossils.

Soils

Soils in the northern third of Teller County are generally coarse textured types derived from Pikes Peak Batholith Granite that are dominated by ponderosa and mixed conifer forests. In contrast, the southwest region of Teller County lies over crystalline rock, including granite, gneiss, and mid-Tertiary igneous rock. Here canyons with steep slopes and arid landscapes favor pinyon-juniper forests. In the middle portion of the County, the high valleys running from Manitou Park in the north to High Park in the south are characterized by deeper and more fine-grained soils often supporting open grasslands. Soils of the mining district between Cripple Creek and Victor are highly altered, but were historically forested. Finally, the southeastern portion of the County is dominated by the massif of Pikes Peak, where soils are poorly developed (USDA, NRCS 1992). In general, soils in Teller County are derived from decomposed granite, have low organic content, and an unusually high pH. Soils of the Fountain Creek Watershed tend to erode easily with moderate-high runoff potential, resulting in high levels of erosion and sedimentation in local tributaries. The combination of steep rugged slopes, strong storms, and soils lacking cohesion add to the sedimentation and erosion issues. Throughout Teller County, sedimentation has resulted in a loss of channel conveyance capacity although this is still considered a minor problem (Pikes Peak Area Council of Governments 2003).

Climate

Teller County has a continental climate characterized by dry air, sunny days, clear nights, variable precipitation, moderate evaporation, and large diurnal temperature changes. Temperature and precipitation patterns in Teller County generally follow elevational

patterns, with highest precipitation and lowest temperatures occurring at higher elevations around Pikes Peak, and lower precipitation and warmer temperatures with increasing distance from the summit (Figure 7). Due to its location east of the Continental Divide, Teller County precipitation generally is highest in spring and summer. At Victor and Florissant, annual precipitation for the period of record averages 18.86 and 14.93 inches, respectively (WRCC 2010). Summer average temperatures are generally on the cool side, ranging from lows in the upper 30^0s to mid 40^0s to highs in the mid to upper 70^0s, with an record high of 92^0 F recorded at Florissant in 1994. Average winter temperatures feature highs in the upper 30^0s and lows in the single digits or teens, although temperatures as low as -32^0 F have been recorded at Florissant in 2006 (WRCC 2010).

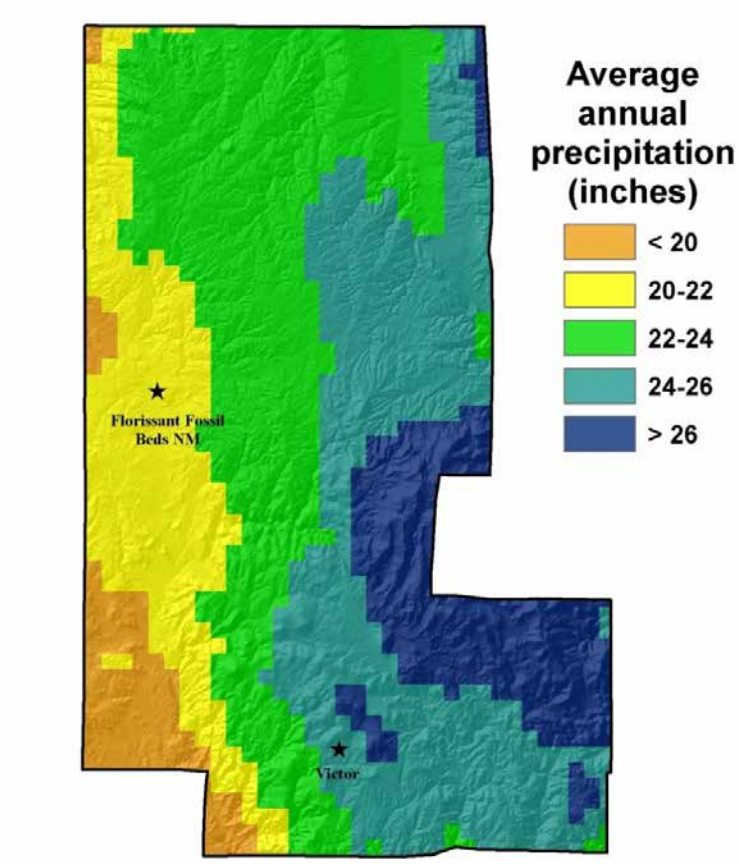


Figure 7. Annual average precipitation in Teller County.

Population

At the 2000 census, the population of Teller County was 20,555, which ranked approximately 24th of 63 counties. Although 2010 census figures are not yet available, the population was projected to have increased to 21,685 by the year 2009 (U.S. Census Bureau 2010). Population in the County has shown a steady increase over the past century, especially in the past two decades. The County is significantly rural in character; less than half of the population of the County lives in the three incorporated towns of Woodland Park, Cripple Creek, and Victor.

Land Ownership

Slightly more than half of the land in Teller County is in private ownership. Federally managed lands dominate the remainder, accounting for about 43% of the County acreage (Figure 8). Of this, lands of the Pike National Forest make up about 34% of the County, especially in the northern portion and around Pikes Peak. Other federal lands are managed by the Bureau of Land Management (7%), and the National Park Service at Florissant Fossil Beds National Monument. A number of Colorado State Wildlife Areas and State Land Board lands account for some 2% of the area, and the remainder of the County is owned by city or county local government entities. USFS lands include a portion of the Manitou Springs Experimental Forest. BLM lands include the Beaver Creek Area of Critical Environmental Concern / Wilderness Study Area. State Wildlife Areas include Dome Rock (Mueller State Park), Pikes Peak, Rosemont Reservoir, and Skaguay Reservoir. The Crown Point/East Fork Eight Mile Creek State Land Board parcel in southeastern Colorado is included in the Stewardship Trust.

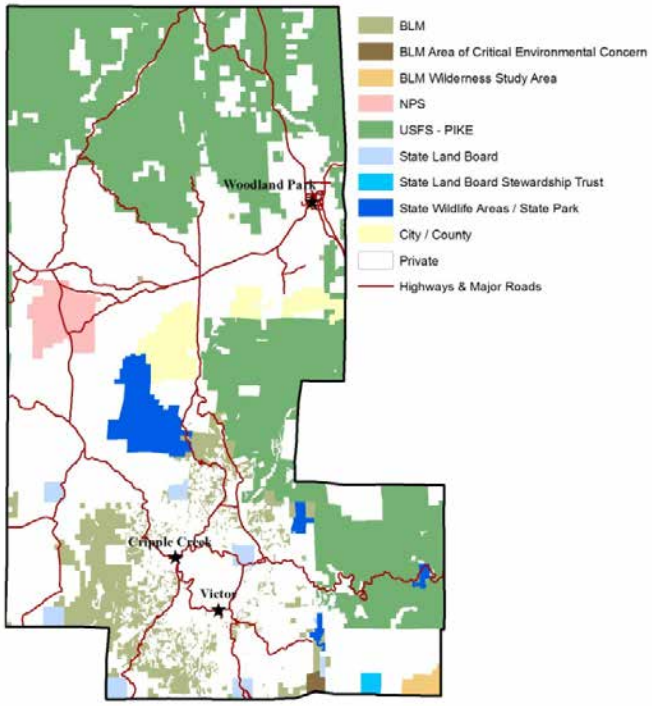


Figure 8. Land ownership in Teller County.

Land Use

What is now U.S. Highway 24 has a lengthy history as a Ute travel corridor linking the Front Range with South Park. With the influx of European hunters, miners, and settlers, many of the local Ute trails were adapted to travel by wagon and rail (Colorado Historical Society 2002). Prior to the 1890's, the primary industry in the Teller County region was timber harvest. At one time, the Woodland Park had five active saw mills producing 200,000 railroad ties during peak years. At the turn of the century, Woodland Park was exporting 12 million board-feet per year. In 1905, President Benjamin Harrison combined the last three

timber reserves into the 1.1 million acre Pike National Forest (Colorado Historical Society 2002).

The 1890 discovery of gold at Cripple Creek touched off a rush that would dramatically influence the subsequent history of the County. When gold was first discovered, around 20 people lived in what was known as "The District" of Cripple Creek. By 1900, over 50,000 people had been drawn to the area (Chronic and Williams 2002). By the time the rush was over in about 1918, the area had produced $450,000,000 in gold and silver. Over the course of its mining history, the Cripple Creek-Victor mining district has produced more than 22 million ounces of gold (Colorado Geological Survey 2009). Gold and silver mining still play an influential role in Teller County. Due to the increasing value of these metals, many of the historical mines have been reopened, and the Cripple-Creek Victor mining district has the highest production of gold and silver in the United States (Colorado Geological Survey 2009).

The current economy of Teller County relies heavily on tourism. The leisure, recreation economic sector employs the highest number of people, responsible for 32% of total employment (Headwater Economics 2009). Legalized gambling began in Cripple Creek in 1991, and the town now hosts more than a dozen casinos. Historical/cultural attractions include the Cripple Creek-Victor Historical Preservation District and abandoned mine/ghost town tours. Due to its location in the central Rocky Mountains, there are ample opportunities for outdoor recreation. Fishing, hunting, hiking, horseback riding, mountain biking, and golfing are some of the most popular activities in this County (Larsen et al. 1991). Mueller State Park and Florissant Fossil Beds National Monument attract outdoor enthusiasts year round. The American Discovery Trail, a 6,800 mile trail stretching from Delaware to California, passes through Teller County over Ute Pass (American Discovery Trail 2009).

Ecological Systems

Teller County is dominated by ecological systems of montane elevations characteristic of the Southern Rocky Mountain ecoregion (Table 1) (Figure 9). Limited alpine area is found in the area around Pikes Peak. At lower elevations, large portions of the County are dominated by ponderosa pine and mixed conifer woodlands, and montane grasslands, especially in the northern portion of the County. Vegetation to the south of Pikes Peak is more varied, and includes aspen, ponderosa pine, pinyon-juniper, and limber-bristlecone pine forests and woodlands. Figure 9 shows ecological systems with cover of at least 1% of the County's acreage.

Table 1. Ecological Systems in Teller County (NatureServe 2010).

Ecological System	Acres	Percent of County
Rocky Mountain Ponderosa Pine Woodland	149,962	42.6%
Rocky Mtn. Montane Dry-Mesic & Mesic Mixed Conifer Forest and Woodland	68,577	19.5%
Southern Rocky Mountain Montane-Subalpine Grassland	42,339	12.0%
Rocky Mountain Aspen Forest and Woodland	22,504	6.4%
Rocky Mountain Subalpine Dry-Mesic & Mesic Spruce-Fir Forest and Woodland	13,711	3.9%
Rocky Mountain Lodgepole Pine Forest (likely introduced for research at Manitou Experimental Forest)	11,832	3.4%
Rocky Mountain Alpine-Montane Wet Meadow*	8,323	2.4%
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	7,105	2.0%
Rocky Mountain Alpine Bedrock and Scree & Dry Tundra	6,571	1.9%
Southern Rocky Mountain Pinyon-Juniper Woodland	4,413	1.3%
Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland	3,782	1.1%
Rocky Mountain Subalpine-Montane Riparian Woodland	3,104	0.9%
Rocky Mountain Subalpine Mesic Meadow	2,641	0.7%
Rocky Mountain Cliff and Canyon*	2,250	0.6%
Rocky Mountain Lower Montane-Foothill Shrubland	2,224	0.6%
Rocky Mountain Subalpine-Montane Riparian Shrubland	1,759	0.5%
Inter-Mountain Basins Montane Sagebrush Steppe	629	0.2%
Rocky Mountain Alpine Fell-Field	508	0.1%
Western Great Plains Foothill and Piedmont Grassland	105	0.0%
Inter-Mountain Basins Semi-Desert Shrub Steppe	44	0.0%
Colorado Plateau Pinyon-Juniper Woodland	8	0.0%
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	5	0.0%
Other		
Open Water	1,072	0.3%
Disturbed / Non-natural	3,953	1.1%

* mining disturbance between Cripple Creek and Victor is incorrectly mapped as this type.

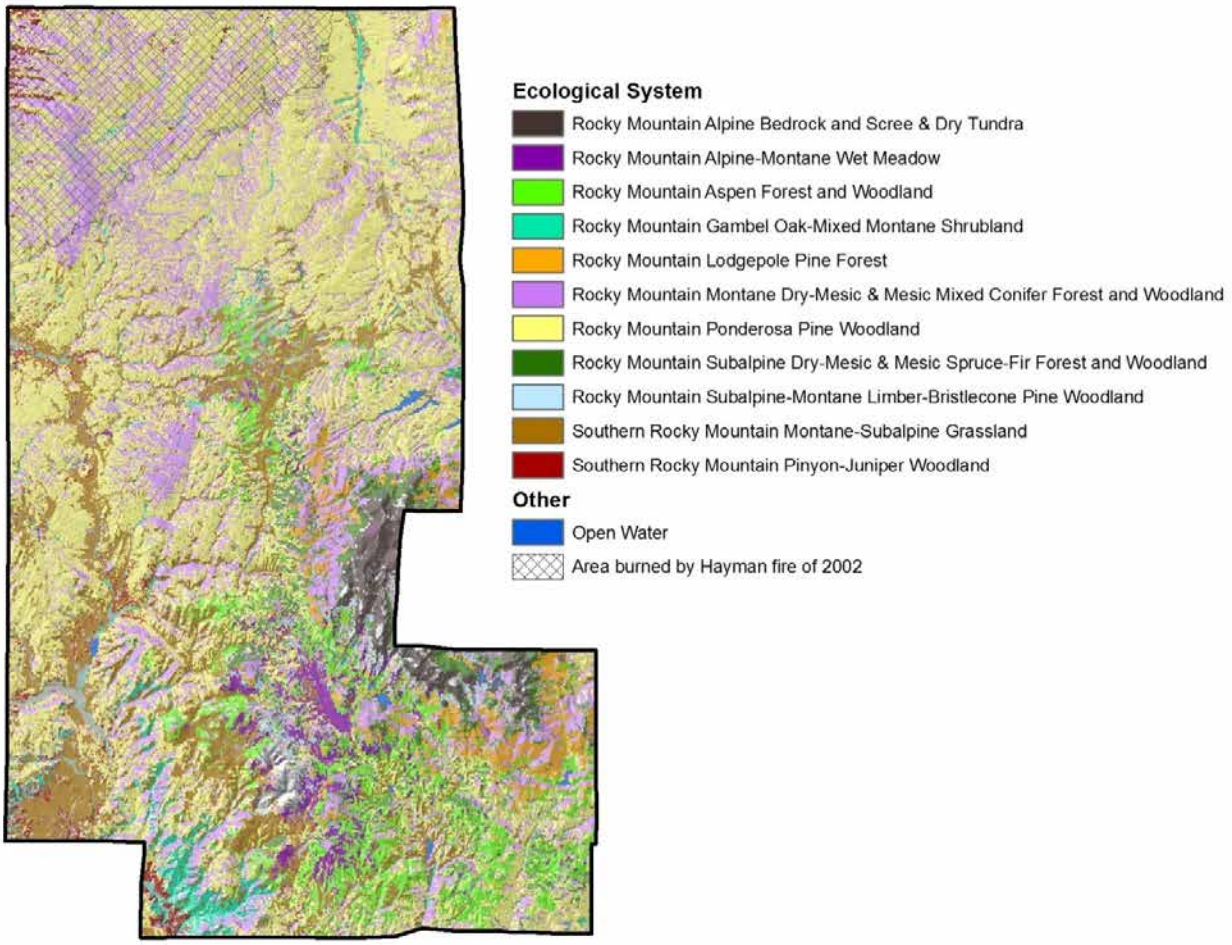


Figure 9. Major Ecological Systems in Teller County.

The following are brief description of the major ecological systems found in Teller County derived from the NatureServe Explorer (2010).

Rocky Mountain Ponderosa Pine Woodland

Pinus ponderosa (ponderosa pine) woodlands dominate Teller County, covering 42% of the land area. In Colorado, ponderosa woodlands and savannas are typically found between the lower elevation grassland and shrubland communities, while the coniferous forests are found at higher elevations. In Teller County, elevations of ponderosa pine woodland are generally between 7,000 and 9,000 feet, where they form extensive stands. Occurrences are typically found in warm, dry exposed sites on almost any slope or aspect, and the system commonly occurs on moderately steep to very steep slopes or ridgetops. At more mesic sites, ponderosa pine forests intergrade with mixed conifer forest or other forest types. These are forest and woodland communities dominated by ponderosa pine a drought-resistant, shade-intolerant conifer which is characteristic of lower treeline in the major mountain ranges of the western United States. Fire is generally regarded as the dominant disturbance in ponderosa pine systems. Additional disturbance factors include insect-pathogen caused mortality, as well as drought and other weather-related events

such as wind throw (Ehle and Baker 2003). Because ponderosa pine seedlings are relatively shade-intolerant, establishment of new trees depends in part on openings created by some form of disturbance. Thick bark, general absence of limbs near the ground, and buds protected by sparse, lengthy needles are adaptations that allow ponderosa pine trees to survive periodic low-intensity fires (Kaufmann et al. 2003). Kaufmann et al. (2006) describe a continuum of potential fire severity and effects ranging from almost no change in forest structure to complete mortality of the canopy and understory. Very low intensity fires may blacken a thin layer of litter, but surface fuels are essentially unchanged, and there is little or no mortality of canopy trees. This type of fire does not produce widespread opportunity for new tree establishment; open sites are no more common than prior to burning. In the middle of the spectrum, fire with moderate intensity exposes soil on the forest floor and kills a variable number of the dominant canopy trees, increasing understory productivity and creating opportunities for a new cohort of trees to germinate and become established in the canopy gaps. High intensity fires kill a large portion of the canopy and eliminate the seed bank. Although open sites for new tree establishment are now plentiful, reforestation will be limited by seed availability. Kaufmann et al. (2006) suggest that, except for extremely small fires, any individual fire may produce this continuum of effects, and that for most areas the historical fire regime would best be characterized as being of mixed or variable severity. These mixed severity fires produce a mosaic of patch types on the landscape, including even-aged stands, uneven-aged stands, open areas, and inclusions of other ecological systems such as riparian areas, that are less susceptible to fire (Kaufmann et al. 2000).

Rocky Mountain Dry-Mesic Mixed Conifer Forest and Woodland

Mixed conifer is a highly variable ecological system of the montane zone of the Rocky Mountains. This is the second most common ecosystem in Teller County, accounting for about 20% of total acreage. These are mixed-conifer forests occurring on all aspects at elevations generally between 8,000 and 11,000 ft. The composition and structure of the overstory are dependent upon the temperature and moisture relationships of the site and the successional status of the occurrence. *Pseudotsuga menziesii* (Douglas fir) and *Abies concolor* (white fir) are most frequent, but *Pinus ponderosa* (ponderosa pine) may be present to codominant. *Pseudotsuga menziesii* forests occupy drier sites, and here *Pinus ponderosa* is a common codominant. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes which burn somewhat infrequently. *Picea pungens* (blue spruce) is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifers species can be found growing in the same occurrence, often with an understory that includes a number of cold-deciduous shrubs and graminoid species, including *Arctostaphylos uva-ursi* (kinnikinnick), *Symphoricarpos oreophilus* (mountain snowberry), *Jamesia americana* (waxflower), *Quercus gambelii* (Gambel oak), and *Festuca arizonica* (Arizona fescue). This system was undoubtedly characterized by a mixed-severity fire regime in its "natural condition," with a high degree of burn variability regarding lethality and return interval. Stands within the Hayman burn area generally had lower burn severity than adjacent ponderosa pine forest, although some were in high burn severity areas.

Southern Rocky Mountain Montane-Subalpine Grassland

Montane and subalpine grasslands cover about 12% of Teller County, forming open park-like areas in many areas. In Colorado this ecological system typically occurs from 7,200 to 10,000 ft, on flat to rolling plains and parks or on lower dry side slopes. These large patch grasslands are intermixed with matrix stands of spruce, ponderosa pine, and aspen forests. Plant associations are variable depending on site factors such as slope, aspect, precipitation, etc., but generally lower elevation montane grasslands are more xeric and dominated by *Muhlenbergia* spp. (muhly), *Pseudoroegneria spicata* (bluebunch wheatgrass), *Festuca arizonica* (Arizona fescue), and *Festuca idahoensis* (Idahoe fescue), while upper montane or subalpine grasslands are more mesic and may be dominated by *Festuca thurberi* (Thurber's fescue) or *Danthonia intermedia* (Vasey's oatgrass). *Danthonia parryii* (Parry's oatgrass) is found across most of the elevational range of this system. Grasses of the foothills and piedmont, such as *Bouteloua gracilis* (blue grama), *Bouteloua curtipendula* (sideoats grama), *Hesperostipa comata* (needle-and-thread grass), *Koeleria macrantha* (prairie junegrass), *Pascopyrum smithii* (western wheatgrass), *Poa secunda* (curly bluegrass), and *Schizachyrium scoparium* (little bluestem) may be included in lower elevation occurrences. Woody species are generally sparse or absent, but occasional individuals from the surrounding forest communities may occur. Scattered dwarf-shrubs may be found in some occurrences with species that vary with elevation and location. Forbs are more common at higher elevation sites with higher moisture.

Rocky Mountain Aspen Forest and Woodland

Aspen dominated forests occupy about 6.5% of Teller County. In Colorado this widespread system is quite common on the west slope, with smaller stands represented on the east slope. Larger stands in Teller County are concentrated in the southern portion of the County, south and west of Pikes Peak, where elevations are generally between 9,000 to 10,000 ft. Topography is variable, sites range from level to steep slopes. These are upland forests and woodlands dominated by *Populus tremuloides* (aspen) without a significant conifer component. They usually occur as a mosaic of many plant associations and may be surrounded by a diverse array of other systems, including grasslands, wetlands, coniferous forests, etc. Conifers that may be present include *Abies concolor* (white fir), *Picea engelmannii* (Engelmann spruce), *Picea pungens* (blue spruce), *Pinus ponderosa* (ponderosa pine), and *Pseudotsuga menziesii* (Douglas-fir). Conifer species may contribute up to 15% of the tree canopy before the occurrence is reclassified as a mixed conifer occurrence. Common shrubs include *Acer glabrum* (mountain maple), *Juniperus communis* (common juniper), *Prunus virginiana* (chokecherry), *Rosa woodsii* (Wood's rose), *Symphoricarpos oreophilus* (mountain snowberry), the dwarf-shrubs and *Vaccinium myrtillus* (whortle berry). The herbaceous layers may be lush and diverse. Common graminoids may include *Bromus carinatus* (California brome), *Calamagrostis purpurascens* (purple reedgrass), *Carex siccata (= Carex foenea*; dry-spike sedge*), Carex geyeri* (Geyer's sedge), *Carex rossii* (short sedge), *Elymus glaucus* (smooth wild rye), *Elymus trachycaulus* (slender wild rye), *Festuca thurberi* (Thurber's fescue), and *Hesperostipa comata* (needle-and-thread grass). Associated forbs may include *Achillea millefolium* (common yarrow), smooth white aster (*Symphyotrichum* porteri), *Delphinium* spp. (larkspur), *Geranium caespitosum* (pineywoods geranium), *Heracleum sphondylium* (cow parsnip), *Lupinus argenteus* (silvery lupine), *Osmorhiza depauperata* (bluntseed sweetroot), *Rudbeckia hirta* (black-eyed Susan),

Thalictrum fendleri (Fendler's meadowrue), and many others. Exotic grasses such as the perennials *Poa pratensis* (Kentucky bluegrass) and *Bromus inermis* (smooth brome) as well as the annual *Bromus tectorum* (cheatgrass) are often common in occurrences disturbed by grazing. As the occurrences age, *Populus tremuloides* (aspen) is sometimes slowly succeeded by conifers until the forest is dominated by conifer species.

Rocky Mountain Subalpine Dry-Mesic and Mesic-Wet Spruce-Fir Forest and Woodland

Spruce-fir dry-mesic forest and spruce-fir mesic-wet forest ecological systems form the primary matrix systems of the montane and subalpine zones of the Southern Rocky Mountains ecoregion, and have limited distribution in Teller County. These forests account for a little less than 4% of the acreage, and are concentrated on the western and southern slopes of Pikes Peak, at elevations ranging from 9,500 to 11,000 ft. Sites within this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Mesic-wet occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. *Picea engelmannii* (Engelmann spruce) dominates the canopy,and even on moist sites. Xeric species may include *Juniperus communis* (common juniper), *Linnaea borealis* (twinflower), or *Vaccinium myrtillus* (whortleberry). Mesic understory shrubs include, *Oreobatus deliciosus* (Boulder raspberry), and *Salix* spp. (willow). Herbaceous species include; *Maianthemum stellatum* (starflower Solomon's-plume), *Cornus canadensis* (red-osier dogwood), *Erigeron eximius* (superb fleabane), *Saxifraga bronchialis* (matte saxifrage), or *Calamagrostis canadensis* (blue-joint reedgrass). Disturbances include occasional blow-down, insect outbreaks and stand-replacing fire. Pine marten (*Martes americana*) are primarily a spruce-fir obligate species that require a healthy and sizeable amount of mature forest and are an indicator of a healthy and viable occurrence of the spruce-fir system.

Rocky Mountain Alpine-Montane Wet Meadow

These high-elevation herbaceous-dominated communities account for something over 2% of the acreage in Teller County, primarily in the area around Pikes Peak. These communities occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. Occurrences range in elevation from montane to alpine (in Teller County generally from 9,000 to 11,000 ft), although most Teller County occurrences are at montane elevations where they are found on wetter sites with very low-velocity surface and subsurface flows. These wetlands are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10%. Alpine sites are typically small depressions or low slopes located below late-melting snow patches or on snowbeds. Often alpine dwarf-shrublands, especially those dominated by *Salix* spp. (willows), are immediately adjacent to the wet meadows. Wet meadow ecological systems provide important water filtration, flow attenuation, and animal habitat. This system often occurs as a mosaic of several plant associations, often dominated by graminoids, such as *Calamagrostis stricta* (northern reedgrass), *Carex illota* (small head sedge), *Carex microptera* (small-wing sedge), *Carex nigricans* (black alpine sedge), *Carex scopulorum* (Rocky Mountain sedge), *Carex utriculata* (beaked sedge), *Carex*

vernacula (native sedge), *Deschampsia caespitosa* (tufted hairgrass), and *Eleocharis quinqueflora* (few-flowered spikerush). Common forb species include *Caltha leptosepala* (marsh marigold), *Cardamine cordifolia* (heartleaf bittercress), *Rorippa alpina* (yellowcress), *Senecio triangularis* (arrow-leaf groundsel), and *Trifolium parryi* (Parry's clover).

Rocky Mountain Gambel Oak-Mixed Montane Shrubland

This large patch ecological system has minor representation in Teller County, accounting for about 2% of the acreage, primarily in the southwestern portion of the County. These shrublands are most commonly found along dry foothills, lower mountain slopes, and at approximately 6,500 to 9,500 ft in elevation. Other mesic montane shrublands with or without *Quercus gambelii* (Gambel oak) may also be present. This ecological system intergrades with the lower montane-foothills shrubland system and shares many of the same site characteristics. Vegetation is typically dominated by *Quercus gambelii* (Gambel oak) alone or codominant with, *Cercocarpus montanus* (birchleaf mountain mahogany), *Prunus virginiana* (chokecherry), or *Symphoricarpos oreophilus* (mountain snowberry). Vegetation types in this system may occur as sparse to dense shrublands composed of medium to tall stature shrubs. Occurrences structure may be multi-layered, with some short shrubby species occurring in the understory of the dominant overstory species. Occurrences can range from dense thickets with little understory to relatively mesic mixed-shrublands with a rich understory of shrubs, grasses and forbs. These shrublands often have a patchy distribution with grasses growing in between shrub patches.

Rocky Mountain Alpine Bedrock and Scree, and Rocky Mountain Dry Tundra

These high elevation ecological systems together account for less than 2% of Teller County's area, where they are concentrated on the western and southern flanks of Pikes Peak at elevations above 11,500 ft. Higher elevation sites are rocky, with poorly developed soils, and are typically exposed to desiccating winds, making it difficult for vegetation to survive. Scree slopes may have sparse cover of forbs, grasses, lichens and low shrubs. Dry tundra ecosystems in the alpine are controlled by snow retention, wind desiccation, permafrost, and a short growing season. This system is characterized by a dense cover of low-growing, perennial graminoids and forbs. Rhizomatous, sod-forming sedges are the dominant graminoids, and prostrate and mat-forming plants with thick rootstocks or taproots characterize the forbs. Dominant species include *Artemisia arctica* (boreal sagebrush), *Carex elynoides* (blackroot sedge), *Carex rupestris* (rock sedge), *Festuca brachyphylla* (shortleaf fescue), *Festuca idahoensis* (Idaho fescue), *Geum rossii* (alpine avens), *Kobresia myosuroides* (Bellardi bog sedge), and *Trifolium dasyphyllum* (whip-root clover).

Southern Rocky Mountain Pinyon-Juniper Woodland

Pinyon-juniper woodlands are a minor component of Teller County vegetation, concentrated along the western and southern border of the County at elevations below 8,000ft, where they account for less than 2% of the vegetation. These woodlands generally occupy warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to

limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. *Pinus edulis* (pinyon pine) and/or *Juniperus monosperma* (one-seeded juniper) dominate the tree canopy. *Juniperus scopulorum*(Rocky Mountain juniper) may codominate or replace one-seeded juniper at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include; *Cercocarpus montanus* (mountain mahogony), *Quercus gambelii* (Gambels oak), *Achnatherum scribneri* (Scribner needlegrass), *Bouteloua gracilis* (blue gram), and *Festuca arizonica* (Arizona fescue).

Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland

These woodlands are somewhat poorly mapped in Teller County, but primarily occur as large patches on the flanks of Pikes Peak at elevations of 10,000 to 11,000 ft, where they account for a little over 1% of the County's land cover. This ecological system occurs throughout the Rocky Mountains on dry, rocky ridges and slopes. Although it can be found near upper treeline above the matrix spruce-fir forest, it can also occur at lower elevations. These are typically woodlands of xeric, high elevation sites. Limber and bristlecone pine do not necessarily occur together, but the two species occupy a similar ecological niche. Teller County occurrences are primarly dominated by bristlecone pine (*Pinus aristata*). Other trees such as *Juniperus* spp. (junipers), *Pinus ponderosa* (ponderosa pine), or *Pseudotsuga menziesii* (Douglas fir) are occasionally present. An open shrub layer may occur in some stands and can include species such as: *Arctostaphylos uva-ursi* (kinnikinnick) *Cercocarpus montanus* (mountain mahogony), *Juniperus communis* (common juniper), *Ribes montigenum* (gooseberry currant) or *Vaccinium myrtillus* (whortleberry) The herbaceous layer, if present, is generally sparse and composed of xeric graminoids, such as *Festuca arizonic* (Arizona fescue), *Festuca idahoensis* (Idaho fescue) *Festuca thurberi* (Thurber fescue), or alpine plants such as *Trifolium dasyphyllu* (alpine clover). Both bristlecone and limber pine are slow-growing, long-lived species with individuals that may live for 1000 or more years. Fire is an important source of disturbance that facilitates stand regeneration in these systems. However, bristlecone is somewhat more tolerant of fire than is limber pine. Although both species appear to depend on fire their response is variable. While bristlecone primarily regenerates after fire limber pine primarily becomes established from Clark's Nutcracker (*Nucifraga columbiana*) caches (Lanner 1996, Rondeau 2001). Older woodlands are often broadly even-aged stands where seedlings are nearly absent, while areas that have recently burned may have abundant seedlings.

Flora

In Colorado 3,430 plant taxa are documented by the University of Colorado at Boulder herbarium (COLO) as occurring in the State. Of these, 493 have been documented in Teller County. In Teller County 23 rare or imperiled plant species have been documented; one species is ranked as G1, three are G2, and seven are ranked as G3; the remaining 12 are state rare species (see Methodology Section, Table 2 for Global Rank descriptions) . These 23 plant species were the primary botany targets for data collection and survey.

Distribution of Colorado flora is reflected by three phytogeographic factors.

1. The Rocky Mountain cordillera, running north to south, presents a potential north-south migration corridor for plant species, resulting in the majority of our high mountain species found to the north and south at least as far as the terminus of the range near Santa Fe, New Mexico.
2. The Rocky Mountains also present a barrier to east-west migration leading to distinct characters of West Slope and East Slope floras.
3. The Southern Rocky Mountains are a massive system of mountain ranges whose units are isolated from each other by intermountain basins, which resulted in some species evolving in isolation and being restricted to a particular mountain range thus leading to a high degree of endemism (Weber 1964, Weber and Wittman 2001).

Colorado endemics are those taxa known to occur only within the confines of the State. Currently 97 Colorado endemics have been identified. In Teller County, these species include:

Pikes Peak Spring Parsley	*Oreoxis humilis*	G1S1
Degener beardtongue	*Penstemon degeneri*	G2S2
Rocky Mountain columbine	*Aquilegia saximontana*	G3S3

Pikes Peak spring parsley is endemic to only one area, Pikes Peak, Colorado, where it inhabits granitic substrates in subalpine and alpine habitats. Degener beardtongue is known from only 13 occurrences in Colorado and occupies open pinyon-juniper woodlands and montane grasslands, in rocky soils with igneous bedrock. Rocky Mountain Columbine is a Colorado endemic that is found on cliffs and rocky slopes in the subalpine and alpine zones near the Continental Divide in central Colorado.

Pikes Peak spring parsley. Photo: D. Malone

Teller County is also home to several regional endemic plant species. These include:

- James's false saxifrage (*Telesonix jamesii*) (G2S2) which occurs in Colorado in the easternmost mountains on granite tors from about 9,000 to 12,000 feet and in northern New Mexico where it has been reported from one mountain area;
- Fendler's false cloak fern (*Argyrochosma fendleri*) (G3S3) which has been documented from at least 20 locations in Colorado, approximately 16 locations in New Mexico and one location Wyoming;
- Grassy slope sedge (*Carex oreocharis*) (G3S1) occurs from southeastern Wyoming to northern Arizona;
- Birdbill day-flower (*Commelina dianthifolia*) (G5S1?) is known from Colorado, New Mexico, Arizona and Texas;

James's False Saxifrage. Photo: D. Malone

- Alpine bluebells (*Mertensia alpina*) (G4?S1) is endemic to the Rocky Mountains occurring at high elevation sites in Colorado, New Mexico, Wyoming, Montana and Idaho;
- Jeweled blazing star (*Nuttalia speciosa*) (G3?S3?) occupies gravel slopes and is known from Colorado and one location in Wyoming; and
- Pale blue-eyed grass (*Sisyrinchium pallidum*) (G2G3S2) is found in Colorado and in Wyoming where it occupies poorly drained meadows, streambanks and irrigated hay meadows.

Alpine bluebells. Photo: D. Malone.

Birdbill day flower. Photo: D. Malone.

Non-native Plant Species

In Colorado there are 498 (14.5% of total flora) invasive plant species. Invasion of non-native and aggressive species and their replacement of native species is a threat to Colorado and Teller County. However, compared to other more populated Colorado watersheds, the threat is not as imminent. The Colorado Department of Agriculture Noxious Weed Program lists species according to their degree of invasiveness. List A species are designated by the State Commissioner for eradication. No List A species were documented during the project. List B weed species are species for which the State develops and implements state noxious weed management plans designed to stop the continued spread of these species. List C weed species are species for which the Commissioner will develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands.

List B species documented within the watershed:

Black henbane (*Hyoscyamus niger*)
Bull thistle (*Cirsium vulgare*)
Butter and eggs (*Linaria vulgaris*)
Canada thistle (*Breea arvense*)
Dalmatian toadflax (*Linaria dalmatica*)
Houndstongue (*Cynoglossum officinale*)
Jointed goatgrass (*Aegilops cylindrica*)
Leafy spurge (*Euphorbia esula*)
Musk Thistle (*Carduus nutans*)
Ox-eye daisy (*Chrysanthemum leucanthemum)*
Salt cedar (*Tamarix ramosissima*)
White top or hoary cress (*Cardaria draba*)

List C species documented within the watershed:

Common burdock (*Arctium minus*)
Cheatgrass (*Anisantha tectorum*)
Common mullein (*Verbascum thaspus*)
Downy brome (*Bromus tectorum*)
Field bindweed (*Convolvulus arvensis*)

Henbane (*Hyoscyamus niger*). Photo: A. Shaw

Fauna

Dramatic topographic relief with complex physiography in combination with geology and the geographic position of Teller County has created a rich mosaic of ecosystems with a richly textured patchwork of habitata. This heterogeneous landscape provides for a high diversity of fauna. Teller County is comprised of four principal ecological zones transitioning along an elevational gradient from lower elevation foothills to the mid-elevation montane zone to high-elevation subalpine and alpine zones. Each ecological zone is comprised of ecological systems and natural plant communities that transition in a predictable pattern with elevation and climate. Climate differs in each of these zones with temperatures decreasing and moisture increasing with elevation. Native plant and animal species have evolved with and are adapted to these environmental conditions. There is strong evidence however that climatic patterns are changing, and that Colorado, with its

high topographic relief and consequent ecological complexity, may expect marked effects from these changes (Fitzgerald et al.1994, USGS 2010, CWCB 2011,).

Animals do not occur randomly in nature; rather their occurrence in a particular habitat is a consequence of several variables including history, geology, physiography, climate and ecological relationships with plants and other animals (Mutel and Emerick 1992, Fitzgerald et al. 1994). Because animals are adapted to use specific resources and tolerate a certain range of environmental conditions, they only occupy those ecosystems that meet their requirements (Mutel and Emerick 1992). Each type of ecosystem provides resources for a characteristic suite of animal species, and although many animal species are adapted to a wide range of environmental conditions and are able to utilize and move among habitats, the range of tolerance of many others is fairly restricted to specific habitats and conditions.

Historically, Colorado has been home to 130 species of mammals (Fitzgerald et al. 1994), 428 bird species (Kingery 1998), 18 amphibian, 35 snake, 5 turtle and 16 lizard species (Hammerson 1999) and about 80 native species of fish (Woodling 1985). Teller County is home to at least 60 mammals (Fitzgerald et al.), 125 bird species (Kingery 1998) and at least 4 amphibian, 6 reptiles (Hammerson 1999), and at least two native fish species (Woodling 1985). Although many of these mammals are habitat specialists, some are generalists and use many different habitats. In Colorado and Teller County those species that are present and tolerant of a broad range of habitats include small mammals such as dwarf shrew (*Sorex nanus*) which is found from the montane through the alpine in forested and shrubby habitat; deer mice (*Peromyscus maniculatus*) and the golden-mantled ground squirrel (*Spermophilus lateralis*) that occur from the alpine down to the foothills and beyond in a variety of habitats; carnivores such as coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*) and several species in the weasel family including long-tailed (*Mustela frenata*) and short-tailed weasel (*Mustela erminea*) and historically gray wolf (*Canis lupus*) which occurred in a wide range of elevations and habitats; ungulates such as mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*) and bighorn sheep (*Ovis canadensis*) migrate to make use of seasonally available foraging and breeding resources; and mammalian carnivores which are found in a broad range of habitats such as bobcat, coyote and mountain lion (*Felix concolor*) can also be elevational migrants, following their prey as they migrate between summer and winter range.

Other mammalian species are more restricted by their natural history to specific elevations and ecosystems. These specialist species can be routinely found in those ecosystems. Only a few reptiles occur in Teller County but one species, the Western rattlesnake (*Crotalus viridis*), is widely distributed across a broad elevational range (3,000 to 9,500 feet) in several habitats including grasslands, mountain shrubland, riparian zones, pinyon-juniper woodland, and montane forests (Colorado Gap Analysis 2001).

Bird distribution is related to habitat preference with vegetative type and structure exerting a major influence on bird distribution (Kingery 1998) and the colorful diversity of Colorado habitats supports a rich bird community. Bird fauna, like mammalian fauna, is comprised of habitat generalists that are found in many ecosystems and elevations, as well as habitat specialists that are found in specific habitat types with a narrow range of

environmental conditions. Unlike mammalian fauna, most avian fauna in Colorado are long distance or elevational migrants moving into Colorado during spring and summer to breed and raise young and moving to lower elevations or latitudes during winter.

Subalpine, montane and foothill zone coniferous and deciduous forests, shrublands and grasslands provide tremendous opportunity for Teller County's native wildlife. Grasslands in Teller County support a large number of mammal and bird species and are home to Gunnison's prairie dog (*Cynomys gunnisoni*) which is a keystone species in this ecosystem (Bangert and Slobodchikoff 2000) and is a candidate for Listing under the Endangered Species Act (USFWS 2010). Prairie dog burrows provide homes for birds and other mammals and reptiles and they themselves are important prey for mammal and avian predators. Black-footed ferret (*Mustela nigripes*) historically occurred in Teller County. Black-footed ferrets co-evolved with prairie dogs and occupy prairie dog colonies where they hunt for prairie dogs and use prairie dog burrows for denning and raising young (Miller et al. 1996). Natural grasslands provide optimal forage for elk, mule deer and pronghorn (*Antilocapra americana*). Small mammals include montane vole (*Microtus montanus*) and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*) and carnivores such as American badger (*Taxidea taxus*) and historically gray wolves which especially occupied habitats where large ungulates were plentiful (Mech 1970). Songbirds that nest in grasslands include Vesper Sparrow (*Pooecetes gramineus*), Savannah Sparrow (*Passerculus sandwichensis*) and Bobolink (*Dolichonyx oryzivorus*). Numerous raptors forage over the grasslands including Red-tailed Hawk (*Buteo jamaicensis*), Prairie Falcon (*Falco mexicanus*) and Peregrine Falcon (*Falco peregrinus*), and, in the winter Ferruginous Hawks (*Buteo regalis*) which prey heavily on prairie dogs. American Kestrel (*Falco sparverius*) and Great Horned Owls (*Bubo virginianus*) hunt here and nest in nearby forests. Eastern fence (*Sceloporus undulatus erythrocheilus*) and short-horned lizard (*Phrynosoma hernandezi*) are found here as well as in shrublands and pinyon-juniper woodlands and provide excellent food for raptors such as American Kestrel. Plains spadefoot toad (*Spea bombifrons*), is found in lower elevation grasslands along streams and, although not documented in Teller County, have been found in El Paso County near its western boundary with Teller County (Hammerson 1999).

Gunnison Prairie Dog. Photo: CDOW

Shrublands, including Gambel oak (*Quercus gambelii*) and mountain mahogany (*Cercocarpus montanus*) communities, are among the most productive of systems providing animals with an abundance of resources. Small mammals such as the least and Colorado chipmunk (*Tamias minimus* and *T. quadrivittatus*) are abundant here and the uncommon gray fox (*Urocyon cinereoargenteus*) makes this habitat its home. Townsend's big-eared bats (*Plecotus townsendii*) forage in these shrublands and use abandoned mines for day roosts. Breeding bird species are abundant here and include Green-tailed and Spotted Towhee (*Pipilo chlorurus* and *P. maculatus*) and Virginia's Warbler (*Vermivora virginiae*).

Lower elevation coniferous forests are characterized by pinyon pine-juniper woodlands. Although many species pass through and use pinyon-juniper habitat only a few remain

year-round. Characteristic small mammals include bushytailed and Mexican woodrats (*Neotoma cinerea* and *N. Mexicana*). Mule deer depend on these woodlands for winter cover and forage (Mutel and Emerick 1992) and carnivores including mountain lion, bobcat and ring-tailed cat (*Bassariscus astutus*) come here to hunt the abundant prey (Armstrong 1972, Fitzgerald et al 1994, Colorado Gap Analysis Project 2001). A variety of bird species nest and forage here including Pinyon Jay (*Gymnorhinus cyanocephalus*) and Juniper Titmouse (*Baeolophus griseus*). In winter, Townsend's Solitaire (*Myadestes townsendi*) visit these woodlands to forage on juniper berries.

Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) forests often intermix and have a similar fauna. Abert's squirrels (*Sciurus aberti*) are characteristic of ponderosa pine forests while pine squirrels (*Tamiasciurus hudsonicus*) are characteristic of Douglas fir forests. Bat species that take up residence in Ponderosa pine forests include fringed myotis (*Myotis thysanodes*). Porcupine (*Erethizon dorsatum*) is common and carnivores including coyote and bobcat come to these forests to hunt the abundant small mammal populations. Songbirds that characterize these forests include Pygmy Nuthatch (*Sitta pygmaea*), Western Tanager (*Piranga ludoviciana*), Plumbeous Vireo (*Vireo plumbeus*), Grace's warbler (*Dendroica graciae*) and Yellow-rumped Warbler (*Dendroica coronata*) and raptors such as Flammulated Owl (*Otus flammeolus*) which nest and hunt in ponderosa pine forests. The Manitou Experimental Forest in Teller County has been the site of Flammulated Owl research since 1979. Long-term studies here have found that old growth ponderosa pine/Douglas fir forests provide breeding habitat essential for the Flammulated Owl (*Otus flammeolus).* In Colorado, nesting Flammulated Owls showed a preference for old trees and stands of ponderosa pine and Douglas-fir. Owls more often settled and nested in areas dominated by older forests then young forest, used old trees and forest stands more often for foraging and returned more often to territories that were in old stands of ponderosa pine mixed with Douglas-fir compared to territories composed of mosaics of stands of other tree species and ages (Reynolds and Linkhart 1992). Likely reasons include habitat structure and prey availability. Ponderosa pine/Douglas fir forest contain up to four times as many Lepidopteran species, which are an important prey species during breeding, as other western conifers. Additionally, old growth forests are characterized by open stands of trees with understories that suit the foraging behavior of Flammulated Owls and older forests contain an abundance of snags and lightening damaged trees that provide nest cavities and provide sites for territorial singing and day-roosting (Linkhart et al. 1998).

Flammulated Owl. Photo: B. Linkhart

Deep, narrow, north-south trending canyons in the southern parts of Teller County are often characterized by a tree canopy of mixed Douglas and white fir on west-facing canyon walls and ponderosa pine on east-facing walls with riparian habitat in canyon bottoms characterized by mixed tree canopy of spruce, cottonwood and deciduous shrubs. These canyon sites provide potential habitat for the Mexican Spotted Owl (*Strix occidentalis lucida*). Mexican Spotted Owl is federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS 2010). Although spotted owls were not detected during this survey, they are present nearby in adjacent counties with similar habitat and topography.

Mexican Spotted Owl
Photo: D. Malone.

Insects are essential to ecosystem function and ponderosa pine woodlands provide habitat for the critically imperiled butterfly Pawnee montane skipper (*Hesperia leonardus montana*). This butterfly occurs in ponderosa pine woodlands and on outcrops of Pikes Peak granites where adequate adult and larval food sources are present; adults feed on nectar sources such as dotted gayfeather (*Liatris punctata*) and larvae feed on grasses especially blue grama (*Bouteloua gracilis*). Although surveys in 2010 did not document the Pawnee montane skipper, potential habitat does exist in Teller County.

High elevation conifer forests include stands of Engelmann spruce (*Picea engelmannii*), bristlecone pine (*Pinus aristata*) and limber pine (*Pinus flexilis*). Mammals that characterize these spruce forests include southern red-backed vole (*Clethrionomys gapperi*), pine squirrels (*Tamiasciurus hudsonicus*) and snowshoe hare (*Lepus americanus*) and the carnivorous, arboreal pine marten (*Martes americana*) which hunt pine squirrels and songbirds. Characteristic songbird species here include Golden-crowned Kinglet (*Regulus satrapa*), Red-breasted Nuthatch (*Sitta canadensis*), Clark's Nutcracker (*Nucifraga columbiana*), Pine Grosbeak (*Pinicola enucleator*), Red Crossbill (*Loxia curvirostra*) and raptors such as Northern Goshawk (*Accipiter gentilis*) and Northern Saw-whet Owl (*Aegolius acadicus*). Three-toed woodpeckers (*Picoides dorsalis*) are also found in mature stands of spruce forest where they forage on decadent trees for insects. Bristlecone and limber pine forests provide an abundance of food and seed eaters such as deer mice, least chipmunk and pine squirrel are common here. Bird fauna here is characterized by Clark's Nutcracker and Gray Jay (*Perisoreus canadensis*) which find an abundant and nutritious food resource in pine seeds.

Aspen forests extend from the lower montane to the subalpine zone and are home to a diverse and abundant suite of animal species. Small mammals are abundant in the lush understory and include montane and masked shrew (*Sorex monticolus* and *S. cinereus*), meadow and long-tailed voles (*Microtus pennsylvanicus* and *M. longicaudus*) and the western jumping mouse (*Zapus princeps*). Elk and mule deer find cover and browse here and numerous meso-predators such as long-tailed weasel (*Mustela frenata*) hunt in this rich habitat. Black bear (*Ursus americanus*) are common in these forests where they find a

storehouse of insects, forbs and grasses to forage on. The bird community is especially diverse in this structurally complex habitat. Characteristic species include Warbling Vireo (*Vireo gilvus*), House Wren (*Troglodytes aedon*), Red-naped and Williamson's Sapsucker (*Sphyrapicus nuchalis* and *S. thyroideus*) and Tree Swallow (*Tachycineta bicolor*).

Alpine tundra in Teller County is a harsh environment and although many mammals (including humans) visit here during the summer, only a few species remain year-round. Summer visitors that come to forage or to breed include elk, mule deer and big horn sheep as well as predators, including mountain lion and coyote that often follow to hunt their prey. Year-round residents include American pika (*Ochotona princeps*) which is also active year-round. Pika inhabit talus slopes, foraging during the summer in adjacent turf meadows and storing small "haypiles" of grasses and forbs for the winter. Northern pocket gophers (*Thomomys talpoides*) are *c*ommon here and are also active year-round. Yellow-bellied marmots (*Marmota flaviventris*) survive the alpine environment by hibernating through the winter. Only a few bird species breed here but some breed here exclusively including White-tailed Ptarmigan (*Lagopus leucurus*), Brown-capped Rosy Finch (*Leucosticte australis*) and American Pipit (*Anthus rubescens*). White-crowned Sparrow (*Zonotrichia leucophrys*) and Horned Lark (*Eremophila alpestris*) nest here but they also nest in similar habitats at lower elevations. Only one bird species remains year-round, the White-tailed Ptarmigan and then only the male remains while the female moves down into the spruce forest.

Beaver. Photo: D. Malone.

Riparian and stream habitat health at all elevations is dependent on beaver activity. Beaver (*Castor canadensis*) were historically abundant throughout the west prior to 1870 but by the early 1900's were extirpated from much of their historic habitat due to unregulated trapping (Cary 1911). Removal of this mammalian engineer changed the character of riparian areas all across Colorado (Naiman et al. 1988). Beaver and western riparian and stream ecosystems have evolved together and are essential to the sustainability of each other. Beaver build dams that create ponds, manage watersheds and perform important ecosystems functions. These functions including slowing spring runoff and raising the water table, promoting water storage and sediment trapping, and creating habitat for other mammal species such as mink (*Mustela vison*) and muskrat (*Ondatra zibethicus*), birds, fish, reptiles and amphibians, and insects. Beaver cache willow branches that eventually root and grow into dense willow shrublands that provide forage for ungulates and nesting habitat for birds. Bird species that occur in Teller County and that rely on riparian and wetland habitats include Osprey (*Pandion haliaetus*), Great Blue Heron (*Ardea Herodias*), Common Snipe (*Gallinago gallinago*), Belted Kingfisher (*Ceryle alcyon*), Red-naped Sapsucker (*Sphyrapicus nuchalis*), American Dipper (*Cinclus mexicanus*), Veery (*Catharus fuscescens*), MacGillivray's Warbler (*Oporonis tolmiei*), Lincoln's Sparrow (*Melospiza lincolnii*) and Fox Sparrow (*Passerella iliaca*). Amphibians and reptiles affiliated with a variety of wetland habitats

include western chorus frog (*Pseudacris triseriata),* northern leopard frog (*Rana pipiens*), tiger salamander (*Ambystoma tigrinum*), smooth green snake (*Opheodrys vernalis*), glossy snake (*Arizona elegans*) and western terrestrial garter snake (*Thamnophis elegans vagrans*) (CDOW 2001). Northern leopard frog is listed as a species of concern in Colorado. Leopard frog populations have declined in many areas, especially in the Rocky Mountains of Colorado, Wyoming and Montana likely due to a variety of impacts including habitat loss and degradation, overexploitation, competition and predation by non-native species and unknown causes (NatureServe 2010).

Northern Leopard Frog. Photo D. Culver.

Stream and wetland ecosystems in Teller County provide important habitat for a variety of native and introduced fish species. Native fish include the greenback cutthroat trout (*Oncorhynchus clarki stomias*) which is found in only a few headwater streams in the Arkansas and South Platte River drainages. Greenbacks, like other native trout, are adapted to cold, clear, well-oxygenated water that supply an abundance of their macroinvertebrate food resource (CDOW 2010). Severe population declines due to habitat degradation, competition from introduced fish species and over-fishing, have led to the greenback cutthroat trout's listing as threatened both federally and in Colorado. The other native fish species in Teller County is the Longnose sucker (*Catostomus catostomus*) which is common in both lakes and streams (Woodling 1985). Numerous fish species have been introduced to Colorado streams and are now ubiquitously distributed throughout appropriate habitat. These include brown (*Salmo trutta*), rainbow (*Oncorhynchus mykiss*) and brook (*Salvelinus fontinalis*) trout.

Greenback Cutthroat Trout.
Photo: J. Woodling

Although the Southern Rocky Mountains retains much of its native wildlife, the distribution, abundance and diversity of native populations has changed over the last few decades, probably as a result of human influence (Fitzgerald et al. 1994). By the early 1900's most large predators, once common on the Front Range, had been extirpated or had become rare in many parts of the state. By the early 1900's gray wolves (*Canis lupus*), which were once abundant over the entire state, were rare throughout the state, mountain lion were rare east of the Continental Divide, both Canada lynx (*Lynx lynx*) and grizzly bear (*Ursus arctos*) were rare throughout their range, the black bear (*Ursus americanus*) was scarce on the eastern slope of the Front Range and wolverine (*Gulo gulo*), which were never common but did have a general occurrence through the mountains, had been extirpated (Cary 1911). Similarly, most ungulate populations had been greatly reduced or exterminated by the early 1900's. Bison, which were distributed over most of the state and were common in mountain parks, were gone by the 1890's and only a few skulls were to be

found by the early 1900's; elk had been extirpated over most of Colorado; mule deer, once common over the entire state, were gone from the plains and were rare east of the Continental Divide but still abundant west of the Divide; and although big horn sheep populations had somewhat recovered by the early 1900's since their protection by law in 1885, long-term viability was, even then, threatened by disease (Cary 1911).

Although many of Colorado's native animals are absent or are present only in limited abundance, with the natural recovery of habitats and more sustainable wildlife management regulations, many species have returned, some flourish and others have been reintroduced. With the recovery of habitats and native wildlife populations Teller County can also look forward to functioning and sustainable ecosystems. Recovery and reintroduction programs have brought the black-footed ferret back from the brink of extinction, bighorn sheep once more thrive in many areas of Colorado, Peregrine Falcon can once again be seen soaring over Teller County and the once (almost) extirpated elk is now again abundant in Colorado.

Riparian shrubland in Teller County. Photo: M. Menefee.

CONSERVATION ASSESSMENT

Potential Impacts to Biological Diversity in Teller County

General threats that may affect biodiversity on a large, landscape-level scale in Teller 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.

Climate Change

Data from the Intergovernmental Panel on Climate Change (IPCC) (Ray et al. 2008) clearly show that our Colorado climate will not be the same as it has been in the past ten years. Climate models project Colorado will warm by 2.5°F by 2025, relative to the 1950–99 baseline, and 4°F by 2050. The projections show summers warming more (+5°F) than winters (+3°F) and suggest that typical summer temperatures in 2050 will be as warm as or warmer than the hottest 10% of summers that occurred between 1950 and 1999; from 1957 to 2006 the average year-round temperatures in the upper Arkansas River basin have increased by 2° F (Ray et al. 2008). The IPCC primary conclusions are: temperatures are increasing and will continue to increase; there is uncertainty with regard to precipitation projections; even with no change in precipitation, temperature increases alone will lead to a decline in runoff for most of Colorado's river basins by the mid-21st century; Synthesis of findings suggests a reduction in total water availability by the mid-21st century; and that a warming climate increases the risk to Colorado's water supply even if precipitation remains at historical levels.

Wildfire Impacts

A substantial portion of northwestern Teller County was burned in the Hayman Fire of 2002 (Figure 10). Ignited during an extremely dry year that followed several below average years, this fire occurred under extreme fire conditions where abundant and continuous fuels were at record low moisture levels and unseasonable warm and dry weather conditions resulted in a burn of some 138,000 acres, making it the largest documented fire in Colorado history (Graham 2003). Most of the affected area was in ponderosa pine and mixed conifer forest, and was historically characterized by a mixed-severity fire regime. Although fire suppression had somewhat altered the landscape composition of the area, it is not clear that the burn was completely outside the range of natural variation for fires in this ecosystem (Graham 2003). Invasive, nonnative plant species pose one of the greatest potential threats to long-term ecosystem integrity in the area burned by the Hayman Fire. In other ecosystems, nonnative invaders have been shown to cause decline of native plant species and pollinators, as well as adverse changes in fire regimes, nutrient cycling, and hydrology. Thus, invasive, nonnative species may be responsible for some of the most serious ecological impacts and the greatest long-term costs (for example, for mitigation) associated with the Hayman Fire (Chong et al. 2003). Subsequent researchers have indicated that exotic plants were stimulated by the Hayman

Fire, especially in severely burned areas. But exotic richness and cover remain low as compared to native understory development. Therefore, concluding that exotic plants are not a major ecological threat at present (Fornwalt et al. 2010). However, it is recommended that monitoring be continued to evaluate if exotic plants will pose a threat in the future.

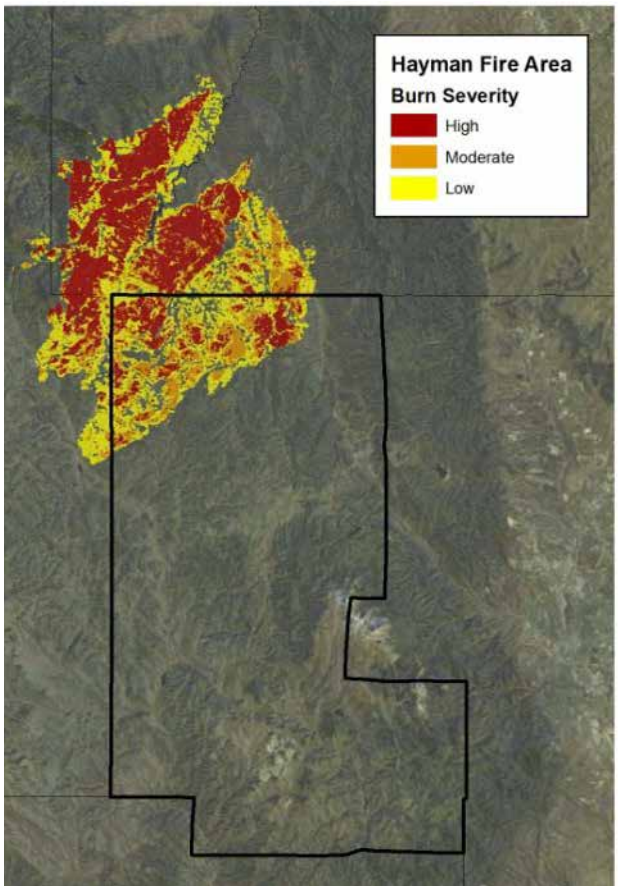


Figure 10. Extent and severity of 2002 Hayman Fire in Teller County.

Recreation

Recreation, once very local and perhaps even unnoticeable, is increasing and becoming a threat to natural ecosystems in Teller 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 forested and non-forested areas. ATVs have also been identified as a vector for the invasion of non-native plant species and a cause of soil erosion with resulting smothering of vegetation and excessive stream sedimentation.

Non-motorized recreation, mostly hiking but also some horseback riding, mountain biking and rock climbing, presents a different set of issues (Knight and Cole 1991; Miller et al. 1998). Wildlife behavior can be significantly altered by repeat visits of hikers, horseback riders, 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 (CDNR 1998). Miller et al. (1998) found lower nest survival for ground-nesting birds adjacent to trails; they also found that ground-nesting 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.

Window Rock. Photo: M. Menefee.

Livestock Grazing

Domestic livestock grazing has been a traditional livelihood in Teller County since the mid-1800s and has left a broad and sometimes subtle impact on the landscape. For some species, properly managed grazing can be a compatible activity. However, some range management practices can adversely affect the region's biological resources. Many riparian areas in Teller County are included in rangeland and grazing allotments. Especially at lower elevations in the County, livestock tend to congregate near wetland and riparian areas for shade, lush browse, and access to water. Long-term, incompatible livestock use of wetland and riparian areas can potentially erode stream banks, cause streams to downcut or spread out of an established channel causing additional erosion, 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).

Fragmentation and Edge Effects

Edges are simply the outer boundary of an ecosystem that abruptly grades into another type of habitat, such as the edge of a Gambel oak shrubland adjacent to grassland .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).

Non-native Species

Invasion of non-native and aggressive species, and their replacement of native species, is one of the biggest threats to Teller County's natural diversity. 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 (James 1993; D'Antonio and Vitousek 1992).

Although complete eradication of non-native aggressive species is not possible, some control efforts can pay off. Regarding non-native invasive plant species, one important guideline is that when a plant is removed, something will take its place, that is, "ecological voids do not exist" (Young 1981). Simply killing aggressive non-native plant species, unless there is a seed source for desirable replacements, will result in more unwanted species, perhaps even more noxious than those removed. Seeding of desirable plant species is usually necessary. When seeding, it is important to consider seedbed characteristics including rock cover, and the potential of the soil to support the planted species. A first step is to assess the current vegetation, in relation to the potential of the site. One approach is to experiment on a small scale to determine the potential success of a weed control/seeding project, using native plant species. Ideally, seed should be harvested locally. A mixture of native grasses and forbs is desirable, so that each species may succeed in the microhabitat for which it is best suited. In general, lower elevations of the County are more affected by non-native and aggressive plant species than higher elevations, and level valley bottoms more than steep slopes.

METHODS

The methods for assessing and prioritizing conservation needs over a large area, such as a County, are necessarily diverse. CNHP follows a general method that is continuously being developed specifically for this purpose. *The Survey for Critical Biological Resources in Teller County* was conducted in several steps summarized below. Additionally, input from Teller County and its stakeholders was sought at all stages.

Survey Methods

Collect Available Information

CNHP databases were updated with information regarding the known locations of species and significant plant associations within Teller County. A variety of information sources were searched for this information. The Colorado State University museums and herbaria were searched, as were plant and animal collections at the University of Colorado, Rocky Mountain Herbarium, Colorado College, and local private collections. 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 entered into CNHP's Biodiversity Tracking and Conservation System (BIOTICS).

Identify rare or imperiled species and significant plant associations with potential to occur in Teller 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 Teller County or from adjacent counties are included in this list. Over 60 rare species and significant plant communities were targeted in this survey. Given the limited amount of time and funding, 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.

Identify Targeted Inventory Areas

Survey sites were chosen based on their likelihood of harboring rare or imperiled species or significant plant communities (see Figure 11, page 49). Previously documented locations were targeted, and additional potential areas were chosen using available information sources. Areas with potentially high natural values were selected using soil surveys, geology maps, vegetation surveys, aerial photos (color-infrared and natural color) 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. Additional TIAs were identified by Teller County and its stakeholders.

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 Program ranks of G1-G3 were the primary target of our inventory efforts. Although species with lower Natural Heritage Program 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.

An alternative method was also used to select additional wetland/riparian TIAs. The U.S. Fish & Wildlife Service's National Wetland Inventory map was reprojected into the datum NAD83 Zone 13N. The reprojected layer was intersected with a land status layer. This merged the attribute tables of the two layers so that the resulting table contained each polygon's ownership status (public vs. private) and its wetland classification. All privately owned wetlands were selected for further analysis. A raster GIS layer of landscape integrity across Colorado was created by CNHP's Conservation Data Services Team in 2006. This layer assigns a numerical value ranging from 0 (no threats) to 2462 (extreme threat) to each point on the landscape to quantify the potential anthropogenic impacts to that point based on surrounding land uses, e.g. agriculture, urban development, oil and gas development, surface mining, and roads. This layer was clipped to the boundaries of Teller County. The resulting Teller County landscape integrity raster layer was reclassified into low (values 0-249), medium (250-499), and high (500 and above) threat levels. The raster layer was then converted into a shapefile of polygons representing these three threat levels. All low threat polygons were selected and used to clip the privately owned wetlands selected above. The resulting low threat privately owned wetlands were further refined by erasing land within a 0.5 mile buffer zone of water diversions. Adjacent polygons were dissolved into larger single polygons. Polygons of one acre or more were selected. An online random number generator was used to randomly select 50 of these polygons for use as Targeted Inventory Areas.

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 the Teller County assessor's office or stakeholders. 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 and Gather Data
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, plants are often not identifiable without flowers or fruit that are only present during certain times of the year or breeding birds cannot be surveyed outside of the breeding season, because they are most visible in breeding plumage and are easier to spot when singing to attract mates. Amphibians are best surveyed in spring when adults are calling and mating, in mid-summer when tadpoles are out and adults are still active and in late summer when metamorphs are present. 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. 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 following section on Natural Heritage Program 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 or from adjacent public land. 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 survey area, which included ditching, adventive plant species, plant species indicative of intensive livestock use, stream bank destabilization, major hydrologic alterations, excessive 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. If roadside assessments of private lands yielded the potential presence of an element occurrence, landowner contact was initiated, and if permission was given, an on-site assessment was performed.

2). On-site assessments. On-site assessment was the preferred method, as it is the only assessment technique that can yield high-confidence statements concerning the known or potential presence of rare and imperiled elements or excellent examples of common associations. On-site assessments are also the most resource intensive because of the effort required to contact landowners. In several 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 CNHP was unable to contact the landowner during the time frame of this study.

The methods used in the animal surveys vary according to the animal that was being targeted. In most cases, the appropriate habitats were visually searched in a systematic fashion, attempting 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 followed by specific reference sources:

- Amphibians: visual observation, vocal surveys and capture using aquatic dip nets (Hammerson 1999)
- Birds: visual observation or identification by song or call (Kingery 1998 Andrews and Righter 1992, National Geographic Society 2006)
- Invertebrates: sweep netting (Opler et al. 2009, Scott 1986)
- Mammals: visual observation, pit fall trapping, Sherman live trapping and mist-netting for bats (Fitzgerald et al. 1994)

3). Plant and plant community data collection

- Lists of all plant associations in the survey area, including the percent cover by that community. In almost all cases, plant associations were immediately placed within both the International National Vegetation Classification (Anderson et al. 1998; Comer et al. 2003) and the Comprehensive Statewide Wetlands Classification (Carsey et al. 2003). Plant synonym followed Kartesz (1999).
- Vegetation data using Weber and Wittman (2001) for each major plant association in the wetland were collected using visual ocular estimates of species cover in a representative portion of the plant association, including non-native species.
- Soil description (wetlands only).
- Water chemistry (wetlands only).
- UTM coordinates and elevation from Garmin GPSmap 76CSx.
- Current and historic land use (e.g., grazing, logging, recreational use) when apparent.
- Notes on geology and geomorphology.
- Reference photos of the site.
- Indicators of disturbance such as logging, grazing, flooding, etc.

Natural Heritage Methodology

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. CNHP actively collects maps and electronically processes specific occurrence information for animal and plant species considered extremely imperiled to vulnerable in the state (S1 - S3). Several factors, such as rarity, evolutionary distinctiveness and endemism (specificity of habitat requirements), contribute to the conservation priority of each species. Certain species are “watchlisted,” meaning that specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted. A complete description of each of the Natural Heritage ranks is provided in Table 2.

This single rank system works readily for all species except those that are migratory. Those animals that migrate may spend only a portion of their life cycles within the state. In these cases, it is necessary to distinguish between breeding, non-breeding and resident species. As noted in Table 2, ranks followed by a "B,” for example S1B, indicate that the rank applies only to the status of breeding occurrences. Similarly, ranks followed by an "N,” for example S4N, refer to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state.

Table 2. Definition of Natural Heritage Imperilment Ranks.

G/S1	Critically imperiled globally/state because of rarity (5 or fewer occurrences in the world/state; or 1,000 or fewer individuals), or because some factor of its biology makes it especially vulnerable to extinction.
G/S2	Imperiled globally/state because of rarity (6 to 20 occurrences, or 1,000 to 3,000 individuals), or because other factors demonstrably make it very vulnerable to extinction throughout its range.
G/S3	Vulnerable through its range or found locally in a restricted range (21 to 100 occurrences, or 3,000 to 10,000 individuals).
G/S4	Apparently secure globally/state, though it may be quite rare in parts of its range, especially at the periphery. Usually more than 100 occurrences and 10,000 individuals.
G/S5	Demonstrably secure globally/state, though it may be quite rare in parts of its range, especially at the periphery.
G/SX	Presumed extinct globally, or extirpated within the state.
G#?	Indicates uncertainty about an assigned global rank.
G/SU	Unable to assign rank due to lack of available information.
GQ	Indicates uncertainty about taxonomic status.
G/SH	Historically known, but usually not verified for an extended period of time.
G#T#	Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.
S#B	Refers to the breeding season imperilment of elements that are not residents.
S#N	Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used.
SZ	Migrant whose occurrences are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.
SA	Accidental in the state.
SR	Reported to occur in the state but unverified.
S?	Unranked. Some evidence that species may be imperiled, but awaiting formal rarity ranking. Note: Where two numbers appear in a state or global rank (for example, S2S3), the actual rank of the element is uncertain, but falls within the stated range.

Legal Designations for Rare Species

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

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

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

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 or 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 4.

Table 4. Element Occurrence Ranks and their Definitions.

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

Potential Conservation Areas

In order to successfully protect populations or occurrences CNHP designs 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. PCAs 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; and
- 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 any 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.

Ranking of Potential Conservation Areas

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

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

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

Protection Urgency Ranks

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

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

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

A protection action involves increasing the current level of protection accorded one or more tracts within a potential conservation area. It may also include activities such as educational or public relations campaigns, or collaborative planning efforts with public or private entities, to minimize adverse impacts to element occurrences at a site. It does not include management actions. Situations that may require a protection action 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 7 summarizes M-ranks and their definitions.

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

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

National Wetland Inventory Map Digitizing

As part of the collaboration with the EPA-funded *Survey of Critical Wetlands and Riparian Areas in Teller County*, original National Wetland Inventory (NWI) paper topographic maps were scanned, brought into AcrGIS 9.2 and geo-referenced. Wetland polygon features were extracted using Definiens eCognition image recognition software (Definiens, Inc., New Jersey, USA). Once polygons were extracted, extraneous lines and jagged edges were cleaned by hand ArcGIS. Each polygon was attributed using the original NWI code, following the U.S. FWS's Cowardin classification (Cowardin et al. 1979). All polygons and attributes were reviewed for quality assurance using the QA/QC tools available from the NWI program. Invalid codes no longer used by the NWI program were updated to the currently accepted codes. No effort was made to modify polygons based on land use changes since the original photo interpretation. The goal of the effort was to digitize the original NWI maps as they were and not to update or re-photo interpret wetlands.

Subalpine wetland in Teller County. Photo: A. Shaw.

RESULTS

Results of the 2010 survey of Teller County confirm that there are many areas with outstanding to very high biological significance. Pre-field season, 88 upland and 101 wetland Targeted Inventory Areas (TIAs) were identified within Teller County (Figure 11), of which 52% were visited during the summer of 2010.

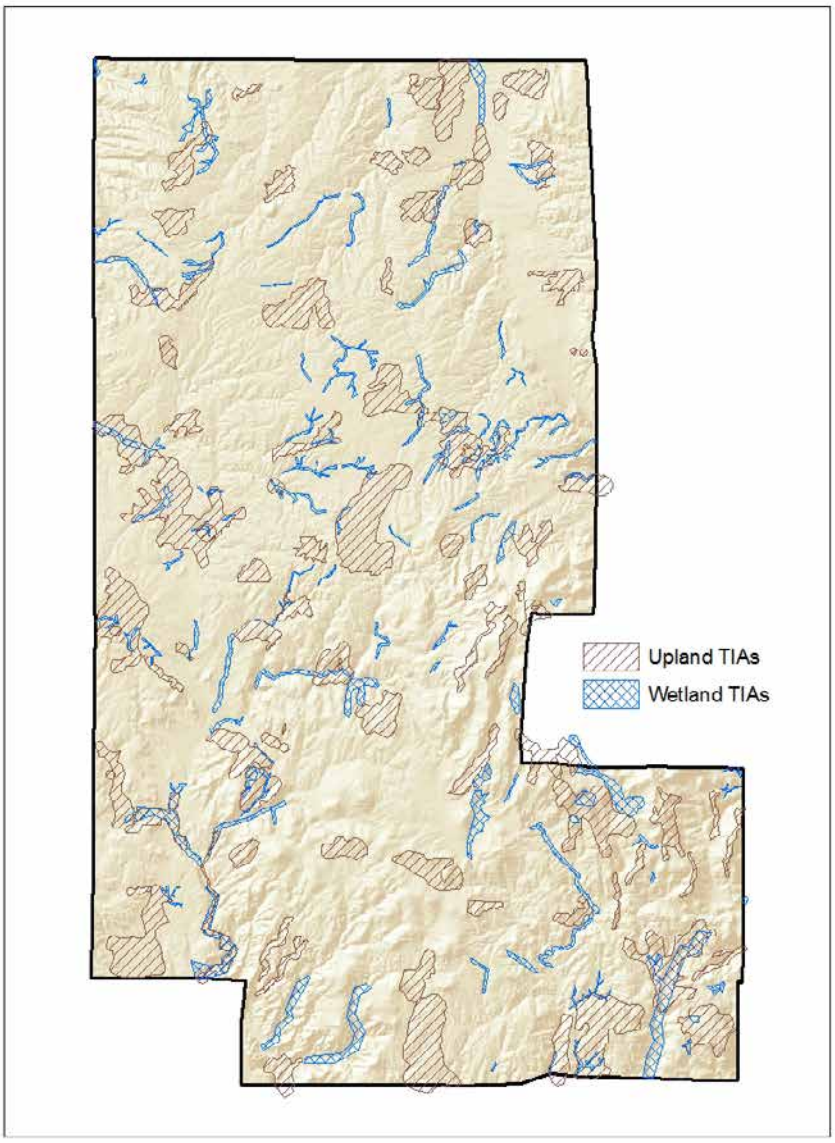


Figure 11. Upland and Wetland Target Inventory Areas.

A total of 100 new element occurrences (18 zoology, 45 ecology, and 37 botany) were documented as well as 27 element occurrences (1 zoology, 10 ecology, and 16 botany) that were updated. CNHP biologists documented 23 rare or imperiled plants, 7 rare or imperiled animals, and 45 plant communities of critical concern (Table 8). The Front Range alum root (*Heuchera hallii*) was found frequently in the County. The global rank of G3 was reduced to G4 and therefore it will be watch-listed. Zoologists and ecologists surveyed approximately ten days for the Mexican Spotted Owl (*Strix occidentalis lucida*) and 4 days for the meadow jumping mouse (*Zapus hudsonius preblei*) with negative results. This is not a comprehensive list of all elements of biological significance known to occur in Teller County, but rather only includes those elements associated with PCAs that are significant enough to be archived in CNHP's Biodiversity Tracking and Conservation Data System (BIOTICS).

Table 8. Significant Species and Plant Communities Documented from Teller County in 2010.

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Fish						
Oncorhynchus clarkii stomias	Greenback Cutthroat Trout	G4T2T3	S2	LT		ST
Birds						
Dendroica graciae	Grace's warbler	G5	S3B			
Falco peregrines anatum	American Peregrine Falcon	G4T4	S2B,		FS	SC
Lagopus leucurus	White-tailed Ptarmigan	G5	S4		FS	
Leucosticte australis	Brown-capped Rosy-finch	G4	S3B, S4N			
Amphibians						
Rana pipiens	Northern Leopard Frog	G5	S3		BLM/FS	
Mammals						
Cynomys gunnisoni	Gunnison's Prairie Dog	G5	S5	C	FS	
Plant Communities						
Alnus incana / Mesic Graminoids Shrubland	Alder/Mesic Graminoids Shrubland	G3	S2			
Betula occidentalis / Maianthemum stellatum Shrubland	River Birch/False Soloman's Seal Shrubland	G4?	S2			

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Betula occidentalis / Mesic Graminoids	River Birch / Mesic Graminoids	G3	S2			
Carex aquatilis Herbaceous Vegetation	Water Sedge Herbaceous Vegetation	G5	S4			
Carex aquatilis – *Carex utriculata* Herbaceous Vegetation	Water Sedge – Beaked Sedge Herbaceous Vegetation	G4	S4			
Carex nebrascensis Herbaceous Vegetation	Nebraska Sedge Herbaceous Vegetation	G4	S3			
Carex rupestris – *Geum rossii* Herbaceous Vegetation	Curly Sedge – Ross' Avens Herbaceous Vegetation	G4	S4			
Carex simulata Herbaceous Vegetation	Analougue Sedge Herbaceous Vegetation	G4	S3			
Cercocarpus montanus / *Muhlenbergia montana* Shrubland	Mountain Mahogany / Mountain Muhly Shrubland	GU	S2			
Danthonia intermedia Herbaceous Vegetation	Intermediate Oatgrass Herbaceous Vegetation	G2G3	S2S3			
Danthonia parryi Herbaceous Vegetation	Parry's Oatgrass Grassland	G3	S3			
Festuca arizonica - *Muhlenbergia filiculmis* Herbaceous Vegetation	Arizona Fescue/Slender Muhly Grassland	GU	S3			
Festuca arizonica – *Muhlenbergia montana* Herbaceous Vegetation	Arizona Fescue / Mountain Muhly Herbaceous Vegetation	G3	S2			
Kobresia myosuroides / *Carex rupestris* var. *drummondiana* Herbaceous Vegetation	Bellardi Bog Sedge / Drummond's Sedge Herbaceous Vegetation	G3	S3?			

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Kobresia myosuroides / Geum rossii Herbaceous Vegetation	Bellardi Bog Sedge / Ross' Avens Herbaceous Vegetation	G5	S5			
Paronychia pulvinata / Silene acaulis Dwarf Shrubland	Rocky Mountain Nailwort / Moss Campion Dwarf Shrubland	G5	S5			
Picea engelmannii / Trifolium dasyphyllum Forest	Engelmann Spruce / Alpine Clover Forest	G2?	S2			
Picea pungens – Betula occidentalis Woodland	Colorado Blue Spruce – River Birch Woodland	G2	S2			
Pinus aristata / Festuca arizonica Woodland	Bristlecone Pine/ Arizona Fescue Woodland	G4	S3			
Pinus aristata / Trifolium dasyphyllum Woodland	Bristlecone Pine/ Alpine Clover Woodland	G2	S2			
Pinus edulis / Achnatherum scribneri Woodland	Pinyon Pine/Indian Ricegrass Woodland	G3	S2			
Pinus ponderosa / Festuca arizonica Woodland	Ponderosa Pine/Arizona Fescue Woodland	G4	S4			
Pinus ponderosa / Leucopoa kingii Woodland	Ponderosa Pine / Spike Fescue Woodland	G3	S3			
Populus angustifolia / Alnus incana Woodland	Narrowleaf Cottonwood / Thin-leaf Alder Woodland	G3	S3			
Populus angustifolia – Juniperus scopulorum Woodland	Narrowleaf Cottonwood –Rocky Mountain Juniper Woodland	G2G3	S2S3			
Populus angustifolia - Pseudotsuga menziesii Woodland	Narrowleaf Cottonwood- Douglas Fir Woodland	G3	S2			
Populus angustifolia / Salix exigua Woodland	Narrowleaf Cottonwood- Coyote Willow Woodland	G4	S4			
Populus angustifolia / Salix irrorata Woodland	Narrowleaf Cottonwood- Bluestem Willow Woodland	G2	S2			

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Populus deltoids – (Salix amygdaloides) / Salix (exigua, interior) Woodland	Plains cottonwood – (Peach-leaf Willow) / Willow Woodland	G3G4	S3			
Populus tremuloides / Alnus incana Forest	Quaking Aspen / Thin-leaf Alder Forest	G3	S3			
Populus tremuloides / Betula occidentalis Forest	Quaking Aspen / River Birch Forest	G3	S2			
Populus tremuloides / Festuca thurberi Forest	Quaking Aspen / Thurber's Fescue Forest	G4	S4			
Pseudotsuga menziesii / Betula occidentalis Woodland	Douglas Fir/ River Birch Woodland	G3?	S3			
Pseudotsuga menziesii / Cornus sericea Woodland	Douglas Fir / Red-osier Dogwood Woodland	G4	S2			
Quercus gambelii – Cercocarpus montanus / (Carex geyeri) Shrubland	Gambel Oak – Mountain Mahogony / (Geyer Sedge) Shrubland	G3	S3			
Salix bebbiana Shrubland	Bebb's Willow Shrubland	G3?	S2			
Salix brachycarpa / Carex aquatilis Shrubland	Short-fruited Willow / Water Sedge Shrubland	G2G3	S2S3			
Salix brachycarpa / Mesic Forbs Shrubland	Short-fruited Willow / Mesic Forbs Shrubland	G4	S4			
Salix exigua / Barren Shrubland	Narrowleaf Willow / Barren Shrubland	G5	S5			
Salix geyeriana - Salix monticola / Mesic Forbs Shrubland	Geyer's Willow-Rocky Mountain Willow/ Mesic Forb Shrubland	G3	S3			
Salix ligulifolia Shrubland	Strapleaf Willow Shrubland	G2G3	S2S3			
Salix monticola / Mesic Graminoids Shrubland	Rocky Mountain Willow / Mesic Graminoids Shrubland	G3	S3			

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Salix planifolia / Carex aquatilis Shrubland	Planeleaf Willow / Water Sedge Shrubland	G5	S4			
Salix planifolia / Carex utriculata Shrubland	Planeleaf Willow / Beaked Sedge Shrubland	GNR	S2			
Salix wolfii / Mesic Forbs Shrubland	Wolf Willow / Mesic Forbs Shrubland	G3	S3			
Plants						
Aquilegia saximontana	Rocky Mountain Columbine	G3	S3			
Argyrochosma fendleri	Fendler Cloak-fern	G3	S3			
Botrychium echo	Reflected Moonwort	G3	S3			
Botrychium hesperium	Western Moonwort	G4	S2			
Botrychium pallidum	Pale Moonwort	G3	S2			
Carex limosa	Mud Sedge	G5	S2			
Carex oreocharis	Grassy slope sedge	G3	S1			
Cheilanthes eatonii	Eaton's Lip Fern	G5?	S1S2			
Commelina dianthifolia	Birdbill Day-flower	G5	S1?			
Cypripedium calceolus ssp. *parviflorum*	American Yellow Lady's-slipper	G5	S2		USFS	
Draba rectifructa	White Arctic Whitlow-grass	G3?	S2			
Elatine triandra	Longstem Water-wort	G5	S1			
Isoetes echinospora ssp. *muricata*	Spiny-spore Quillwort	G5?T5?	S2			
Malaxis brachypoda	White Adder's mouth	G4Q	S1			
Mertensia alpina	Alpine Bluebells	G4?	S1			
Nuttalia speciosa	Jeweled Blazing Star	G3?	S3?			
Oreoxis humilis	Pikes Peak Spring-Parsley	G1	S1		USFS	
Penstemon degeneri	Degener Beardtongue	G2	S2		BLM, USFS	
Salix serissima	Autumn Willow	G4	S1		USFS	
Sisyrinchium pallidum	Pale blue-eyed grass	G2G3	S2			

Scientific Name	Common Name	Global Rank	State Rank	US ESA	Federal Sensitive	State Sensitive
Telesonix jamesii	James' False Saxifrage	G2	S2			
Unamia alba	Prairie Goldenrod	G5	S2S3			
Woodsia neomexicana	New Mexico Cliff Fern	G4?	S2			

Prairie Goldenrod (*Unamia alba*). Photo: Corey Raimond

Autumn Willow (*Salix serissima*). Photo: Al Schneider

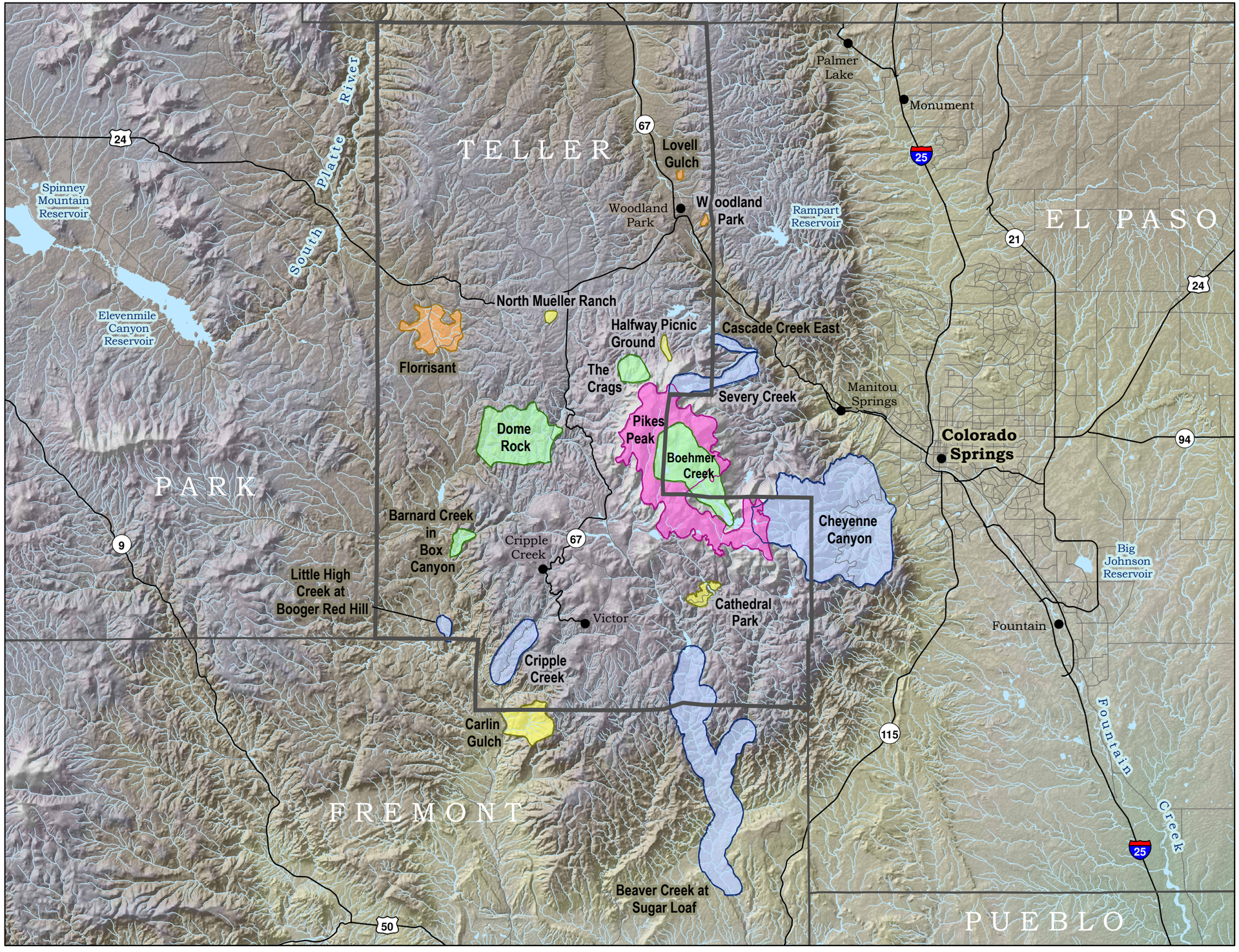
Forty-nine Potential Conservation Areas (PCAs) were identified for Teller County (Table 9) that represents the immediate habitat needed for the viability of the critical biological elements. Before the project there were only 19 PCAs identified in Teller County (Map 1). Of the PCAs presented in the report (Map 2);

- 1 is of outstanding biodiversity significance (B1),
- 9 are of very high biodiversity significance (B2),
- 16 are of high biodiversity significance (B3),
- 18 are of moderate biodiversity significance (B4), and
- 5 are of general biodiversity significance (B5).

Table 9. Potential Conservation Areas in Teller County.

Site Name	**Biodiversity Rank**
Pikes Peak	B1
Beaver Creek at Sugar Loaf	B2
Bison Creek	B2
Dry Creek at Antelope Park	B2
East Beaver Creek	B2
Little High Creek at Booger Red Hill	B2
Manchester Creek	B2
Phantom Canyon of Eightmile Creek	B2
Severy Creek	B2
Skaguay Reservoir	B2
Almagre Mountain	B3
Booger Red Hill	B3
Cripple Creek	B3
Crystal Creek near Cedar Mountain Road	B3
Florissant	B3
Florissant at Hornbek Homestead	B3
Fourmile Creek at Dome Rock	B3
High Park	B3
Mitre Peak at Cabin Gulch	B3
Rule Creek	B3
Seven Lakes	B3
Sheep Mountain at Bison Reservoir	B3
The Crags	B3
Trout Creek at Manitou Experimental Forest	B3
West Fourmile Creek	B3
Wilson Creek	B3
Barnard Creek in Box Canyon	B4

Site Name	Biodiversity Rank
Blue Springs	B4
Catamount Creek	B4
Crazy Gulch	B4
Crystola	B4
East Fork of West Beaver Creek	B4
Halfway Picnic Ground	B4
Horsethief Park	B4
Hungry Gulch	B4
John's Gulch	B4
Manitou Forest	B4
Quinlan Gulch	B4
South Catamount Creek	B4
Straub Mountain	B4
Trail Creek	B4
Twin Rocks Road	B4
Upper Crystola Creek	B4
West Fourmile at Fourmile Creek	B4
Crystola Creek at Aquaduct	B5
Slater Creek	B5
Trout Creek Fen	B5
Upper Grape Creek	B5
White Gulch	B5



Colorado Natural Heritage Program
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254 General Services Building
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Fort Collins, CO 80523-1474

Ph (970) 491-1309
http://www.cnhp.colostate.edu

Map Date: 03/14/2011

Legend

CNHP Potential Conservation Areas (PCAs) by Biodiversity Significance Rank

- B1: Outstanding Biodiversity Significance
- B2: Very High Biodiversity Significance
- B3: High Biodiversity Significance
- B4: Moderate Biodiversity Significance
- B5: General Biodiversity Interest

Base Data

- Counties
- Cities
- Highways
- Major Roads
- Lakes, Reservoirs
- Rivers
- Streams, Creeks

10m Digital Elevation Model Produced by the U.S. Geological Survey

Location in Colorado

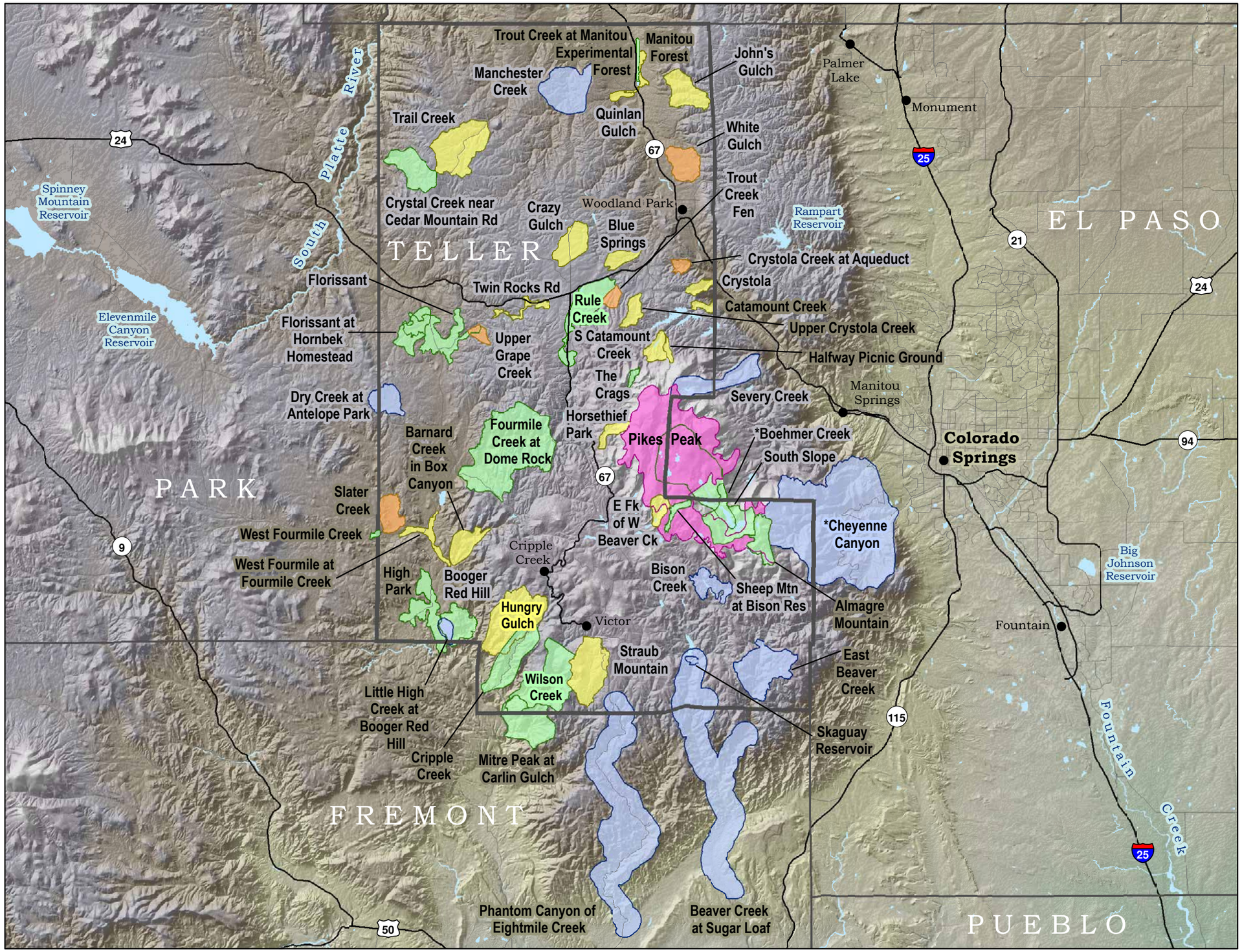
PCAs represent CNHP's best estimate of the primary area supporting the long-term survival of targeted species, subspecies and natural communities.

0 1 2 4 Miles

N

Coordinate System: UTM, Zone 13, NAD83

Map 1. Potential Conservation Areas in Teller County before 2010 Survey.



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Map Date: 03/25/2011

Legend

CNHP Potential Conservation Areas (PCAs) by Biodiversity Significance Rank*

- B1: Outstanding Biodiversity Significance
- B2: Very High Biodiversity Significance
- B3: High Biodiversity Significance
- B4: Moderate Biodiversity Significance
- B5: General Biodiversity Interest

*PCAs with an asterisk preceding the site name are not described in the report

Base Data

- Counties
- Cities
- Highways
- Major Roads
- Lakes, Reservoirs
- Rivers
- Streams, Creeks

10m Digital Elevation Model Produced by the U.S. Geological Survey

Location in Colorado

PCAs represent CNHP's best estimate of the primary area supporting the long-term survival of targeted species, subspecies and natural communities.

0 1 2 4 Miles

N

Coordinate System: UTM, Zone 13, NAD83

Map 2. Potential Conservation Areas in Teller County.

Wetland Mapping

Through the EPA-funded portion of this project, 11 original National Wetland Inventory paper topographic maps were scanned and digitized. Six additional topographic quads had already been digitized prior to this project (Figure 14). Of the 357,760 acres of Teller County, 3% are classified as wetlands according to the National Wetland Inventory maps (Table 10) (Figure 13). To further illustrate the distribution of the wetlands in the County, CNHP used Level IV ecoregions as defined by Omernick (1987). The Omernik ecoregion system is hierarchical and considers the spatial patterns of both the living and non-living components of the region, such as geology, physiography, vegetation, climate, soils, land use, wildlife, water quality, and hydrology. There are five Level IV ecoregions in Teller County. The Crytalline Mid-elevation Forests and Shrublands ecoregion encompasses the majority of wetlands and the Volcanic Subalpine Forest region the least.

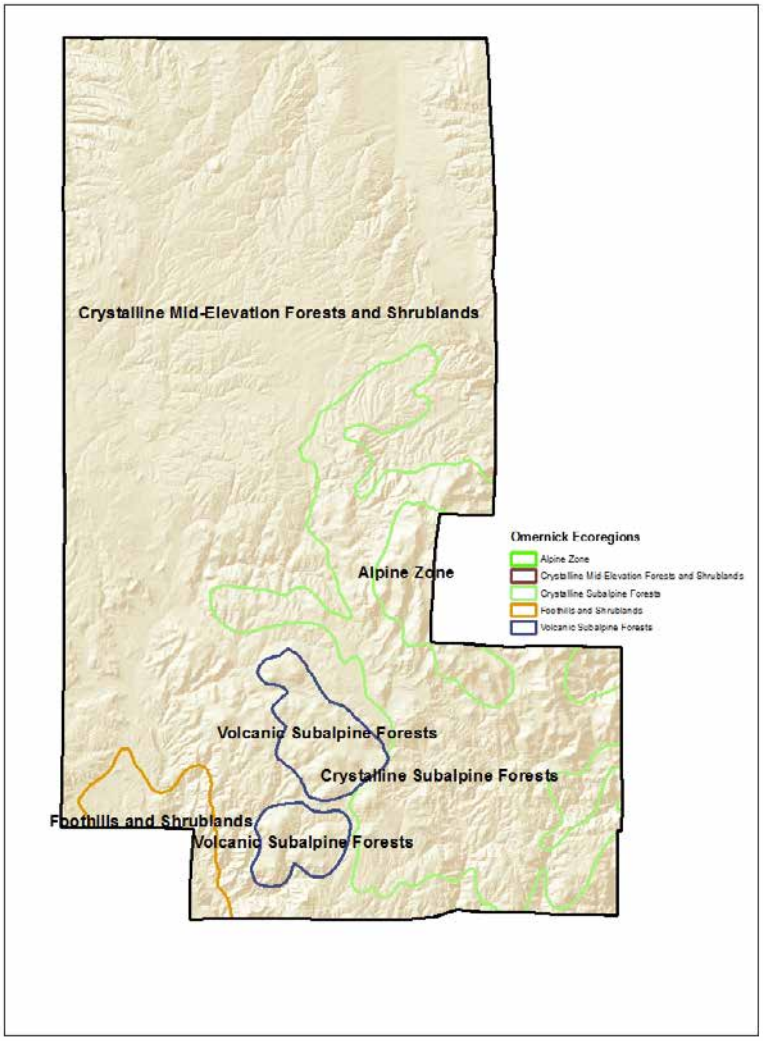

Figure 13. Omernick Ecoregions within Teller CO.

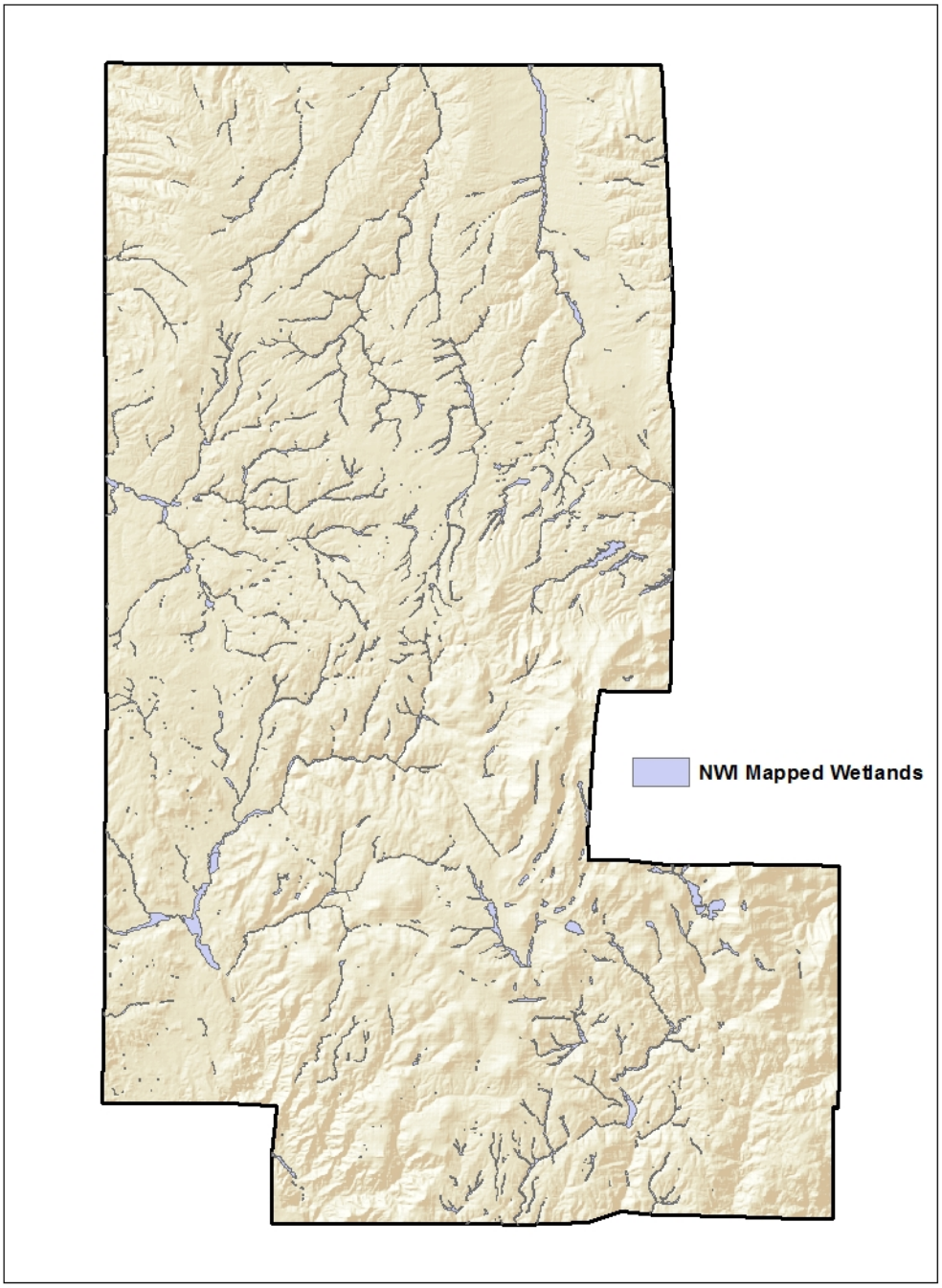

Figure 14. Overview of Mapped Wetlands in Teller County.

Table 10. Total acres within each Omernik ecoregion with NWI classification.

	PFO (Forested Wetlands)	PSS (Shrub Wetlands)	PEM (Emergent Wetlands)	PUS (Shoreline and Shallow water Wetlands)	PUB F/G (Freshwater Ponds)	R3 (Rivers and Streams)	LI/L2 (Freshwater Lakes)	Totals
Alpine Zone		347			1		172	**520**
Crystalline Subalpine Forests		989	1081	4	140	8	423	**2645**
Volcanic Subalpine Forests			106	2	4			**112**
Crytalline Mid-elevation Forests and Shrublands	28	2585	3361	47	435	10	512	**6978**
Foothills and Shrublands		6	105	3	1	6		**121**
Grand Total	**28**	**3927**	**4653**	**56**	**581**	**24**	**1107**	**10376**

- Laucustrine Limnetic (L1)—freshwater lakes, deeper water zone, supports non-rooted plants, plant and animal plankton
- Lacustrine Littoral (L2)—freshwater lakes, shallow water zone, supports rooted plants and bottom dwelling animals
- Riverine Upper Perennial (R3)—river and stream channels
- Palustrine Emergent Wetland (PEM)—vegetated wetlands dominated by emergent herbaceous flowering plants
- Palustrine Scrub-Shrub Wetland, (PSS)—vegetated wetlands dominated by woody vegetation > 6 m tall
- Palustrine Forested Wetland (PFO)—vegetated wetlands dominated by woody vegetation that is 6m > tall
- Palustrine Unconsolidated Bottom (PUB)—shallow water wetlands with vegetative cover less than 30% (open ponds)
- Palustrine Unconsolidated Shore (PUS)—shoreline wetlands with vegetative cover less than 30%

Discussion

The biodiversity of Teller County exemplifies what Colorado is most identified by--montane grasslands with rolling hills lined with ponderosa pine woodlands, interrupted by steep, rugged and narrow canyons, punctuated by peaks that reach to the sky and accented with hoodoo-like monoliths, with the undulating green line of willow shrublands delineating the wet meadows. This is perhaps Teller County's most valuable asset and one of the reasons for its prosperity. The County's biodiversity is why it is the destination for so many due to the high quality of life and ready access to open space and recreation. CNHP encourages the County's decision makers and planners to be mindful of informed land planning to keep Teller County's biodiversity intact and to direct future growth to the most appropriate places while avoiding sensitive ecological habitats such as wetlands, stream corridors, flood prone areas, and alpine tundra.

This project's significant findings include; several new sub occurrences documented for one of the world's rarest plants, Pikes Peak spring parsley (*Oreoxis humilus*) (G1S1); one of the best known occurrence of the montane population of the Gunnison Prairie Dog (*Cynomys gunnisoni*) (G5S5); re-discovery of a historical occurrence of the spiny-spored quillwort (*Isoetes setacea* ssp. *muricata*) (G5? T5?S2) not seen since 1902, and several new locations of fens, a type of peatland that is groundwater fed and has accumulated at least 40 cm (16 inches) of organic soil or peat. The Florissant Fossil Beds National Monument is not only home to richest and most diverse fossil deposits in the world. It also supports large, contiguous montane grassland where the state rare prairie goldenrod (*Unamia alba*) thrives, as well as a fen with an occurrence of pale blue-eyed grass (*Sisyrinchium pallidum*). Several County records for state rare plants were also documented: autumn willow (*Salix serissima*) (G4S1), longstem water-wort (*Elatine triandra*) (G5S1), and birdbill day-flower (*Commelina dianthifolia*) (G5S1).

As part of the discussion regarding the County's biodiversity, CNHP would like to recommend the following conservation strategies to be considered by Teller County Government and its stakeholders.

Integrate the results and specifically the PCAs profiled in this report in the Teller County Strategic Plan (2009) and the Growth Management Plan for Teller County (1990). The PCAs will assist in identification of priority areas and reaches for environmental and recreational attributes**.** The PCAs in this report provide a basic framework for implementing a comprehensive conservation program. The B1 and B2 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 Palmer Land Trust, 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.

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 Teller 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.

Take the data presented in this report into consideration when reviewing of proposed activities in or near Potential Conservation Areas to determine whether or not those proposed activities may 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. 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. 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.

Recognize the importance of larger, contiguous natural habitats. While the PCAs identified in this report contain known locations of significant elements of natural diversity, protection of large contiguous riparian corridors may ensure that we do not lose species that have not yet been located. Work to protect large blocks of land within the watershed 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.

Encourage public education outreach, 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, Teller County is rich in animal and plant diversity. 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 Teller County should increase awareness of the uniqueness of the habitats within the County.

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 Teller 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 CNHP, CDOW, 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., Coalition of the Upper South Platte, schools, 4-H clubs, Colorado Native Plant Society, Audubon) in assisting with management and monitoring projects on public lands. Make a concerted effort to involve individual landowners in conservation dialogue, as applicable.

Continue species surveys 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 2010. 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 Teller County. Monitoring rare elements is especially recommended to track trends.

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, yellow toadflax, purple loosestrife, and stocking of 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, campgrounds, and at trailheads. 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. Refer to the Teller County Weeds Department for assistance on identifying and eradicating weeds http://www.co.teller.co.us/CSU/default.aspx. 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 and an Integrated Weed Management Plan. These resources are available at http://parks.state.co.us/NaturalResources/CNAP/Publications/

Develop and implement comprehensive program to address loss of wetlands. Wetlands occupy only 3% of the land in the County, but are important to plants, wildlife, and people.

In conjunction with the information contained in this report, information regarding the degree and trend of loss for all wetland types (i.e., emergent marshes, riparian shrublands and forests, seeps/springs, etc.) should be sought and utilized to design and implement a comprehensive approach to the management and protection of Teller County wetlands. As part of this project all the National Wetland Inventory Maps were digitized for the County, providing so that County can now better manage their wetlands. See U.S. Fish and Wildlife Service Wetlands Mapper http://www.fws.gov/wetlands/Data/Mapper.html and the Colorado State Parks Best Management Practices for Wetlands http://parks.state.co.us/NaturalResources/CNAP/Publications/ Encourage and support statewide wetland protection efforts such as the Colorado Division of Wildlife's Wetlands Program http://wildlife.state.co.us/LandWater/WetlandsProgram/. 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 Colorado State University Extension or other local agencies. Encourage communication and cooperation with landowners regarding protection of wetlands in Teller County.

Pikes Peak. Photo: M. Menefee.

SITES OF BIODIVERSITY SIGNIFICANCE

The 49 most important sites in Teller County are profiled in this section as Potential Conservation Areas (PCAs) with biodiversity ranks (Table 9, Map 2).

Each Potential Conservation Area (PCA) is described in a standard PCA profile report that reflects data fields in CNHP's Biodiversity Tracking and Conservation System (BIOTICS). The contents of the profile report are outlined and explained below:

- PCA Profile Explanation
- Biodiversity Rank: B#
- 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 Natural Heritage Ranking System section for more details.
- Protection Urgency Rank: P#
- A summary of major land ownership issues that may affect the long-term viability of the PCA and the element(s).
- Management Urgency Rank: M#
- A summary of major management issues that may affect the long-term viability of the PCA and the element(s).

- USGS 7.5-minute Quadrangle name(s): A list of USGS 7.5 minute quadrangles which contain the boundary of the PCA; all quadrangles are from Colorado unless otherwise noted.
- Size: Expressed in acres.
- *Elevation: Expressed in feet.
- General Description: A brief narrative of the topography, hydrology, vegetation, and current use of the potential conservation area.
- *Key Environmental Factors: A description of key environmental factors that are known to have an influence on the PCA, such as seasonal flooding, wind, geology, soil type, etc.
- *Climate Description: Where climate has a significant influence on the elements within a PCA, a brief description of climate, weather patterns, seasonal and annual variations, and temperature and precipitation patterns is included.
- *Land Use History: General comments concerning past land uses within the PCA which may affect the elements occurring within the boundary.
- *Cultural Features: Where pertinent, a brief description is given of any historic, cultural, or archeological features found within the PCA.
- Biodiversity Significance Rank Comments: A synopsis of the rare species and significant plant communities that occur within the proposed conservation area. A table within the area profile lists each element occurrence found in the PCA, global and state ranks of these elements, the occurrence ranks and federal and state agency special designations. See Table 1 for explanations of ranks and Table 2 for legal designations.

- Boundary Justification: Justification for the location of the proposed PCA 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 Urgency Rank Comments: Brief comments to justify the rating assigned to the PCA.
- *Management Urgency Rank Comments: Brief comments to justify the rating assigned to the PCA.
- *Land Use Comments: Brief comments describing the current and/or past land use as it affects those elements contained in the PCA.
- *Natural Hazard Comments: If any potential natural hazards such as cliffs, caves, poisonous plants, etc. are prominent within the PCA and relevant to a land manager or steward, comments are included along with any precautions that may need to be taken.
- *Exotic Species Comments: A description of potentially damaging exotic (i.e., alien) flora and/or fauna within the PCA, including information on location, abundance, and their potential effect on the viability of the targeted elements within the PCA.
- *Offsite Considerations: Where offsite land uses or other activities (e.g., farming, logging, grazing, dumping, watershed diversion, etc.) may have a significant influence on the elements within a PCA, a brief description of these is included.
- *Information Needs: A brief summary of any information that may still be needed in order to effectively manage the PCA and the elements within it.

- Optional fields may or may not be included in Potential Conservation Area descriptions.

Pikes Peak

Biodiversity Rank - B1: Outstanding Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M1: Essential within 1 Year to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Woodland Park, Manitou Springs, Pikes Peak

Size: 17,691 acres (7,159 ha) **Elevation:** 10,800 - 14,110 ft. (3,292 - 4,301 m)

General Description: Pikes Peak, at 14,109 feet, dominates the horizon along the entire Front Range. Pikes Peak with its numerous granite outcrops, is a distinctive granitic massif that is part of a 1,300 square mile batholith that marks the southern end of the Colorado Front Range (Benedict 2008). Bedrock geology is composed of Pikes Peak granite which is extremely friable and readily erodes into the porous gravels that characterize soils throughout the landscape (Tweto 1979). Decomposition of Pikes Peak granite into coarse, angular gravels (called grus), consisting mostly of feldspar and quartz, is conspicuous throughout the site (Benedict 2008).The true alpine zone, an expanse of dry meadows and boulder fields, extends from treeline around 11,400 to the summit of Pikes Peak at 14,109 (Kelso 2008). The alpine meadows are dominated by large patch systems that include Kobresia - curly sedge (*Kobresia myosuroides - Carex rupestris*) and curly sedge - Ross' avens (*Carex rupestris - Geum rossii*) herbaceous vegetation interspersed with forbs such as alpine bluebells (*Mertensia alpina*) snowball saxifrage (*Saxifraga rhomboidea*), alpine dryad (*Dryas octopetala*), alpine clover (*Trifolium dasyphyllum*), Rocky Mountain columbine (*Aquilegia saximontana*), Parry lousewort (*Pedicularis parryi*), and numerous mustards (*Draba* spp.). The Pike's Peak spring parsley (*Oreoxis humilis*), found in the alpine zone, is one of the world's rarest plants. The entire global population of the Pikes Peak spring parsley is located within this site. The fellfield communities dominate adjacent rocky ridges and rock outcrops where chasmophytes (plants that inhabit rock crevices), such as James telesonix (*Telesonix jamesii*), occupy crevices. Alpine soils are a patchy mosaic of gravel and thin turf where cushion plants have established and have begun to develop an organic soil layer. Krummholz stands of Engelmann spruce (*Picea engelmannii*) and limber pine (*Pinus flexilis*) occur at the lower limit of the alpine zone and mark the transition to the subalpine. The subalpine zone is a mosaic of conifer forests dominated by Engelmann spruce (*Picea engelmannii*) on moist north- and west-facing slopes, and by ancient Bristlecone pine (*Pinus aristata*) woodlands on drier, south-facing slopes. Willow shrublands occur characterized by wolf willow (*Salix wolfii*) carrs. Several stream headwaters (e.g. Boehmer East Fork, West Fork, Beaver Creek and French Creek) flow down to the elaborate network of reservoirs which supply Victor, Cripple Creek, and Colorado Springs with water.

Pikes Peak

Key Environmental Factors: Key factors include physical characteristics, especially geology, and edaphic properties and specifically the friable Pikes Peak granite that erodes into porous gravel soils; Climate as related to the alpine zone precludes tree growth and spatial characteristics. Snow distribution is a key determinant of the distribution of alpine plant communities. Indirect consequences of climate change include vegetation changes including an increase in tree-limit which will decrease the alpine zone.

Climate Description: Due to elevation and complex topography climate on Pikes Peak is dramatically different from climate at relatively nearby locations at lower elevations. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. On Pikes Peak, at an elevation of 14,109 feet, the alpine climate is substantially different from the mid-elevation climate in Woodland Park at an elevation 8,600 feet and only 14.5 miles away. At this site on this west-facing slope of Pikes Peak at an average elevation of 12,500 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 23.77 °F and a minimum of 0.52 °F. Warmest temperatures occurred in July with an average maximum of 58.06 °F and an average minimum of 31.68 °F. Annual average maximum precipitation was 39.16 inches. April through August were the wettest months of the year with July having the greatest average precipitation with 5.38 inches. Driest months are November through February with January and February having the least precipitation with 0.84 and 0.83 inches respectively (Prism 2010).

Land Use History: In 1859, the discovery of gold in the area prompted many pioneers to post "Pikes Peak or Bust" banners on their wagons. Pikes Peak is also touted as the inspiration for the song, "America the Beautiful". Pikes Peak was the first biological survey conducted in the Colorado alpine by Edwin James, a member of the 1820 Longs Expedition (Kelso 2008).

Cultural Features: In 1806 President Thomas Jefferson dispatched an expedition to explore the Pikes Peak region. The party was led by Zebulon Pike, who called the peak "Grand Peak". Pikes Peak was then mapped first by USGS as "James Peak", but was commonly called Pikes Peak by trappers and military men (Chronic and Williams 2002). The mountain was also the inspiration for the anthem "America the Beautiful: with its "purple mountain majesties above the fruited plain." (Chronic and Williams 2002).

Biodiversity Significance Rank Comments (B1): This site includes all known occurrences for the globally critically imperiled (G1/S1) Pikes Peak spring parsley (*Oreoxis humilis*). Three of these occurrences are in excellent (A-ranked) condition. The site also supports good (B-ranked) and fair (C-ranked) occurrences of the Rocky Mountain columbine (*Aquilegia saximontana*). This columbine is a globally vulnerable

Pikes Peak

(G3/S3) Colorado endemic. Excellent (A-ranked) occurrences of the globally imperiled (G2/S2) James' telesonix (*Telesonix jamesii*) have also been documented. James' telesonix is known only from Colorado and New Mexico. In Colorado it is scattered sporadically on granite tors of the easternmost mountains; in northern New Mexico, it has been reported from one mountain area. Excellent (A-ranked) and good (B-ranked) occurrences of the state rare (G4?/S1) alpine bluebells (*Mertensia alpina*) have also been found in the site. Alpine bluebells are documented solely from Pikes Peak in Colorado. Another state rare (G4/S2S3) alpine species, the arctic draba (*Draba fladnizensis*) has been documented. Alpine plant community occurrences in this site include good (B-ranked) occurrences of the globally apparently secure (G4/S4) curly sedge - alpine avens (*Carex rupestris - Geum rossii*) herbaceous vegetation, a good (B-ranked) occurrence of the globally demonstrably secure (G5/S5) nailwort-moss campion (*Paronychia pulvinata - Silene acaulis*) herbaceous vegetation, and a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) wolf willow (*Salix wolfii*) / mesic forb shrubland. A good (B-ranked) occurrence of the globally secure (G5/S5) Kobresia - alpine avens (*Kobresia myosuroides - Geum rossii*) turf meadow is documented and as well as a good (B-ranked) occurrence of a globally imperiled (G2?/S2) bristlecone pine / alpine clover (*Picea engelmannii / Trifolium dasyphyllum*) woodland. This type is a regional endemic with only a few recorded occurrences within its potential range. It requires relatively xeric subalpine slopes between 11,250 and 11,645 feet (just below timberline) with skeletal mineral soils and adequate drainage. Stands are threatened by recreational use, mining, and possibly effects of atmospheric deposition of pollutants (NatureServe 2010). Animal occurrences include Brown-capped finch (*Leucosticte australis*) (G4/S3B,S4N) and White-tailed Ptarmigan (*Lagopus leucurus*) (G5/S4).

Pikes Peak

Natural Heritage element occurrences at the Pikes Peak PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Birds	Leucosticte australis	Brown - capped Rosy - finch	G4	S3B,S4N				E	2010-07-04
Birds	Lagopus leucurus	White - tailed Ptarmigan	G5	S4			USFS	E	2010-07-18
Natural Communities	Picea engelmannii / Trifolium dasyphyllum Forest	Timberline Forests	G2?	S2				B	2010-06-22
Natural Communities	Salix wolfii / Mesic Forbs Shrubland	Subalpine Riparian Willow Carr	G3	S3				C	2010-07-05
Natural Communities	Carex rupestris - Geum rossii Herbaceous Vegetation	Alpine Meadows	G4	S4				B	2010-07-05
Natural Communities	Kobresia myosuroides - Geum rossii Herbaceous Vegetation	Alpine Meadows	G5	S5				B	2010-07-18
Natural Communities	Paronychia pulvinata - Silene acaulis Dwarf - shrubland	Alpine Fellfields	G5	S5				B	2010-07-05
Vascular Plants	Oreoxis humilis	Pikes Peak spring parsley	G1	S1			USFS	A	1998-08-22
Vascular Plants	Oreoxis humilis	Pikes Peak spring parsley	G1	S1			USFS	C	1998-08-22
Vascular Plants	Oreoxis humilis	Pikes Peak spring parsley	G1	S1			USFS	A	1998-08-23
Vascular Plants	Oreoxis humilis	Pikes Peak spring parsley	G1	S1			USFS	A	2010-07-05
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				BC	2010-07-04
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2000-06-27
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2008-08-08
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2010-07-18

Pikes Peak

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				B	2010-08-12
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				AB	2010-07-16
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2010-07-14
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				B	2010-07-05
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				B	2010-07-06
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				BC	2010-07-04
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				B	2000-06-27
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				C	2006-06-07
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				B	2010-07-06
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				C	2000-07-10
Vascular Plants	Aquilegia saximontana	Rocky Mountain columbine	G3	S3				C	2005-07-10
Vascular Plants	Draba fladnizensis	arctic draba	G4	S2S3				C	1998-07-28
Vascular Plants	Mertensia alpina	alpine bluebells	G4?	S1				B	1998-08-22
Vascular Plants	Mertensia alpina	alpine bluebells	G4?	S1				B	2010-07-18
Vascular Plants	Mertensia alpina	alpine bluebells	G4?	S1				AB	2010-07-06

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary encompasses known element plant species occurrences and likely potential habitat as well as surrounding habitat sufficient to enable the maintenance of essential ecological processes, including snowmelt and snow distribution and edaphic erosional processes. Additional consideration was given to Colorado's changing climate (CWCB 2010) and the need for the ability of native species to be able migrate upward in elevation in order to survive changing environmental conditions.

Pikes Peak

Protection Urgency Rank Comments (P3): This site is partially publicly owned (managed by the Pike National Forest) and partially owned by the Colorado Springs Utilities and the City of Victor. A more conservative designation, such as Wilderness, would enable management that would increase the potential for long-term ecosystem sustainability

Management Urgency Rank Comments (M1): On the summit of Pikes Peak is a restaurant and parking area. The Pikes Peak Highway heads down the mountain on the north side. The only other road in this site is the reservoir maintenance road (not open to the public) up Beaver Creek which ends at Reservoir 8. There is also a tunnel moving water between east and middle Beaver Creeks. The Pikes Peak toll road is creating erosion and sedimentation problems. Currently, there is little recreation off the roads and established trails. Trail maintenance should be kept up especially on Trail 652 which is also eroding badly. If hiking use increases more established trails may need to be created. Motor vehicle use should not be permitted off the toll road. All forms of recreation should be limited to established trails and roads. Interpretive signs are encouraged to inform visitors of the unique habitat and the rare plants found on top of Pikes Peak.

Pikes Peak
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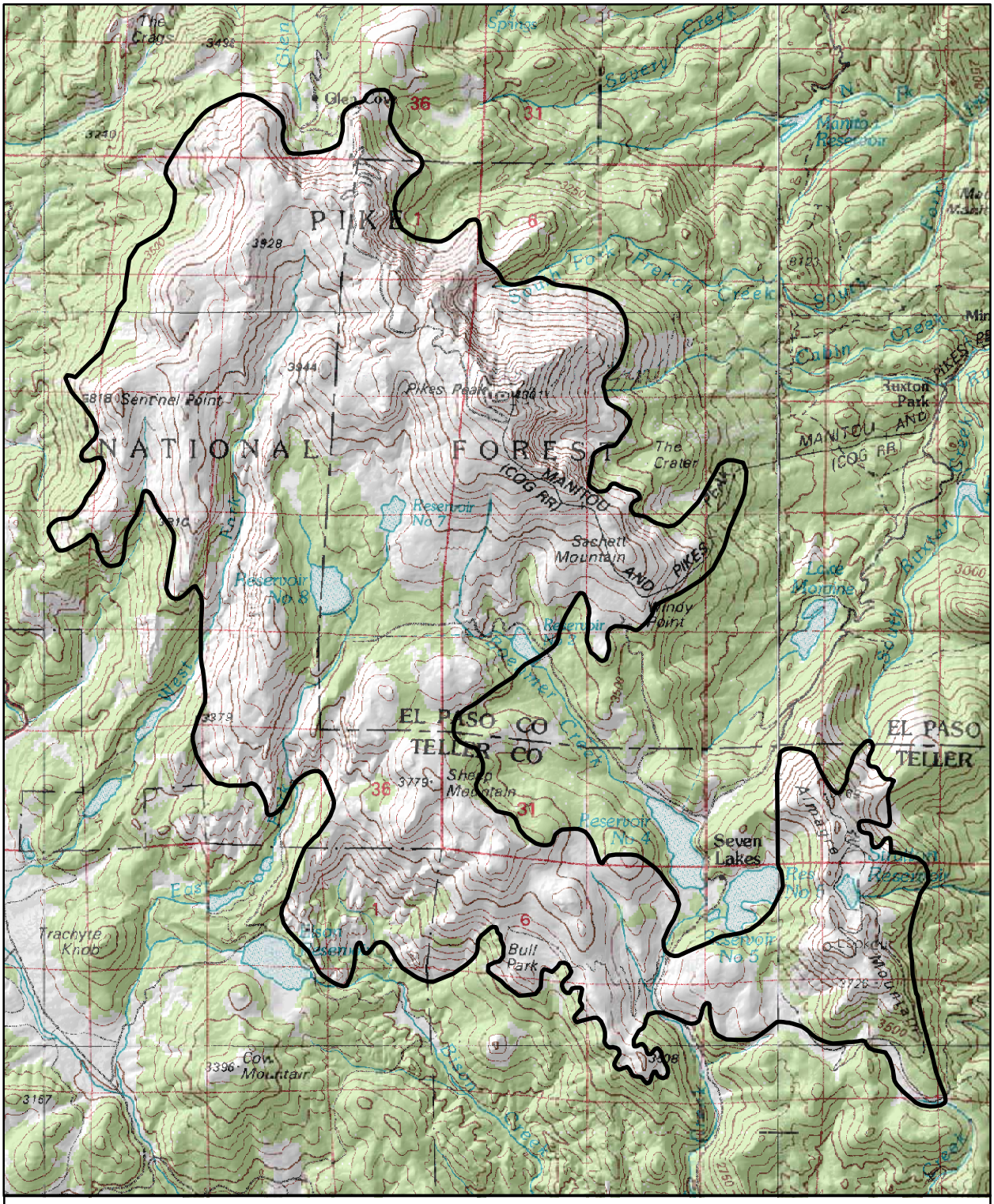

Map 3. Pikes Peak Potential Conservation Area, B1: Outstanding Biodiversity Significance

Beaver Creek at Sugar Loaf

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M4: Not Needed Now; No Current Threats; May Need in Future

U.S.G.S. 7.5-minute quadrangles: Big Bull Mountain, Mount Big Chief, Mount Pittsburg, Phantom Canyon

Size: 12,893 acres (5,218 ha) **Elevation:** 5,750 - 9,800 ft. (1,753 - 2,987 m)

General Description: Beaver Creek drains the southern slopes of Pikes Peak and forms a steep-sided valley that winds through craggy granitic hills before spilling out onto the plains below. The foothills above the riparian corridor are rugged; their steep sides have shallow soils interspersed among rock outcrops. They are blanketed with a mix of ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*), which transitions to pinon - juniper woodland (*Pinus edulis - Juniperus scopulorum* and *J. monosperma*) at lower elevations. The plains below are a mosaic of shale barrens and prairie interspersed among ranches and low intensity residential development. Beaver Creek and its tributaries span elevation zones from upper and lower montane to foothills to plains and the character of the riparian vegetation shifts with elevation and stream gradient. Higher in the watershed, in the foothills and montane zones, the steep, rugged, sparsely vegetated hills can lead to a flash flood regime. The channel is boulder-strewn and fast-flowing. The moderately high gradient of Beaver Creek above the confluence of the east and west branches has carved steep-sided, narrow valleys where Douglas-fir (*Pseudotsuga menziesii*) is more prevalent than narrowleaf cottonwood (*Populus angustifolia*). Below the confluence, the somewhat steep gradient along the riparian corridor has a mosaic of riparian shrubland and riparian woodland vegetation associations; portions of the reach have thinleaf alder (*Alnus incana*) dominated shrublands, others are dominated by river birch (*Betula occidentalis*) with sections of narrowleaf cottonwood trees over a mixed thinleaf alder and river birch shrub layer. Coyote willow (*Salix exigua*) forms locally dominant patches where the channel is more sandy and chokecherry (*Prunus virginiana*) forms dense thickets higher above the channel. The herbaceous layer, where present, has limited abundance of mesic herbs due to heavy shade and dense cover of poison ivy (*Toxicodendron radicans*). As Beaver Creek emerges from its canyon, bluestem willow (*Salix irrorata*) becomes abundant and the stream gradient lessens. Plains cottonwood (*Populus deltoides*) becomes dominant in the canopy as the creek leaves the foothills, widens, and rolls through the barrens and prairie to the Arkansas River. The riparian corridor is lined with coyote willow (*Salix exigua*) and pockets of lush herbs. In the lower portion of the site, Beaver Creek is lined with

hay meadows and there are some old homesteads scattered along the reach. There are irrigation ditches and small local diversions to the adjacent hay fields. Far upstream in the watershed is Skagway Reservoir. Upland and riparian geology is composed of granitic rocks of 1,700 m.y. age group (Tweto 1979). Soils in this site have a shallow profile with abundant gravel that is unstable and has little water holding capacity

Key Environmental Factors: Key environmental variables that influence site biota are ecological processes including especially hydrology and grazing intensity

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on in the montane zone site at an average elevation of 9,400 feet , from 1971 through 2000, coldest temperatures occurred in January with an average maximum of 35.62 °F and a minimum of 11.80 °F. Warmest temperatures occurred in July with an average maximum of 73.80 °F and an average minimum of 47.50 °F. Annual average maximum precipitation was 21.68 inches. May through August were the wettest months of the year with an average of 3.33 precipitation per month. Driest months are December, January and February with 0.58, 0.46 and 0.46 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B2): This site encompasses a good (B-ranked) occurrence of a globally imperiled (G2/S2) riparian natural community, narrowleaf cottonwood / bluestem willow (*Populus angustifolia / Salix irrorata*) woodland. It has several excellent (A-ranked) occurrences of globally vulnerable riparian natural communities; one each of narrowleaf cottonwood / thinleaf alder (*Populus angustifolia / Alnus incana*) woodland (G3/S3), narrowleaf cottonwood - Douglas-fir (*Populus angustifolia - Pseudotsuga menziesii*) woodland (G3/S2), and thinleaf alder (*Alnus incana*) / mesic graminoids shrubland (G3/S3). There is a good (B-ranked) occurrence of the globally vulnerable Geyer willow (*Salix geyeriana*) - mountain willow (*Salix monticola*) / mesic forbs shrubland (G3/S3), an excellent (A-ranked) occurrence of the apparently globally secure (G4?/S2) river birch / starry false lily of the valley (*Betula occidentalis / Maianthemum stellatum*) shrubland and a good (B-ranked) occurrence of the globally vulnerable (G3G4/S3) plains cottonwood - (peachleaf willow) / (coyote willow, sandbar willow) (*Populus deltoides* - (*Salix amygdaloides*) / *Salix* (*exigua, interior*) woodland. Additionally present is a poor (D-ranked) occurrence of the globally imperiled (G2G3/S2) pale blue-eyed grass (*Sisyrinchium pallidum*).

Beaver Creek at Sugar Loaf

Natural Heritage element occurrences at the Beaver Creek at Sugar Loaf PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia / Salix irrorata Woodland	Foothills Riparian Woodland	G2	S2				B	2005-07-29
Natural Communities	Alnus incana / Mesic Graminoids Shrubland	Montane Riparian Shrubland	G3	S3				A	2005-07-29
Natural Communities	Populus angustifolia - Pseudotsuga menziesii Woodland	Montane Riparian Forest	G3	S2				A	2005-07-25
Natural Communities	Populus angustifolia / Alnus incana Woodland	Montane Riparian Forest	G3	S3				A	2005-07-29
Natural Communities	Salix geyeriana - Salix monticola / Mesic Forbs Shrubland	Geyer's Willow - Rocky Mountain Willow/Mesic Forb	G3	S3				B	2010-06-21
Natural Communities	Populus deltoides - (Salix amygdaloides) / Salix (exigua, interior) Woodland	Plains Cottonwood Riparian Woodland	G3G4	S3				B	2005-07-25
Natural Communities	Betula occidentalis / Maianthemum stellatum Shrubland	Foothills Riparian Shrubland	G4?	S2				A	2005-07-29
Vascular Plants	Sisyrinchium pallidum	pale blue - eyed grass	G2G3	S2			BLM	D	2010-06-08

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn as a 1 km buffer of the riparian corridor clipped at the upper end by the watershed boundary. The north end extends to Skagway Reservoir. The southern boundary corresponds with Beaver Creek State Wildlife Area boundary. On private lands, only those sites with written permission from the landowner were accessed.

Protection Urgency Rank Comments (P3): Lands contained in this site are both

privately and publicly owned. Public land managers are the State of Colorado and the BLM. Stresses to the system from livestock and wildlife grazing and hydrologic alteration could be mitigated and threats reduced if appropriate action is taken within five years.

Management Urgency Rank Comments (M4): At the lower elevations, non-native hay grasses, especially smooth brome (*Bromus inermis*), are abundant in the herbaceous layer. It is difficult to control smooth brome in the best of situations, much less when it has been planted in adjacent fields for a hay crop. A concerted decision to restore the hay fields to a natural floodplain would have to occur in order to address the herbaceous understory of the occurrence. There are irrigation ditches and small local diversions to the adjacent hay fields. Upstream in the watershed is the Skagway Reservoir. Despite these alterations to hydrology, perennial flow is currently maintained in this riparian system, which is beneficial to the ecological processes that drive the riparian biodiversity. It is suggested that adjusting releases from the reservoir to mimic the natural flow regime would enhance the potential for recovery and long-term sustainability of the stream and riparian system.

Exotic Species Comments: Alien plant species include smooth brome (*Bromus inermis),* yellow toadflax *(Linaria vulgaris),* and Canada thistle *(Cirsium arvense).*

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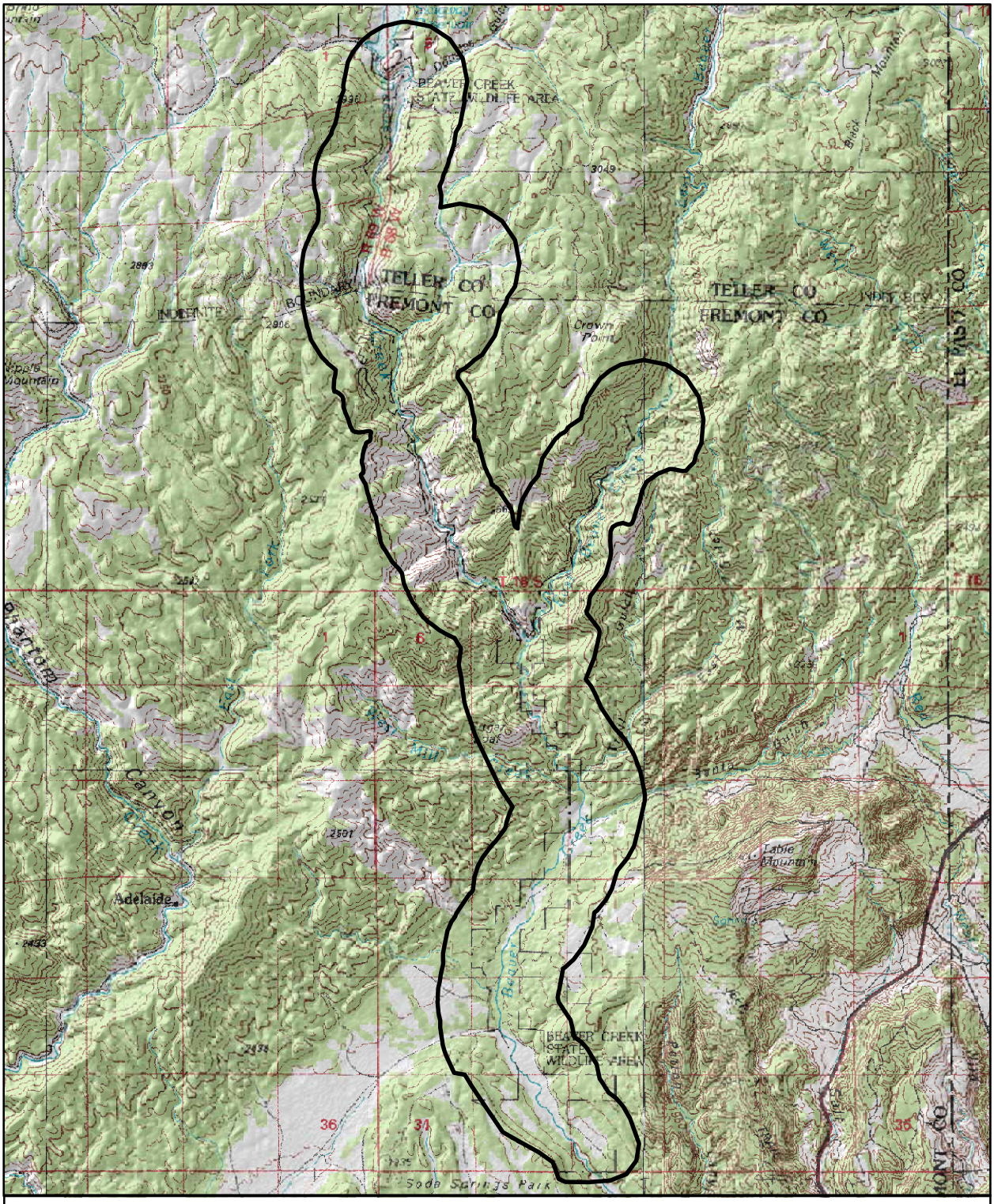

Colorado Natural Heritage Program
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/04/2011

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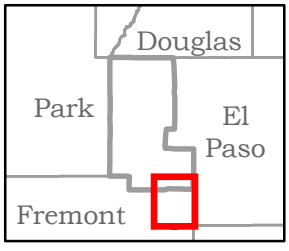
Legend

PCA Boundary

Colorado Springs, 38104-E1
Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 4. Beaver Creek at Sugarloaf Potential Conservation Area, B2: Very High Biodiversity Significance

Bison Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Big Bull Mountain

Size: 1,094 acres (443 ha) **Elevation:** 9,300 - 9,600 ft. (2,835 - 2,926 m)

General Description: The Bison Creek site is located in the montane zone on the west slope of the Front Range in Colorado. The site encompasses a variably wide south-trending valley and surrounding hill slopes drained by Bison Creek. Topography on the west side is characterized by rolling hills that are cut by a deep, steep canyon with dramatic steep-walled cliff faces while on the east side, steep rock outcrops dominate. Upland habitat is characterized by a mosaic of mixed deciduous and coniferous trees that include bristlecone pine (*Pinus aristata*), quaking aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*). Cliff habitat borders each side of the wide valley and extends into side canyons and is occupied by chasmophytes (plants that occur in rock crevices) such as James' telesonix (*Telesonix jamesii*), Front Range alumroot (*Heuchera hallii*), Underwood spikemoss (*Selaginella underwoodii*), Oregon woodsia (*Woodsia oregana*), Fendler sandwort (*Eremogone fendleri*), and waxflower (*Jamesia americana*). This rugged canyon/hill landscape provides excellent protected habitat for native wildlife including American elk (*Cervus elaphus*), mountain lion (*Felis concolor*), and American black bear (*Ursus americana*) as well as a diversity of bird species including Northern Goshawk (*Accipiter gentilis*), Pinon Jay (*Gymnorhinus cyanocephalus*), and Clark's Nutcracker (*Nucifraga columbiana*). Grazing and rural development is ubiquitous throughout this landscape and historic logging and mining impacts continue to alter hydrologic and soil processes. Geology is composed of the very friable Pikes Peak granite which decomposes into gravel containing feldspar and quartz grains (Tweto 1979, Chronic and Williams 2007). Soils in this site have a shallow profile with abundant gravel that is unstable and has little water holding capacity.

Key Environmental Factors: Key environmental factors that influence biota include: physical characteristics, especially topography and geology related to cliffs; and ecological processes including hydrology and grazing intensity.

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on in the montane zone site at an average elevation of 9,400 feet, from 1971 through 2000, coldest temperatures occurred in January with an average maximum of 33.75 °F and a

minimum of 7.77 °F. Warmest temperatures occurred in July with an average maximum of 70.70 °F and an average minimum of 44.83 °F. Annual average maximum precipitation was 21.62 inches. July and August were the wettest months of the year with 4.10 and 4.01 inches of precipitation respectively. Driest months are December, January and February with 0.49 and 0.49 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B2): The site was drawn for an excellent (A-ranked) occurrence of the globally imperiled (G2/S2) James' telesonix (*Telesonix jamesii*). James' telesonix is considered to be only in Colorado and New Mexico. In Colorado (at about 9,000-12,000 feet), it is scattered sporadically on granite tors of the easternmost mountains (in the north-central to central region); in northern New Mexico, it has been reported from one mountain area (NatureServe 2010).

Natural Heritage element occurrences at the Bison Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				A	2010-09-24

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was delineated to encompass known element occurrences and contiguous habitat that potentially supports the rare plants. Additionally, sufficient habitat to enable essential ecosystem processes, specifically hydrologic and geologic processes, and topography, specifically rock outcrops and cliffs, was included in the boundary delineation. Only private lands with written permission were accessed.

Protection Urgency Rank Comments (P3): Both public and private lands occur in this site. Public lands are fairly well protected and there is no immediate threat. However, grazing impacts on private lands threaten system hydrology.

Management Urgency Rank Comments (M3): Cliff habitat is somewhat immune from proximate grazing impacts. However, alteration to the surrounding habitat may impact cliff habitat by altering cliff hydrology; element occurrences are located where seeps are evident in the cliff and these seeps are dependent on hydrology in adjacent upland habitat. In surrounding upland and riparian habitat grazing is long-term and impacts are ubiquitous. Additionally, stream and riparian habitat has been impacted with grazing-induced hydrologic alteration and channelization.

Bison Creek
References

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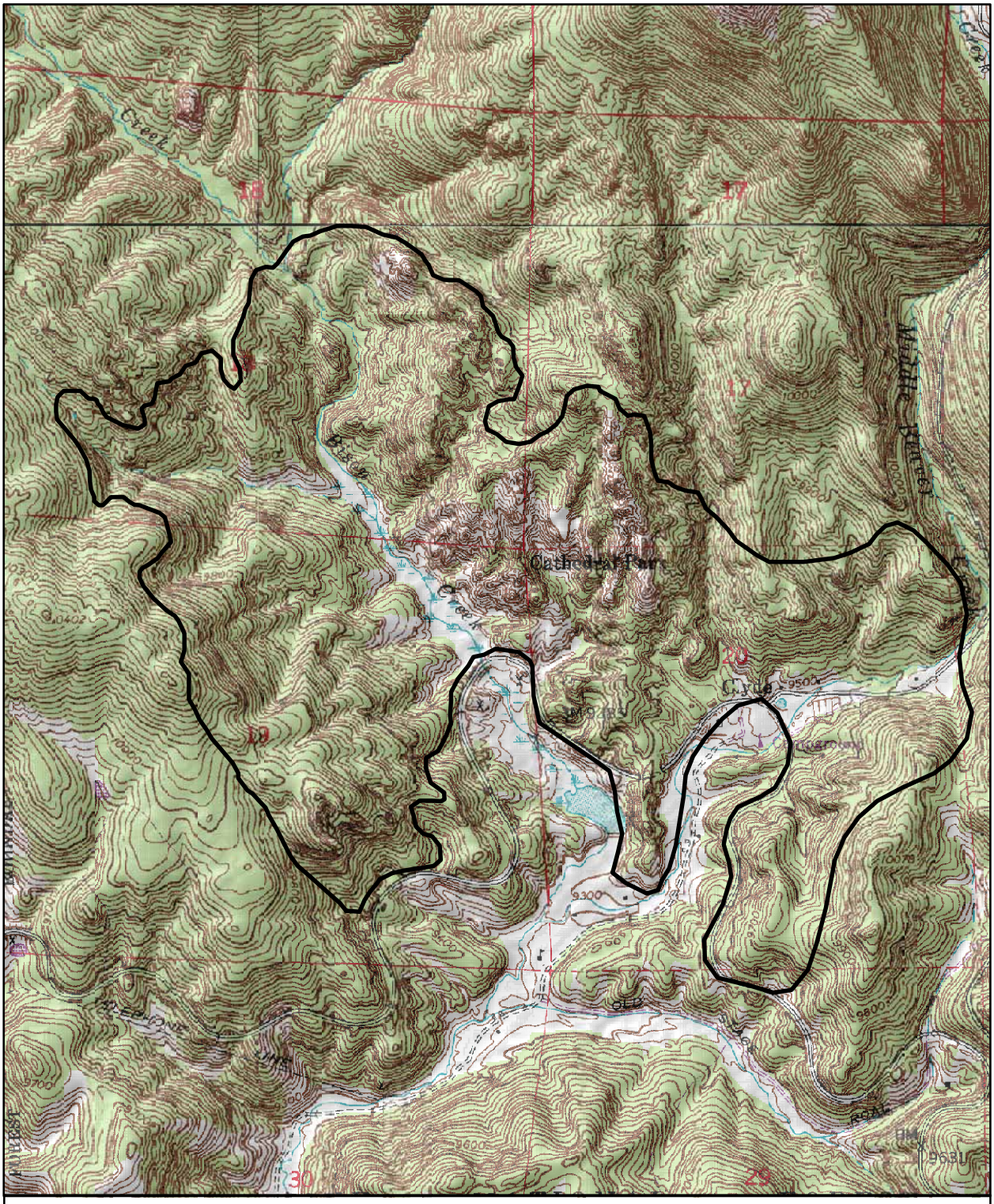
Version Author: Malone, D.G.

Version Date: 01/06/2011



Map 5. Bison Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Dry Creek at Antelope Park

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Wrights Reservoir, Lake George

Size: 1,180 acres (478 ha) **Elevation:** 8,700 - 9,240 ft. (2,652 - 2,816 m)

General Description: The site is drawn for a population of pale blue-eyed grass (*Sisyrinchium pallidum*) inhabiting the aptly named Dry Creek. The majority of Dry Creek is a moist to wet draw with a narrow stream channel. The hydrology has been altered by the construction of several small ponds on Dry Creek and its tributaries. The wetland soil consists of silty clay loam. The dominant plant community is mountain rush (*Juncus arcticus* var. *littoralis*) herbaceous vegetation. Uplands on the surrounding rolling hills are intact except for a small subdivision immediately south of the site and a working ranch and road in the middle of the site. The flat uplands adjacent to Dry Creek are an Arizona fescue (*Festuca arizonica*) / slimstem muhly (*Muhlenbergia filiculmis*) grassland. Ponderosa pine (*Pinus ponderosa*) woodlands dominate the hilltops. Upland soil consists of Guffey very gravelly sandy loam (USDA NRCS 2008). The underlying geology is Pikes Peak granite (Tweto 1979). The site is grazed moderately by livestock and wildlife. Wildlife observed include: mule deer (*Odocoileus hemionus*), porcupine (*Erethizon dorsatum)*, Red-winged Blackbird (*Agelaius phoeniceus*), and Peregrine Falcon (*Falco peregrinus*).

Key Environmental Factors: Pale blue-eyed grass (*Sisyrinchium pallidum*) occurs in meadows with moist to saturated soils. This population inhabits moist soil, whereas the wetter soils below the pond are currently inhabited by its close relative, strict blue-eyed grass (*Sisyrinchium montanum* var. *montanum*). If the water source were to dry up such that even the area below the pond were dry, the population would likely not persist.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8

°F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B2): This site contains a good (B-ranked) population of pale blue-eyed grass (*Sisyrinchium pallidum*), a plant that that is globally imperiled (G2G3/S2). This species is a regional endemic, ranging from central Colorado to southeastern Wyoming (Spackman et al. 1997).

Natural Heritage element occurrences at the Dry Creek at Antelope Park PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Sisyrinchium pallidum	pale blue - eyed grass	G2G3	S2			BLM	B	2010-08-04

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to encompass Dry Creek's watershed north of Teller County Road 12 and the adjacent subdivision. This includes the entire area that drains into the slough to provide surface water to maintain soil moisture for the population of pale blue-eyed grass (*Sisyrinchium pallidum*). It also includes wet meadow habitat downstream that the population could potentially colonize. Only the private lands for which written permission was granted were visited.

Protection Urgency Rank Comments (P3): This site is located on private property that is currently run as an outdoor camp.

Management Urgency Rank Comments (M2): Immediately east of the Witcher Ranch compound, the meadow becomes a monoculture of Canada thistle (*Cirsium arvense*) with a border of cheatgrass (*Bromus tectorum*). Through most of the site's wetlands, Canada thistle (*Cirsium arvense*), butter-and-eggs (*Linaria vulgaris*), and quackgrass (*Elymus repens*) are abundant but not dominant. If weed control is not practiced, the whole wetland could potentially become a weed patch, threatening the population of pale blue-eyed grass (*Sisyrinchium pallidum*).

Dry Creek at Antelope Park
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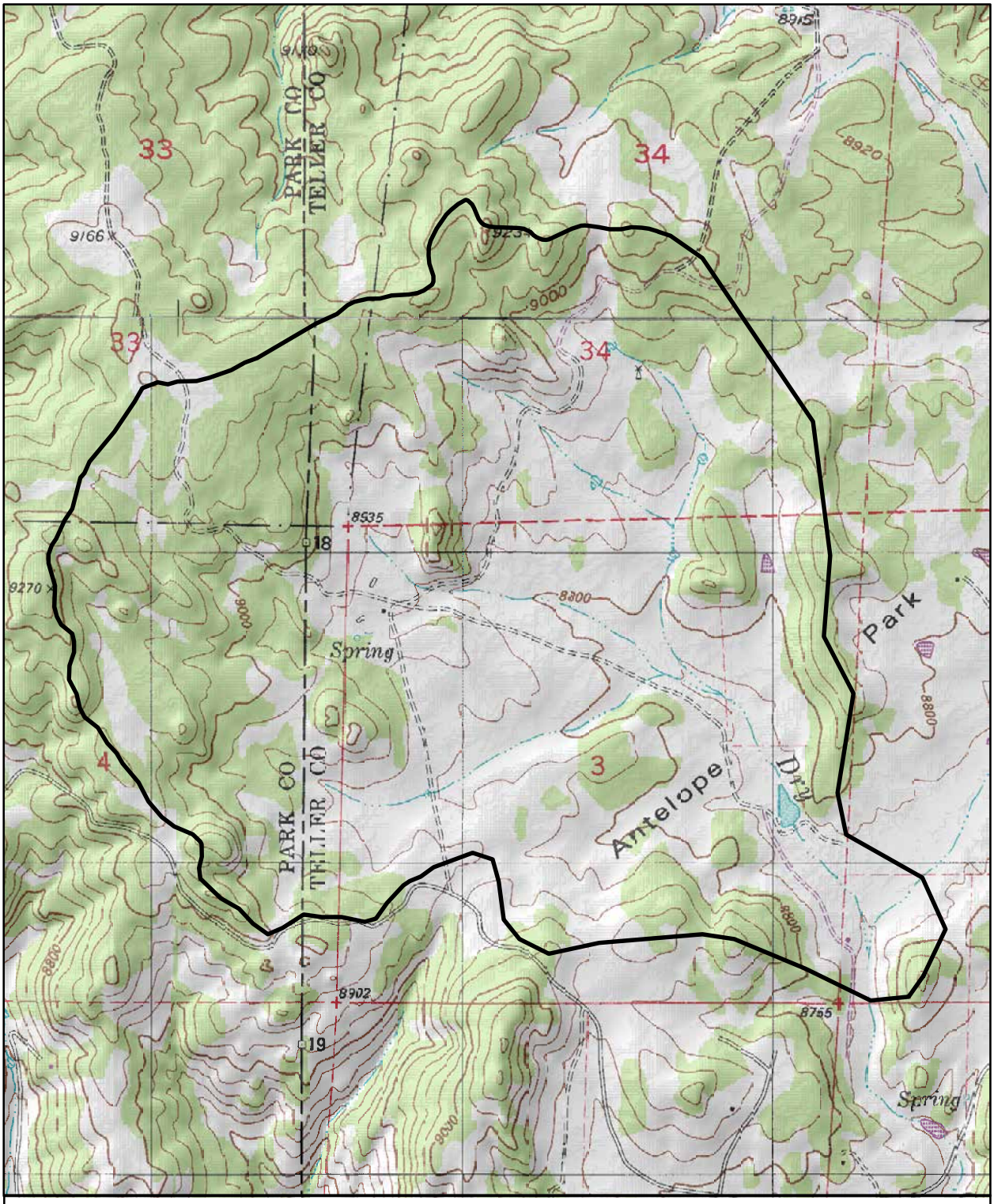
Version Author: Shaw, A.E.

Version Date: 12/03/2010



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http://www.cnhp.colostate.edu

Map Date: 03/07/2011

Miles
0 0.1 0.2

N

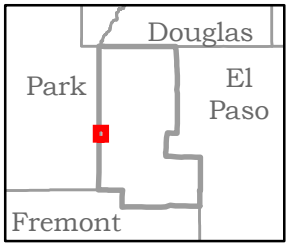
Legend

PCA Boundary

Wrights Reservoir, 38105-G3
Lake George, 38105-H3

7.5 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 6. Dry Creek at Antelope Park Potential Conservation Area, B2: Very High Biodiversity Significance

East Beaver Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Mount Big Chief, Big Bull Mountain

Size: 3,101 acres (1,255 ha) **Elevation:** 8,540 - 10,120 ft. (2,603 - 3,085 m)

General Description: This site is a steep-walled upper montane / lower subalpine valley. A diverse (29 species) breeding bird community was present during the 2010 site visit in this sub-watershed indicating the presence of a variety of high quality habitat with sufficient foraging, nesting and protective resources. Habitat is a complex mosaic of deciduous and coniferous forest, meadows, cliffs and streams. East Beaver Creek trends south through a moderately wide canyon where it is a Rosgen type C4 stream. The riparian soil is a sandy clay loam that is saturated during peak flows and gradually dries out. The creek was downcut historically but the channel is now stable, with the possible exception of the south end of the site, where herbaceous plants and shrubs have been grazed. The stream banks are stabilized somewhat by shrubs and grasses. East Beaver Creek has access to a floodplain except for a half-mile stretch of creek that passes through a very narrow sinuous canyon where the road diverges from the creek. The creek contains brook trout (*Salvelinus fontinalis*). Caddisfly (*Trichoptera* spp.) larvae were observed downstream at the county line. Stream bed substrate ranges from gravel to boulders. Tree cover is sparse within the riparian zone on the main stem of East Beaver Creek. However, in steep sections of the tributary that flows west from Black Mountain, the Bebb's willow (*Salix bebbiana*) shrubland has up to 35% cover of quaking aspen (*Populus tremuloides*) and 40% total tree cover. The plant community is otherwise similar in the steep and flatter sections of the tributary and adjoining East Beaver Creek, so the whole community is classified as Bebb's willow shrubland. The tributaries that flank Pecks Camp have 37% quaking aspen cover and 46% total tree cover. These two tributaries support quaking aspen (*Populus tremuloides*) / thinleaf alder (*Alnus incana*) forest. On East Beaver Creek between these two tributaries, the dominant plant community is thinleaf alder / mesic graminoids shrubland. Throughout the riparian zone of the site, willows (*Salix* spp.) and thinleaf alder exhibit high levels of mortality but show successful sapling recruitment. The uplands have recovered well from historic logging and have good connectivity to Pike National Forest Forest. The forest is structurally complex and diverse with a dense cover of native graminoids. Soils are well developed and stable. Quaking aspen (*Populus tremuloides*) woodlands occupy moist swales and slopes in a mosaic with Engelmann spruce (*Picea engelmannii*). Wide saddles are dominated by lush

graminoid meadows, rocky ridges and cliffs are occupied by bristlecone pine (*Pinus aristata*), limber pine (*P. flexilis*), and ponderosa pine (*Pinus ponderosa*) woodlands occupy south-facing ridges and slopes in a mosaic with xeric graminoids. Upland soil is classified as Lakehelen very gravelly fine sandy loam (USDA NRCS 2008). Rock outcrops are Pikes Peak granite (Tweto 1979).

Key Environmental Factors: The dominant shrubs and tree species of all three documented riparian plant associations are sensitive to browsing animals such as elk (*Cervus canadensis*). Livestock and wildlife have impacted the vegetation, it is likely the plant communities would likely extend further north and south if those areas were not grazed. Thinleaf alder (*Alnus incana*) / mesic graminoids shrubland is an early successional plant community. Quaking aspen (*Populus tremuloides*) / thinleaf alder (*Alnus incana*) forest may be early-seral or climax communities. Thinleaf alder builds up stream banks with time and is outcompeted by trees that colonize that now the banks are above annual flood levels (Carsey et al. 2003). Major floods may be needed to set back succession to a stage at which thinleaf alder can maintain dominance and/or colonize new areas. Greater flooding would also benefit the Bebb's willow (*Salix bebbiana*) community. Many willows have died and more are dying, probably due to the Penrose-Rosemont reservoir that is diverting water upstream.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: This valley was intensively logged, grazed, and unsuccessfully mined around the turn of the century, and a few equipment remnants of these operations remain. The original hotel was moved up the valley to the north edge of the site, with the historic barn. Elk (*Cervus canadensis*) were reintroduced in the early part of the 20th century by the late Mr. Rathke to establish a private hunting camp which continues to this day.

Biodiversity Significance Rank Comments (B2): The biodiversity rank is based on a good (B-ranked) occurrence of a globally imperiled (G2/S2) plant, James' telesonix (*Telesonix jamesii*). There is also a good (B-ranked) occurrence of the globally

vulnerable (G3?/S2) Bebb's willow (*Salix bebbiana*) shrubland, a good (B-ranked) occurrence of the globally vulnerable (G3/S3) thinleaf alder (*Alnus incana*) / mesic graminoids shrubland, and a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) quaking aspen (*Populus tremuloides*) / thinleaf alder (*Alnus incana*) forest on either side of the valley. During the 2010 survey a Northern Goshawk (*Accipiter gentilis*), currently watchlisted by CNHP, was observed.

Natural Heritage element occurrences at the East Beaver Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Alnus incana / Mesic Graminoids Shrubland	Montane Riparian Shrubland	G3	S3				B	2010-07-22
Natural Communities	Populus tremuloides / Alnus incana Forest	Montane Riparian Forests	G3	S3				C	2010-07-21
Natural Communities	Salix bebbiana Shrubland	Montane Willow Carrs	G3?	S2				B	2010-07-23
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				B	2010-09-02

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is placed along the adjacent ridgelines to incorporate the immediate watershed to preserve flooding frequency and intensity to the extent possible given the Penrose-Rosemont Reservoir upstream. Only private lands with written permission were visited.

Protection Urgency Rank Comments (P3): Portions of the site are or will soon be under conservation easement with the Colorado Cattlemen's Agricultural Land Trust (Mark Johnson, personal communication, July 21, 2010). The ridgeline on the east side of the site and other scattered parcels are not protected.

Management Urgency Rank Comments (M3): The riparian vegetation, stream channel, and fish habitat would benefit from keeping livestock grazing limited. Beaver (*Castor canadensis*) were reintroduced this year, which should benefit the riparian vegetation in the long run by increasing flooding.

Exotic Species Comments: Exotic plants that could pose a threat to native vegetation include leafy spurge (*Euphorbia esula*), butter-and-eggs (*Linaria vulgaris*), common mullein (*Verbascum thapsus*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and musk thistle (*Carduus nutans*).

East Beaver Creek
References

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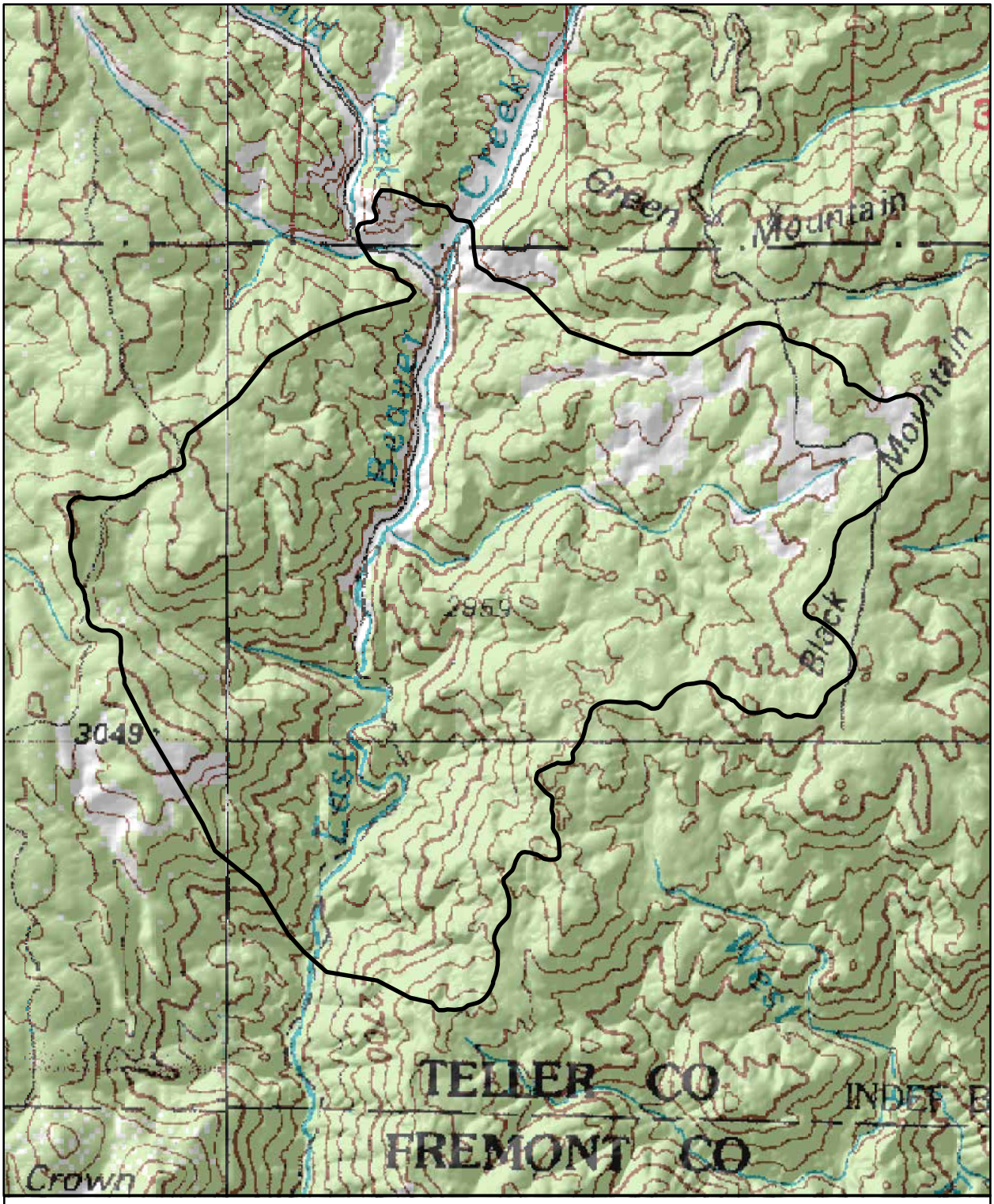
Version Author: Shaw, A.E. and D.G. Malone

Version Date: 11/30/2010



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Map Date: 03/07/2011

Miles
0 0.2 0.4

N

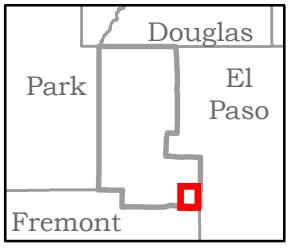
Legend

PCA Boundary

Colorado Springs, 38104-E1
Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 7. East Beaver Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Little High Creek at Booger Red Hill

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: High Park

Size: 399 acres (162 ha) **Elevation:** 7,400 - 8,200 ft. (2,256 - 2,499 m)

General Description: The Little High Creek at Booger Red Hill site is located in the lower montane zone foothills on the west slope of the Front Range in the south western region of Teller County. The site encompasses rolling hills cut by a deep, steep-walled, south-trending canyon that is drained by Little High Creek which has its confluence with Four-mile Creek approximately 0.5 km downstream of this site. Stream channel habitat is a relatively steep gradient, boulder-controlled channel characterized as a Rosgen type F1/F2 with a rapids dominated bed morphology and a step-pool structure. Frequent and continual high energy, flood-scour events are evident. Riparian habitat is a narrow and patchy linear mosaic of two community associations. The majority of the gradient occurs in two steep plunge-pool series that keep this reach inaccessible. Narrowleaf cottonwood - bluestem willow (*Populus angustifolia / Salix irrorata*) is dominant but several patches of narrowleaf cottonwood - Douglas-fir (*Pseudotsuga menziesii*) are also present. Several other willow and non-willow riparian shrubs are also present including coyote willow (*Salix exigua*), Drummond's willow (*S. drummondiana*), and Rocky Mountain maple (*Acer glabrum*). Uplands are characterized by a mosaic of habitats including grasslands, shrublands, and woodlands. Shrublands include mountain mahogany (*Cercocarpus montanus*) and Gambel oak (*Quercus gambelii*). Forested communities include pinon pine - Rocky Mountain juniper (*Pinus edulis - Juniperus scopulorum*) woodlands on east-facing slopes and ponderosa pine (*Pinus ponderosa*) woodlands on west-facing slopes. Rolling hills are cut by deep canyons and on canyon rims birdbill dayflower (*Commelina dianthifolia*) occupies shallow, depressions that have been weathered into the exposed bedrock. Canyon walls are occupied by a variety of communities that vary with aspect and soil moisture. Moist sites are occupied by Douglas-fir forest. Drier canyon walls are characterized by a sparse tree layer with pinon pine (*P. edulis*), Rocky Mountain juniper (*J. scopulorum*) and a few Douglas-fir with variably dense cover of shrubs and herbs. Commonly occurring shrub species on these canyon walls include waxflower (*Jamesia americana*) and ocean spray (*Holodiscus discolor*). Cliff faces are occupied by ferns, forbs and graminoids, wherever groundwater from surrounding uplands seeps into cliff cracks and crevices. On these cliff faces chasmophytes (plants that inhabit rock crevices) thrive and include species such as Fendler's cloak fern (*Argyrochosma fendleri*), Eaton's lipfern (*Cheilanthes eatonii*) and Front Range alum-root (*Heuchera hallii*). Local

hydrology is driven by soil characteristics, precipitation and infiltration. Geology is composed of granitic rocks of the 1,400 m.y. age group interspersed with Tertiary age intra-ash-flow quartz latitic lavas (Tweto 1979). Soils are a complex mosaic of classes. Hillslope soils include Corpen-High complex, 5 to 25 percent slopes, Highpark very gravelly sandy loam, 5 to 40 percent slopes, Quander-Bushpark very gravelly loams, 5 to 40 percent slopes, and Bushpark-Seitz association, 15 to 50 percent slopes; canyon and canyon rim soils are Cathedral-Rock outcrop complex, 40 to 60 percent slopes and 35 to 70 percent slopes (USDA NRCS 2008). Riparian habitat provides critical resources for numerous bird species. Birds observed at this riparian canyon site included: Common Nighthawk (*Chordeiles minor*), Northern Flicker (*Colaptes auratus*), Western Wood-Peewee (*Contopus sordidulus*), Plumbeous Vireo (*Vireo plumbeus*), Steller's Jay (*Cyanocitta stelleri*), White-breasted Nuthatch (*Sitta carolinensis*), Canyon Wren (*Catherpes mexicanus*), American Dipper (*Cinclus mexicanus*), Townsend's Solitaire (*Myadestes townsendi*), and Wilson's Warbler (*Wilsonia pusilla*).

Key Environmental Factors: Hydrology is the key factor determining biota in this site. The narrowleaf cottonwood-bluestem willow association, which dominates riparian habitat at this site, is considered an early-seral community following the establishment of narrowleaf cottonwood (Carsey et al 2003) which requires flooding and sandy soils for establishment.

Climate Description: Although the site is located in the montane zone the climate is somewhat dry. At this site at an elevation of 7,900 feet coldest temperatures occurred in January with an average maximum of 40.77 °F and a minimum of 11.80 ° F. Warmest temperatures occurred in July with an average maximum of 79.63 °F and an average minimum of 50.05 °F. Annual average maximum precipitation was 17.32 inches. July and August were the wettest months of the year with 2.75 and 3.06 inches of precipitation respectively. Driest months are December, January and February with 0.49, 0.44 and 0.50 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B2): This site encompasses a good (B-ranked) occurrence of a globally imperiled (G2/S2) riparian natural community, narrowleaf cottonwood / bluestem willow (*Populus angustifolia / Salix irrorata*) woodland. This plant association has been documented only from the Rio Grande Valley in New Mexico and along the Colorado Front Range. Additionally, there is a good (B-ranked) occurrence of narrowleaf cottonwood - Douglas-fir (*Populus angustifolia - Pseudotsuga menziesii*) woodland, a globally vulnerable (G3/S3) riparian natural community. This association is reported in Utah, Nevada, and Colorado. Although it is relatively widespread, occurrences are small and patchy, and it is easily degraded and exists only where accessibility limits anthropogenic alteration (NatureServe 2010).

Little High Creek at Booger Red Hill

Natural Heritage element occurrences at the Little High Creek at Booger Red Hill PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia / Salix irrorata Woodland	Foothills Riparian Woodland	G2	S2				B	2005-08-16
Natural Communities	Populus angustifolia - Pseudotsuga menziesii Woodland	Montane Riparian Forest	G3	S2				B	2005-08-16

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn along adjacent ridgelines, which includes the watershed boundary to the south and west, for immediate watershed protection and includes a 1km buffer upstream. The boundary includes sufficient habitat to enable hydrologic processes which are related to precipitation infiltration and groundwater recharge. Only sites with written landowner permission were surveyed.

Protection Urgency Rank Comments (P4): Lands are a combination of private and public parcels. Public lands are managed by the BLM for grazing and dispersed recreation. Private landowners are conservation minded.

Management Urgency Rank Comments (M3): Impacts to this riparian woodland community ensue from hydrologic alteration, excessively intense livestock grazing, and exotic species invasion (NatureServe 2010). At this site grazing-induced alteration to soils and vegetation in surrounding upland hillslopes has altered the infiltration and runoff regime and local hydrology. Exotic plant species threaten site viability. Potential for long-term site viability would be enhanced by reducing grazing intensity and by weed eradication.

Exotic Species Comments: Non-native plants documented within the site include redtop (*Agrostis gigantea),* Canada thistle (*Cirsium arvense*), plumeless thistle (*Carduus acanthoides*), yellow sweetclover (*Melilotus officinalis*), and smooth brome (*Bromus inermis*).

Little High Creek at Booger Red Hill
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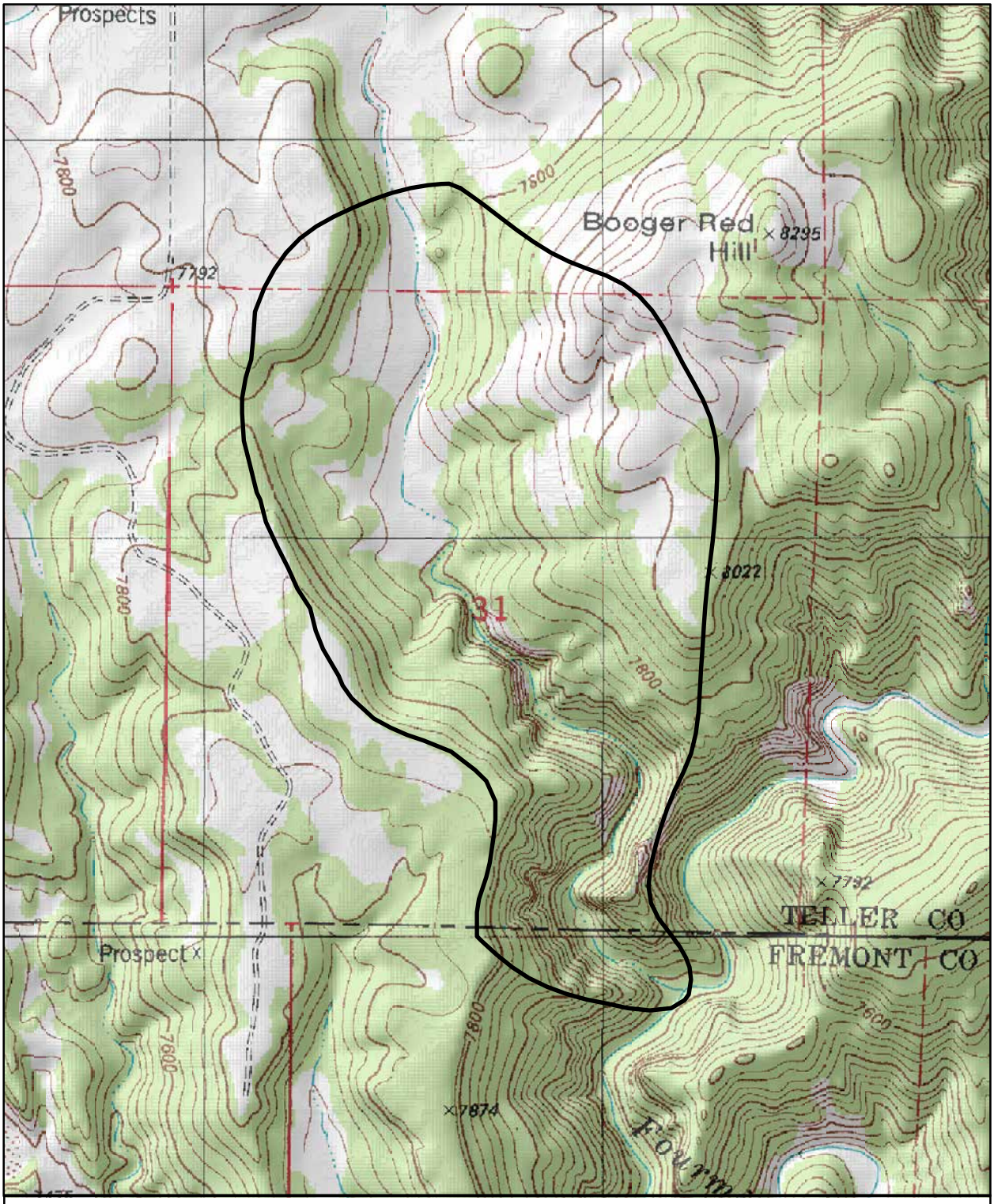
Version Author: Malone, D.G.

Version Date: 12/09/2010



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Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/07/2011

Miles
0 0.1 0.2

N

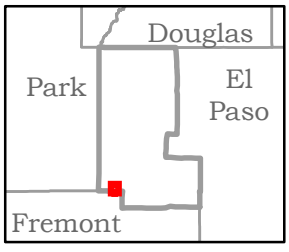
Legend

PCA Boundary

High Park, 38105-F3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 8. Little High Creek at Booger Red Hill Potential Conservation Area, B2: Very High Biodiversity Significance

Manchester Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Signal Butte

Size: 2,791 acres (1,129 ha) **Elevation:** 7,740 - 8,725 ft. (2,359 - 2,659 m)

General Description: This site includes the immediate watersheds of Manchester and West creeks. The creeks have cut a narrow moderate-grade valley through Pikes Peak granite (Tweto 1979). The site is located in the montane zone on the southeastern edge of the Hayman Burn (2002). The dominant riparian plant community is a blue spruce (*Picea pungens*) / river birch (*Betula occidentalis*) woodland, with loamy sand substrate. The dominance of these species can indicate a high groundwater table. The non-burn, surviving upland forest is dominated by Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*). Upland soil is classified as Pendant cobbly loam (USDA NRCS 2008). Starting at the north edge of the site and continuing downstream, the Hayman Burn has destroyed the surrounding forest, creating massive deposition from the erosion of the valley slopes. The resulting gravel deposits have choked the creek, creating islands covered with weeds. Beavers (*Castor canadensis*) have recently recolonized the willow carr in one weedy section of West Creek at the north end of the site.

Key Environmental Factors: Blue spruce (*Picea pungens*) / river birch (*Betula occidentalis*) riparian woodlands are a stable climax plant community, so the key factor maintaining this plant composition is the absence of major disturbance. Fire or a catastrophic flood would likely result in this plant association being replaced by an early successional community like a quaking aspen (*Populus tremuloides*) / river birch (*Betula occidentalis*) woodland (Carsey et al. 2003). For successful blue spruce regeneration, soils must be moist (Carsey et al. 2003), so sufficient stream flows and periodic flooding are required to maintain the current plant association.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January,

and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B2): This site is drawn for an excellent (A-ranked) occurrence of a globally imperiled (G2/S2) community, blue spruce (*Picea pungens*) / river birch (*Betula occidentalis*) woodlands. All known occurrences are located within Colorado and adjacent areas of New Mexico and Wyoming. This site hosts the only example of this plant association documented in Teller County as of 2010. Upper montane riparian woodlands and forests make up less than 1% of landcover in the Southern Rocky Mountains, so this riparian vegetation structure in general is somewhat rare. The site also contains a large subpopulation of an excellent (A-ranked) occurrence of a globally vulnerable (G3/S3) plant, jeweled blazingstar (*Nuttalia speciosa*). This species' taxonomic status as distinct from other blazingstars (e.g. by Weber & Whitman 2001) has been questioned. If this species is combined with similar species by taxonomists, it may no longer warrant classification as globally vulnerable.

Natural Heritage element occurrences at the Manchester Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Picea pungens / Betula occidentalis Woodland	Montane Riparian Woodland	G2	S2				A	2010-08-13
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				A	2010-08-13

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn to encompass the valley's ridgetops (the ridge to the west is unnamed but associated with Signal Butte; the ridge to the east is Rule Ridge) and a short stretch upstream of both of the creeks that converge to form West Creek. These boundaries were selected because the hydrology of the immediate watershed must supply sufficient surface water and annual flooding to sustain a blue spruce (*Picea pungens*) / river birch (*Betula occidentalis*) woodland. Only with written permission were private lands surveyed.

Protection Urgency Rank Comments (P3): The plant community driving this site is on private land, the majority of which is under conservation easement. The downstream tip of the community is on private land that is not protected. The majority of the site is within Pike National Forest.

Management Urgency Rank Comments (M3): Weed and erosion control on the slopes burned by the Hayman fire would help maintain the willow carr at the

downstream edge of the site. Otherwise sedimentation and weeds could spread upstream into the site's riparian woodlands.

Exotic Species Comments: Many weeds have invaded the downstream willow carr, including butter-and-eggs (*Linaria vulgaris*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), and common mullein (*Verbascum thapsus*).

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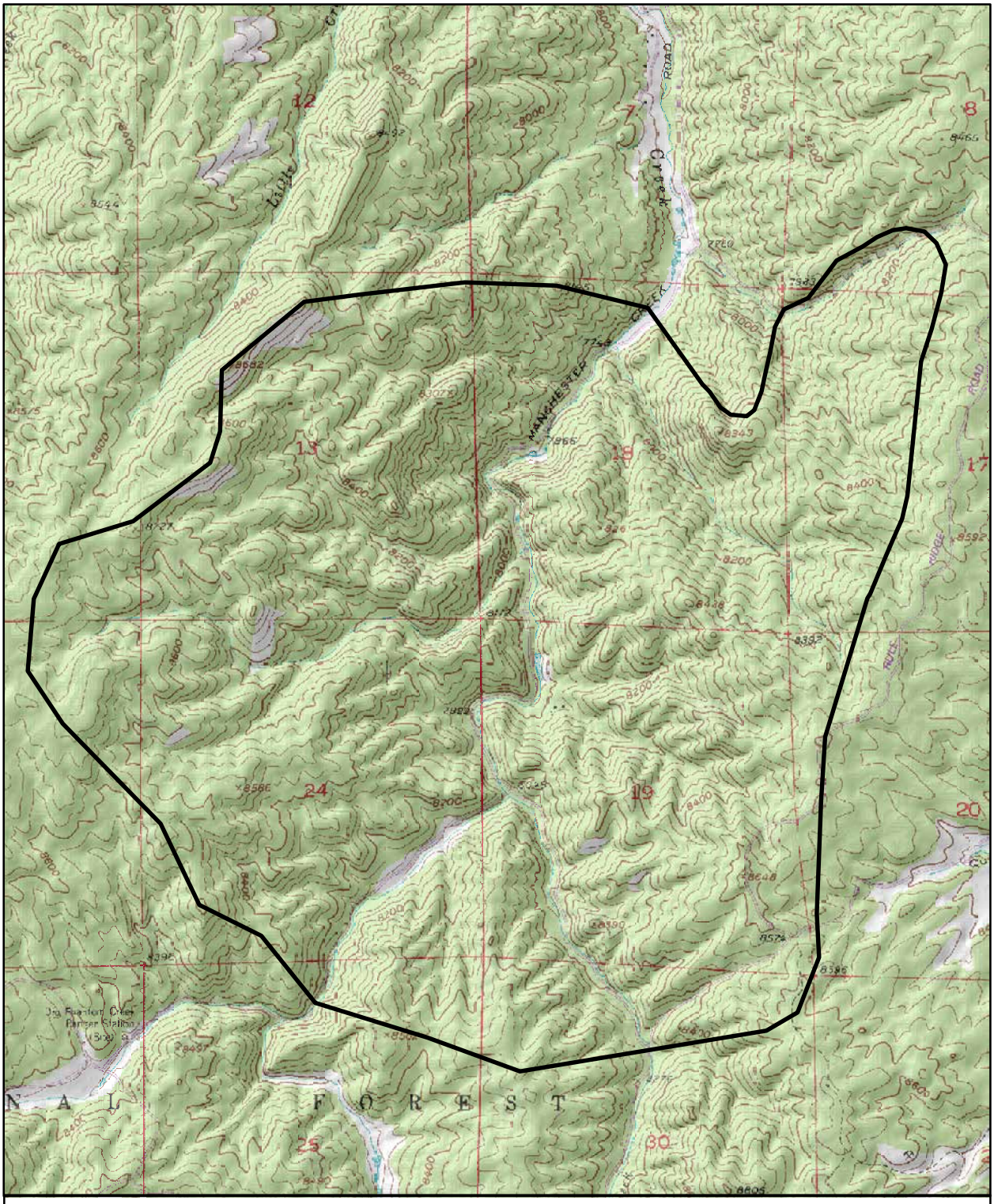
Version Author: Shaw, A.E.

Version Date: 11/30/2010



Map 9. Manchester Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Phantom Canyon of Eightmile Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M4: Not Needed Now; No Current Threats; May Need in Future

U.S.G.S. 7.5-minute quadrangles: Big Bull Mountain, Cripple Creek South, Florence, Phantom Canyon, Cooper Mountain

Size: 12,771 acres (5,168 ha) **Elevation:** 5,800 - 9,520 ft. (1,768 - 2,902 m)

General Description: Eightmile Creek has carved Phantom Canyon through rugged, low elevation, granitic hills southwest of Pikes Peak. At the upstream end, dense Douglas-fir (*Pseudotsuga menziesii*) forest occupies north-facing slopes while relatively sparse ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*) are on south-facing slopes. At lower elevations, the upland vegetation transitions to pinon - juniper (*Pinus edulis - Juniperus scopulorum*) woodland. Canyon sides are quite steep in some places with many cliff faces and rock outcrops. Tributaries of Eightmile Creek are moderately to somewhat steep, boulder-strewn channels at the bottom of narrow, sinuous valleys that course down the canyon sides. The riparian corridor within Phantom Canyon is predominantly a mixed evergreen-deciduous woodland with a variable, broken canopy along a dry, sandy wash. Eightmile Creek has ephemeral to intermittent flow, the latter occurring at higher elevations within the riparian system. Higher in the watershed, where there is more intermittent water flow, there is a greater diversity of conifer species, with Douglas-fir and white fir (*Abies concolor*) commonly occurring amidst areas of alder or willow shrub carr vegetation. However, the vast majority of the riparian canopy at lower elevations is comprised of scattered narrowleaf cottonwood (*Populus angustifolia*), plains cottonwood (*Populus deltoides*), and lanceleaf cottonwood (*Populus acuminata*) groves (the latter two species occur at the downstream end, below about 6,800 feet) interspersed with Rocky Mountain juniper (*Juniperus scopulorum*) in the canopy, subcanopy, and shrub layer throughout. The shrub layer is almost non-existent other than sporadic areas of regeneration of canopy species and occasional copses with hoptree (*Ptelea trifoliata*) and prairie rose (*Rosa arkansana*) although vines often drape the subcanopy and shrub layers. The herbaceous understory is likewise sparse and primarily comprised of drier, more upland species although there are very local patches of more mesic herbs. The stream channel is primarily sand and gravel or cobbles with occasional areas having boulders. Catastrophic flooding has occurred repeatedly in Phantom Canyon. Upland vegetation was, by all reports, denuded during railroad construction during early mining era at Cripple Creek (late 1800's). A devastating flood occurred in 1912 when "a 30-foot high wall of water roared down the canyon in a torrent that ripped 12

bridges from their abutments and destroyed miles of [railroad] track" (BLM interpretive sign at Steel Bridge). As part of the Goldbelt Scenic Byway, a road that replaced the railroad follows the entire reach through Phantom Canyon. The most recent significant flood washed out Phantom Canyon Road in 1995.

Key Environmental Factors: Lower to upper montane elevations; moderate gradient; ephemeral to intermittent flow; historic catastrophic flooding.

Climate Description: Average annual precipitation is 16.2 inches. Snowfall is greatest in April and May. Monsoon rains peak in July and August. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July. (http://www.worldclimate.com.)

Land Use History: A narrow gauge railroad was built through Phantom Canyon in the late 1800's to early 1900's to transport gold and materials between Cripple Creek upstream in Teller County and Canon City downstream along the Arkansas River. After continual maintenance problems following catastrophic flooding episodes, the railroad was dismantled in 1915. The transportation corridor was reopened as a car road in 1918. It is now part of the Goldbelt Scenic Byway.

Biodiversity Significance Rank Comments (B2): This site is drawn for good (B-ranked) occurrences of a globally imperiled (G2G3/S2S3) riparian natural community, narrowleaf cottonwood - Rocky Mountain juniper (*Populus angustifolia - Juniperus scopulorum*) woodland. It also encompasses a good (B-ranked) occurrence of thinleaf alder (*Alnus incana*) / mesic graminoids shrubland (G3/S3) and a good (B-ranked) and an excellent (A-ranked) occurrence of narrowleaf cottonwood - Douglas-fir (*Populus angustifolia - Pseudotsuga menziesii*) woodland (G3/S2). The globally imperiled (G2/S2) plant, Degener beardtongue (*Penstemon degeneri*), is also present in good condition (B-ranked).

Phantom Canyon of Eightmile Creek

Natural Heritage element occurrences at the Phantom Canyon of Eightmile Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia - Juniperus scopulorum Woodland	Montane Riparian Forest	G2G3	S2S3				B	2005-07-13
Natural Communities	Populus angustifolia - Juniperus scopulorum Woodland	Montane Riparian Forest	G2G3	S2S3				B	2010-08-10
Natural Communities	Alnus incana / Mesic Graminoids Shrubland	Montane Riparian Shrubland	G3	S3				B	2005-07-12
Natural Communities	Populus angustifolia - Pseudotsuga menziesii Woodland	Montane Riparian Forest	G3	S2				A	2005-07-13
Natural Communities	Populus angustifolia - Pseudotsuga menziesii Woodland	Montane Riparian Forest	G3	S2				B	2005-07-12
Vascular Plants	Penstemon degeneri	Degener beardtongue	G2	S2			BLM/ USFS	E	1990-07-19
Vascular Plants	Penstemon degeneri	Degener beardtongue	G2	S2			BLM/ USFS	B	2007-06-30

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn as a 1 km buffer of the riparian corridor, which roughly approximates the adjacent ridgelines surrounding Eightmile Creek for immediate watershed protection.

Protection Urgency Rank Comments (P4): The majority of this site is owned and managed by the BLM; the remainder is in private ownership. Portions of it are within the Beaver Creek Wilderness Study Area, a BLM Area of Critical Environmental Concern.

Management Urgency Rank Comments (M4): Monitoring for and controlling any invasive species establishment will reduce this threat. As part of the Goldbelt Scenic Highway, reactive management to any hazardous spills from auto accidents will

help to maintain water quality.

Exotic Species Comments: Much of the herbaceous vegetation is exotic, including common mullein (*Verbascum thaspus*), Canada thistle (*Cirsium arvense*), butter-and-eggs (*Linaria vulgaris*), Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), redtop (*Agrostis stolonifera*), and orchardgrass (*Dactylis glomerata*).

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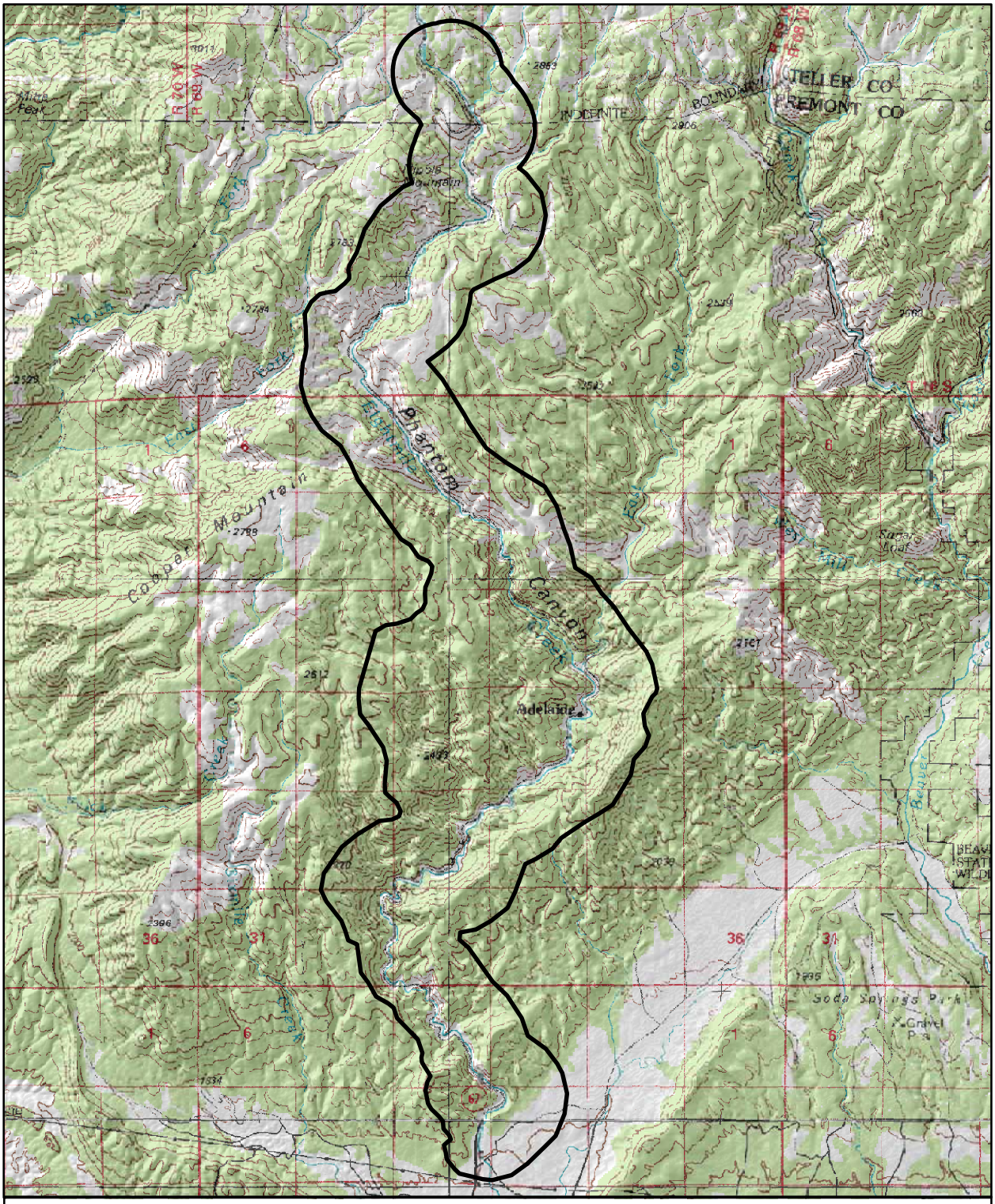
Version Author: Shaw, A.E. and D.R. Culver

Version Date: 11/30/2010



Colorado Natural Heritage Program
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/07/2011

Miles
0 0.5 1

N

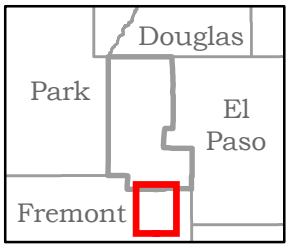
Legend

PCA Boundary

Canon City, 38105-A1
Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 10. Phantom Canyon of Eightmile Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Severy Creek

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Woodland Park, Cascade, Pikes Peak

Size: 2,259 acres (914 ha) **Elevation:** 8,200 - 12,300 ft. (2,499 - 3,749 m)

General Description: The Severy Creek site is located on the east slope of the Front Range just below Pikes Peak and encompasses a subalpine glacial cirque. Severy Creek begins in these wetlands and flows east, out of the cirque down steep-walled mountain slopes. At higher elevations the spruce forest transitions to krummholz and then to alpine tundra where plant communities are characterized by a complex mosaic of cushion plant communities with species such as alpine dryad (*Dryas octopetala*) which is essential in stabilizing these gravel slopes, turf and forb meadows and fellfield communities. Hydrology is dominated by shallow ground discharge and surface water flow that initiates from surrounding upland alpine and subalpine zone slopes and maintains basin wetlands and stream flow. Habitat on the steep walls of the cirque is dominated by a dense canopy of Engelmann spruce (*Picea engelmannii*) forest while habitat on the wide, flat basin of the cirque is a patchy mosaic of open water, wet meadows and willow carrs including a shortfruit willow (*Salix brachycarpa*) / water sedge (*Carex aquatilis*) community. Bedrock geology is composed of Pikes Peak granite (Tweto 1979) which is extremely friable, eroding into coarse and easily destabilized gravel soils. Uplands are severely fragmented by the Pikes Peak toll road and by ongoing road development. Roads have altered system hydrology, exacerbated erosion processes and degraded landscape connectivity. Altered hydrology and connectivity diminish long term potential viability of upland, wetland and stream habitats. Copious amounts of gravel have been carried into and accumulated on the floor of the cirque at the perimeter of the wetlands. Because gravel is highly porous and has little water holding capacity the thick accumulation of gravel is effectively producing drier conditions than would typically be seen in a wetland.

Key Environmental Factors: Hydrology is the primary ecological process necessary to the maintenance of the wetland system that is the focus of this site. Specifically, shallow ground and surface water flow from surrounding upland slopes maintains the upland, wetland and stream habitat in the cirque basin. Importantly, at this site hydrology is dependent on the interaction of climate, floristics, and soils. Although the greatest amount of precipitation comes during summer months, winter snowfall makes an essential contribution to the hydrologic system. Snow is blown from alpine habitat down into the upper subalpine forests where it is trapped and stored.

As the snow melts it infiltrates into soils and slowly moves downslope into wetland and stream habitat thereby mediating fluctuations in the wetland and stream hydrograph.

Climate Description: Due primarily to elevational changes and topographic complexity wide climate variations occur within short distances and local climate on Pikes Peak is dramatically different from climate at relatively nearby locations which are at lower elevations. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. At this site on this northeast slope on Pikes Peak at an elevation of 12,500 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 27.63 °F and a minimum of 6.04 °F. Warmest temperatures occurred in July with an average maximum of 62.85 °F and an average minimum of 36.66 °F. Annual average precipitation was 29.21 inches. April through August are the wettest months of the year with July having the greatest average precipitation with 4.94 inches. Driest months are November through February with January and February having the least precipitation with 0.76 and 0.80 inches respectively (Prism 2010).

Biodiversity Significance Rank Comments (B2): This site contains one of three, native historic populations of greenback cutthroat trout (*Oncorhynchus clarkii stomias*) (G4T2T3/S2) in the Arkansas drainage and one of only four stable native historic populations rangewide (Metcalf et al. 2007). Greenback cutthroat trout is the only trout endemic to the headwaters of the South Platte and Arkansas River drainages. By the early 1900's, the subspecies was believed extinct due to over-harvest, introduction of non-native trout species, and habitat alteration (U.S. Fish and Wildlife Service 1998). The population was discovered by Colorado Division of Wildlife in 1998 and determined to be "pure" based on genetic testing (Policky et al. 1999; Metcalf et al. 2007). There is also a good to fair (BC-ranked) occurrence of the globally imperiled (G2G3/S2S3) short-fruit willow / water sedge (*Salix brachycarpa / Carex aquatilis*) shrubland. This association is described only from the Colorado Rocky Mountains but is also expected to occur in Utah. It has a naturally restricted distribution occurring only in narrow bands between wetter and drier micro-sites at montane elevations and consists of an unusual combination of mesic and less mesic habitat demanding plant species. This community is newly described, from only four stands, has not been specifically inventoried, and is predicted to be relatively uncommon (NatureServe 2010).

Severy Creek

Natural Heritage element occurrences at the Severy Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Fish	Oncorhynchus clarkii stomias	Greenback Cutthroat Trout	G4T2T3	S2	LT	ST		A	1999-99-99
Natural Communities	Salix brachycarpa / Carex aquatilis Shrubland	Subalpine Riparian / Wetland Carr	G2G3	S2S3				BC	2010-08-15

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

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

Protection Urgency Rank Comments (P3): Currently the site is public land managed by the USFS with no special designation. Wilderness designation would enable management that would improve the potential for long-term sustainability of the upland, riparian and stream ecosystems included in this site.

Management Urgency Rank Comments (M2): Colorado Division of Wildlife proposes to remove non-native brook trout from the lower two kilometers of the system and make small yearly transplants of greenbacks above a natural barrier within the stream (Policky et al. 1999). Other potential management issues are recreational fishing and the potential for spreading of whirling disease or introduction of non-native fish, timber operations, and road building/maintenance. Road-induced alteration has altered erosional processes which has impacted hydrology and degraded vegetation. Potential for long-term persistence of the community would be greatly improved by controlling anthropogenically-induced upland erosion.

Severy Creek
References

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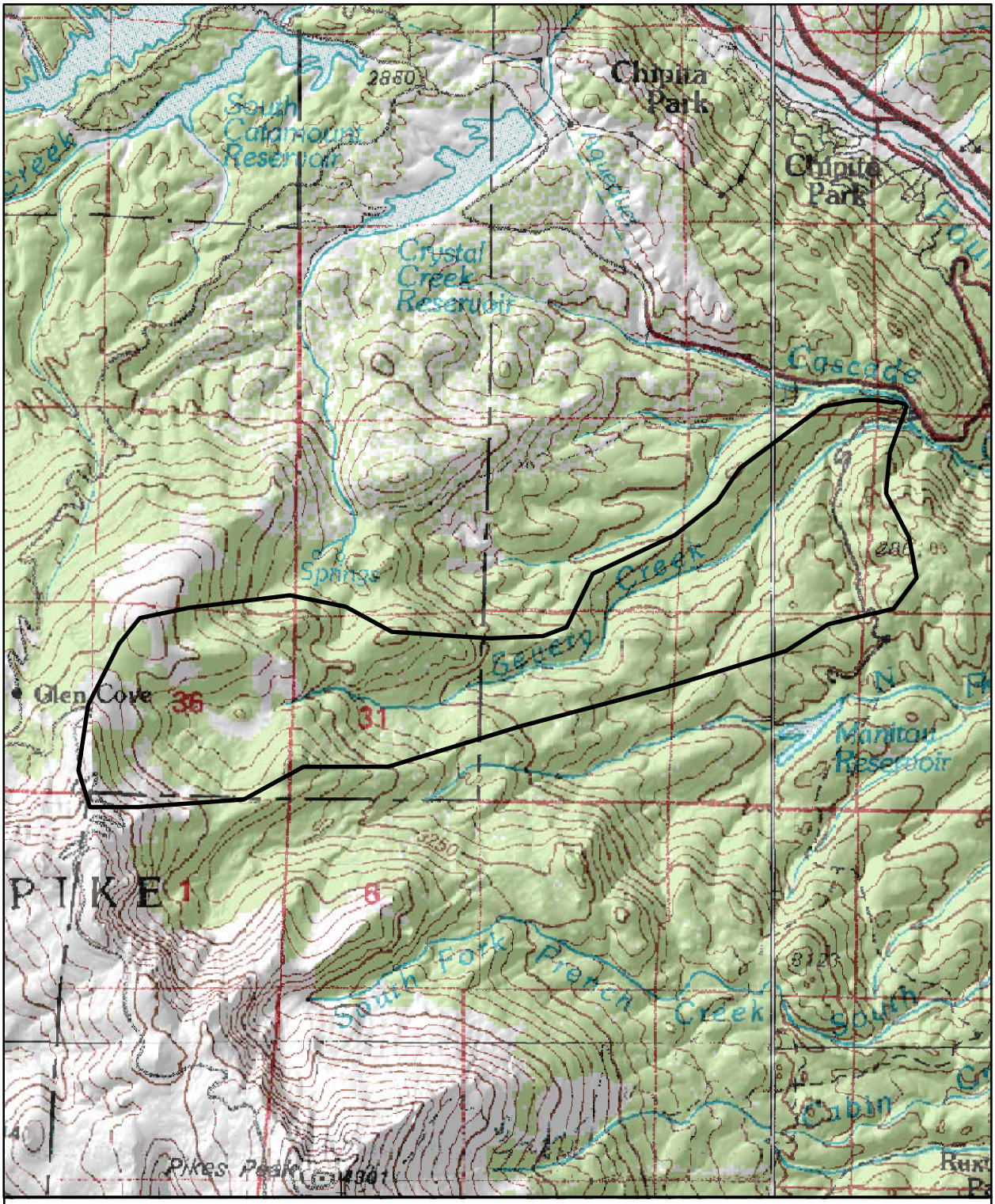
Version Author: Malone, D.G.

Version Date: 02/22/2011



Map 11. Severy Creek Potential Conservation Area, B2: Very High Biodiversity Significance

Skaguay Reservoir

Biodiversity Rank - B2: Very High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Big Bull Mountain

Size: 120 acres (49 ha) **Elevation:** 8,500 - 9,000 ft. (2,591 - 2,743 m)

General Description: The Skaguay Reservoir site is located in the montane zone on the west slope of the Front Range in Colorado. The site encompasses a steep-walled canyon that is drained by Beaver Creek. Beaver Creek is impounded by the Skaguay Reservoir and dam upstream of the site. Below the dam the valley is a fairly wide, with a low gradient and here Beaver Creek is classified as a Rosgen type C4 stream that is modified by dam impacts and grazing. Further downstream where the valley narrows and the gradient increases, the stream transitions to a B class stream, grazing impacts cease and stream quality improves. Riparian habitat is characterized by a linear mosaic of mesic grasslands and willows (*Salix* spp.) shrublands with intermittent tree cover dominated by Colorado blue spruce (*Picea pungens*) with occasional white fir (*Abies concolor*). This relatively lush riparian zone contrasts sharply with adjacent uplands where topography is characterized rolling hills interrupted by steep rock outcrops and cliffs. Cliff habitat is occupied by a diversity of chasmophytes (plants that inhabit rock crevices) including forbs such as James' telesonix (*Telesonix jamesii*) and Front Range alum-root (*Heuchera hallii*) and shrubs including waxflower (*Jamesia americana*). West-facing slopes are mixed Engelmann spruce - quaking aspen (*Picea engelmannii - Populus tremuloides*) forest while east-facing slopes are a mosaic of stands of ponderosa pine (*Pinus ponderosa*) with limber pine (*Pinus flexilis*) on ridge tops interspersed with xeric graminoid meadows and shrublands. Upland and riparian geology is composed of granitic rocks of 1,700 m.y. age group (Tweto 1979). Soils in this site have a shallow profile with abundant gravel that is unstable and has little water holding capacity.

Key Environmental Factors: Variables that influence site biota are: physical characteristics especially cliffs and seeps; and ecological processes including especially grazing intensity as it relates to alteration of hydrological process as a result of soil and vegetation alteration.

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on in the montane zone site at an average elevation of 9,400 feet, from 1971 through 2000, coldest temperatures occurred in January with an average maximum of 35.62 °F and a

minimum of 11.80 °F. Warmest temperatures occurred in July with an average maximum of 73.80 °F and an average minimum of 47.50 °F. Annual average maximum precipitation was 21.68 inches. May through August were the wettest months of the year with an average of 3.33 inches precipitation per month. Driest months are December, January and February with 0.58, 0.46 and 0.46 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B2): The site supports a good (B-ranked) occurrence of the globally imperiled (G2/S2) James' telesonix (*Telesonix jamesii*). James' telesonix is considered to be only in Colorado and New Mexico. In Colorado it is scattered sporadically on granite tors of the easternmost mountains. In northern New Mexico, it has been reported from one mountain area (NatureServe 2010).

Natural Heritage element occurrences at the Skaguay Reservoir PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				B	2010-06-08

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The Skaguay Reservoir site boundary was delineated to encompass known element occurrence and potential contiguous habitat. Additional habitat was included to enable ecological processes, especially hydrological processes that are essential to the long-term persistence of the occurrence. Only private lands with written permission were accessed.

Protection Urgency Rank Comments (P3): Lands in this site are privately and publicly owned. Public land managers are the State of Colorado and the BLM. Stresses to the system can include grazing and hydrologic alteration.

Management Urgency Rank Comments (M3): The element occurrence is currently in good condition; however, long-term viability may be impacted with upland hydrologic alteration. The plants occupy cracks in cliff faces where seeps occur. Groundwater from adjacent upland habitat is the likely source of water in these rock crevices that supports the element.

Skaguay Reservoir
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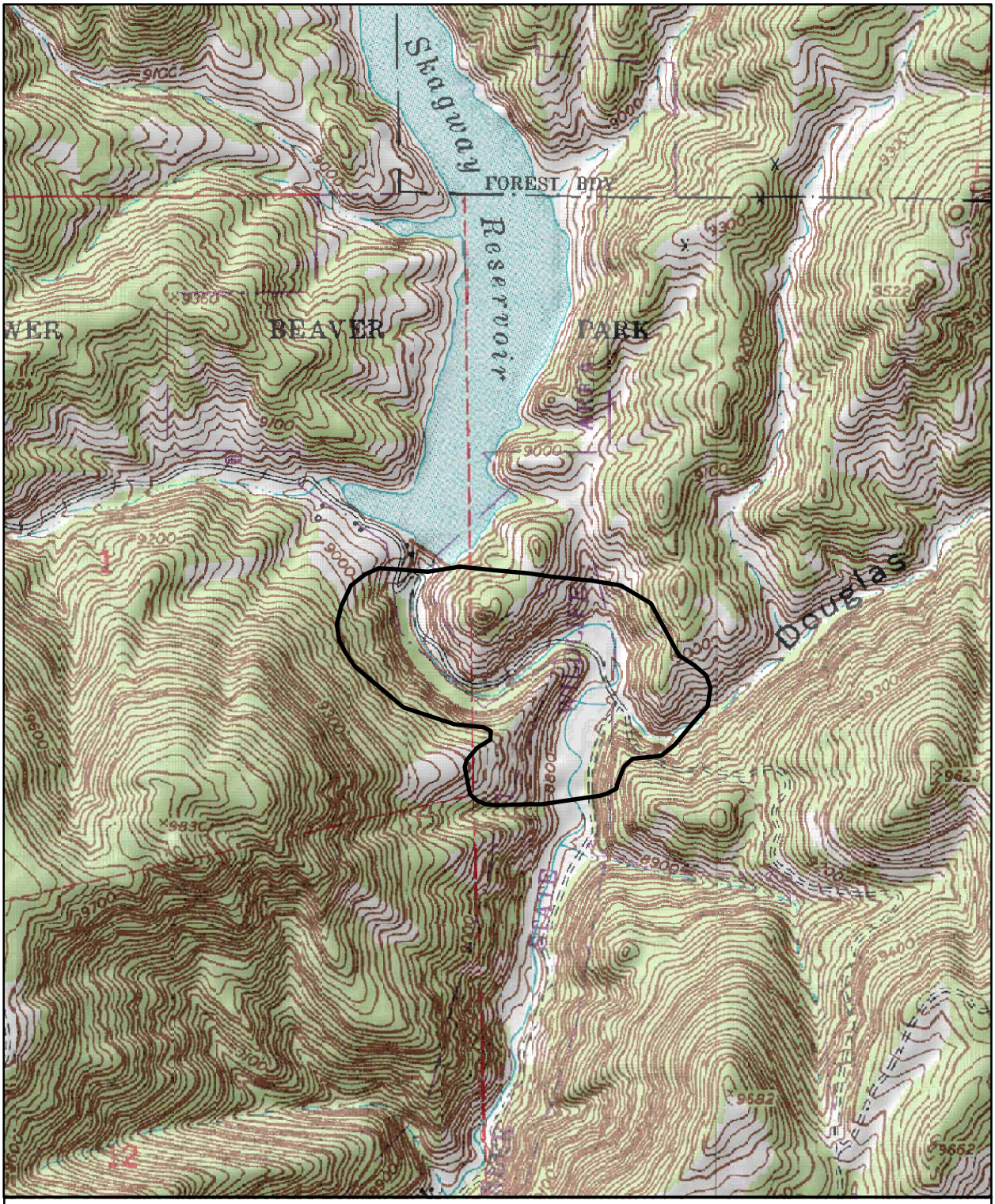
Version Author: Malone, D.G.

Version Date: 01/03/2010



Colorado Natural Heritage Program
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/07/2011

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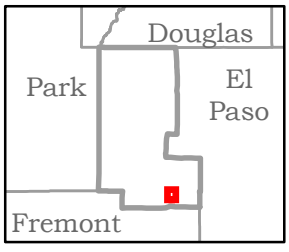
Legend

PCA Boundary

Big Bull Mountain, 38105-F1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 12. Skaguay Reservoir Potential Conservation Area, B2: Very High Biodiversity Significance

Almagre Mountain

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M1: Essential within 1 Year to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Manitou Springs

Size: 1,156 acres (468 ha) **Elevation:** 11,200 - 12,349 ft. (3,414 - 3,764 m)

General Description: The Almagre Mountain site is located on the east slope of the Front Range on the ridges and south flanks of Almagre Mountain. The site encompasses ecosystems from the alpine tundra down into the upper subalpine zone. Alpine habitats are a diverse mosaic of large and small patch ecological systems that includes boulder fields, fellfields, cliff habitat occupied by chasmophytes (plants that inhabit rock crevices) such as James' telesonix (*Telesonix jamesii*), steep gravel slopes stabilized by cushion plants especially alpine dryad (*Dryas octopetala*), krummholz stands of bristlecone (*Pinus aristata*) and limber pine (*Pinus flexilis*), turf meadows, woodlands and human-disturbed sites. Large patch systems include turf meadows dominated by Kobresia - curly sedge (*Kobresia myosuroides - Carex rupestris*) communities which occupy low gradient, alpine ridge tops and slopes and also ancient bristlecone pine/alpine clover (*P. aristata / Trifolium dasyphyllum*) woodlands which occupy steep, south-facing gravel slopes. Subalpine uplands are a mosaic of conifer forests dominated by Engelmann spruce on moist north- and west-facing slopes, and by ancient Bristlecone pine woodlands on drier, south-facing slopes. Valley bottom habitat is characterized by a linear mosaic of shrub and graminoid wetlands bordered by an ecotone of graminoid meadows with communities such as timber oatgrass (*Danthonia intermedia*) grasslands. Hydrology in the alpine zone is dependent on snow fall amount and distribution as well as on summer precipitation. In the subalpine, shallow groundwater flow from surrounding slopes maintains the wetlands that are the headwaters for Gould Creek which drains this sub-watershed. Site geology is characterized by the extremely friable Pikes Peak granite (Tweto 1979) which weathers into unconsolidated gravels that typify soils on steep slopes. Ridgetop soils are relatively deep and well developed with a thick layer of humus.

Key Environmental Factors: Key environmental factors that determine site biota include: edaphic properties especially soil texture and erosional characteristics; hydrology including snow distribution and shallow groundwater flow.

Climate Description: Due to elevational changes and complex topography local climate on Pikes Peak, and at other high elevation sites in the Front Range, is dramatically different from climate at relatively nearby locations at lower elevations. Due to geography, precipitation in Front Range ecosystems in Teller County comes

primarily during summer months. Although summer precipitation is the primary source of moisture, winter snowfall makes an important contribution to site hydrology. At alpine sites that are characterized by turf meadows such as occur in this site, most snow that falls into the alpine zone is blown down into the krummholz and subalpine zones where trees trap and store snowfall. This pattern of snow distribution has important implications to community development and site hydrology. In the alpine zone of this site, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 24.75 °F and a minimum of 1.49 ° F. Warmest temperatures occurred in July with an average maximum of 59.43 °F and an average minimum of 34.09 °F. Annual average maximum precipitation was 29.92 inches. July and August were the wettest months with 5.00 and 4.75 inches of precipitation respectively. Driest months are January and February having the least precipitation with 0.79 and 0.89 inches respectively (Prism 2010).

Biodiversity Significance Rank Comments (B3): The site is drawn for a fair (C-ranked) occurrence of a globally imperiled (G2/S2) bristlecone pine / alpine clover (*Pinus aristata / Trifolium dasyphyllum*) woodland. This type is a regional endemic with only a few recorded occurrences within its potential range. It requires relatively xeric subalpine slopes between 11,250 and 11,645 feet (just below timberline) with skeletal mineral soils and adequate drainage. Stands are threatened by recreational use, mining, and possibly effects of atmospheric deposition of pollutants (NatureServe 2010). Also, there is a good (B-ranked) occurrence of the globally vulnerable (G3/S3) Kobresia - curly sedge (*Kobresia myosuroides - Carex rupestris*) turf meadow and a fair (C-ranked) occurrence of the globally imperiled (G2G3/S2S3) timber oatgrass (*Danthonia intermedia*) grasslands. This association is a major upland alpine turf community of the southern Rocky Mountains. Elevations range from 11,300-12,500 feet along the Continental Divide and on the western slope of Colorado.

Almagre Mountain

Natural Heritage element occurrences at the Almagre Mountain PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Pinus aristata / Trifolium dasyphyllum Woodland	Upper Montane Woodlands	G2	S2				C	2010-09-15
Natural Communities	Danthonia intermedia Herbaceous Vegetation	Montane Grasslands	G2G3	S2S3				C	2010-09-15
Natural Communities	Kobresia myosuroides - Carex rupestris var. drummondiana Herbaceous Vegetation	Dry Alpine Meadows	G3	S3?				B	2010-09-15

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundaries were delineated to encompass the known element occurrences and their potential extent as well as the ecological processes, including hydrologic and edaphic processes, essential to their long-term persistence. Additional consideration was given to Colorado's changing climate (CWCB 2010) and the need for the ability of native species to be able migrate upward in elevation in order to survive changing environmental conditions.

Protection Urgency Rank Comments (P4): Site is public land managed by the USFS as National Forest. A more conservative designation, such as Wilderness, would enable management that would increase the potential for long-term ecosystem sustainability.

Management Urgency Rank Comments (M1): Geology consists of very friable Pikes Peak granite which erodes into gravel that is easily destabilized. Due to these geologic characteristics, anthropogenic development that disturbs these soils, such as the 4WD roads and trails that are cut across these mountain slopes greatly exacerbate erosion in this naturally unstable geology. Consequences include habitat loss from extensive erosion, altered ecosystem processes including degradation of the hydrologic regime, diminished migration potential for both plants and animals, altered geomorphic/erosional processes that impact water resources and physical damage to vegetation from smothering and trampling. Likelihood for long-term persistence and sustainability of this landscape, native communities and ecological processes would be greatly enhanced by closing roads and trails to vehicles and by restoration of the alpine habitat around Stratton Reservoir.

Almagre Mountain
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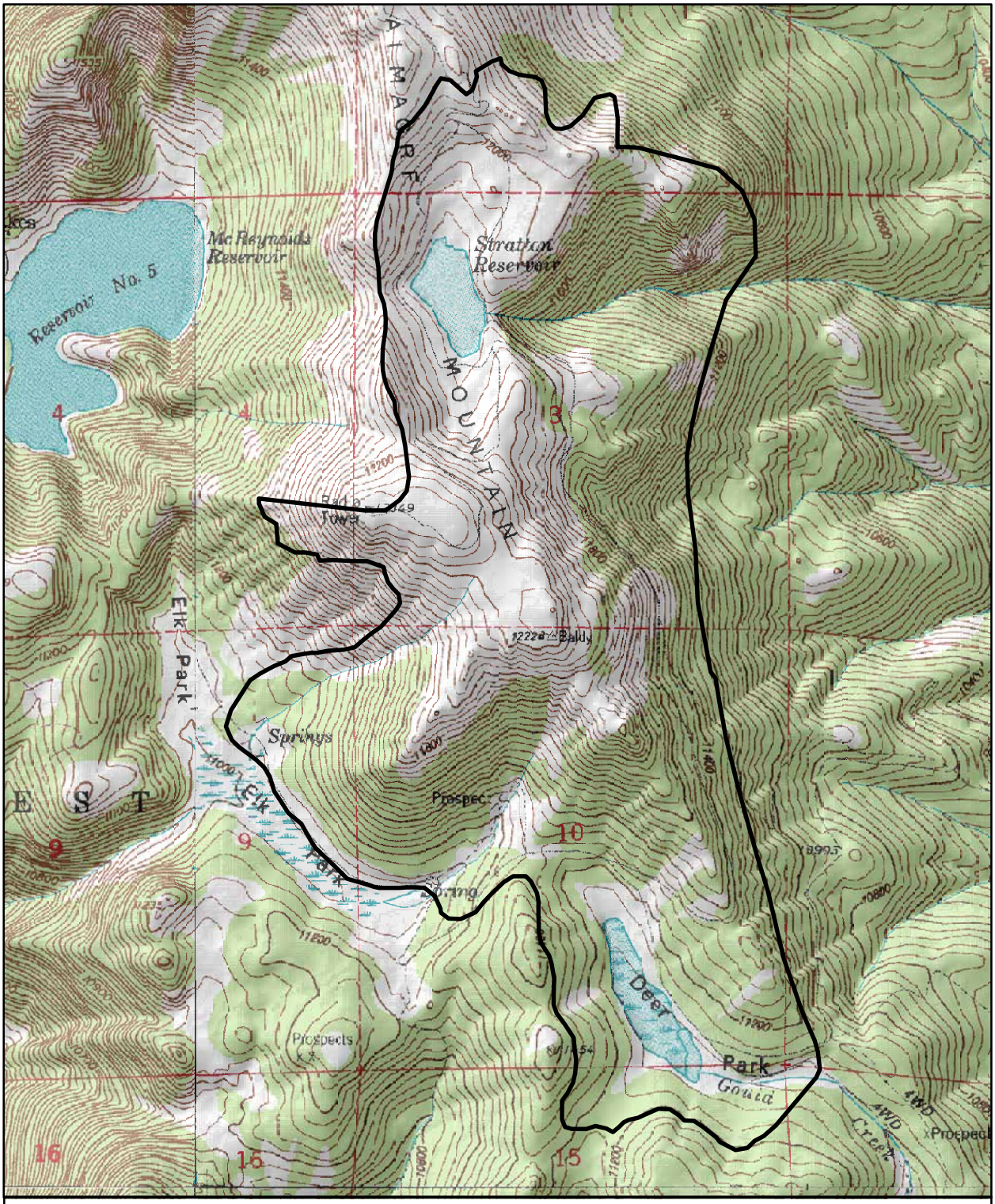
Version Author: Malone, D.G.

Version Date: 01/06/2011



Map 13. Almagre Mountain Potential Conservation Area, B3: High Biodiversity Significance

Booger Red Hill

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: High Park, Cripple Creek South

Size: 1,559 acres (631 ha) **Elevation:** 7,260 - 8,295 ft. (2,213 - 2,528 m)

General Description: The Booger Red Hill site is located in the lower montane zone foothills on the west slope of the Front Range in the south western region of Teller County. The site encompasses rolling hills cut by two, deep, steep-walled canyons that are drained by Little High Creek in the west canyon and by Four Mile Creek in the east canyon. Riparian habitat varies between the canyons. Riparian habitat along Little High Creek is a narrow and patchy distribution of a deciduous forest with an overstory tree canopy dominated by narrowleaf cottonwood (*Populus angustifolia*) and a shrub layer dominated by bluestem willow (*Salix irrorata*) although several other willow and non-willow riparian shrubs are also present. Four Mile Creek riparian habitat is patchy linear mosaic of coyote willow (*Salix exigua*), and thinleaf alder (*Alnus incana*). Uplands in this topographically complex landscape are characterized by a mosaic of habitats. Hillslopes are a mosaic of grasslands, shrublands, and woodlands. Shrublands include communities of mountain mahogany (*Cercocarpus montanus*) and Gambel oak (*Quercus gambelii*). Forested communities here include pinon pine - Rocky Mountain juniper (*Pinus edulis - Juniperus scopulorum*) woodlands on east-facing slopes and ponderosa pine (*Pinus ponderosa*) woodlands on west-facing slopes. Rolling hills are cut by deep canyons. On canyon rims, where habitat is characterized by opens stands of ponderosa pine, birdbill dayflower (*Commelina dianthifolia*) occupies shallow, depressions that have been weathered into the exposed bedrock. Canyon walls are occupied by a variety of communities that vary with aspect and soil moisture. Moist, northeast-facing gullies on the canyon wall are dominated by Douglas-fir (*Pseudotsuga menziesii*) forest. Drier canyon walls are characterized by a sparse tree layer with variably dense cover of shrubs and herbs. Tree species include pinon pine, Rocky Mountain juniper and a few Douglas-fir. Commonly occurring shrub species on these canyon walls include waxflower (*Jamesia americana*) and ocean spray (*Holodiscus discolor*). Cliff faces are occupied by ferns, forbs and graminoids, wherever groundwater from surrounding uplands seeps into cliff cracks and crevices. On these cliff faces chasmophytes (plants that inhabit rock crevices) thrive and include species such as Fendler cloak-fern (*Argyrochosma fendleri*), Eaton's lipfern (*Cheilanthes eatonii*), American rockbrake (*Cryptogramma acrostichoides*) and Front Range alum-root (*Heuchera hallii*). Local hydrology is driven by soil characteristics, precipitation and infiltration. The

natural hydrologic regime has been altered by fire suppression induced changes to vegetation and grazing-induced changes to soil and vegetation. Geology is composed of granitic rocks of the 1,400 m.y. age group interspersed with Tertiary age intra-ash-flow quartz latitic lavas (Tweto 1979). Soils are a complex mosaic of classes. Hillslope soils include Corpen-High complex, 5 to 25 percent slopes, Highpark very gravelly sandy loam, 5 to 40 percent slopes, Quander-Bushpark very gravelly loams, 5 to 40 percent slopes, and Bushpark-Seitz association, 15 to 50 percent slopes; canyon and canyon rim soils are Cathedral-Rock outcrop complex, 40 to 60 percent slopes and 35 to 70 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Key environmental factors that influence site biota include: physical characteristics, especially topography that is characterized by steep-walled canyons and cliff faces where groundwater discharges through crevices and fractures; and ecological processes, specifically a natural fire regime which is essential to maintaining the forest-grassland mosaic that characterizes these upland hillslopes (Rondeau 2001) and local hydrology which is largely responsive to precipitation infiltration.

Climate Description: Although the site is located in the montane zone the climate is somewhat dry. At this site at an average elevation of 7,700 feet coldest temperatures occurred in January with an average maximum of 40.17°F and a minimum of 11.91 ° F. Warmest temperatures occurred in July with an average maximum of 78.75 °F and an average minimum of 49.95 °F. Annual average maximum precipitation was 17.03 inches. July and August were the wettest months of the year with 2.68 and 3.03 inches of precipitation respectively. Driest months are December, January and February with 0.48, 0.43 and 0.43 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B3): The site is drawn for an excellent (A-ranked) occurrence of the globally vulnerable (G3/S3) Fendler cloak-fern (*Argyrochosma fendleri*). Additionally present is an excellent (A-ranked) occurrence of the state imperiled (G5/S1?) birdbill dayflower (*Commelina dianthifolia*) which was previously not documented in Teller County (NatureServe 2010) and a good (B-ranked) occurrence of the state rare (G5?/S1S2) Eaton's lipfern (*Cheilanthes eatonii*).

Booger Red Hill

Natural Heritage element occurrences at the Booger Red Hill PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Argyrochosma fendleri	Fendler cloak - fern	G3	S3				A	2010-08-23
Vascular Plants	Commelina dianthifolia	birdbill day - flower	G5	S1?				A	2010-08-24
Vascular Plants	Cheilanthes eatonii	Eaton's lip fern	G5?	S1S2				B	2010-08-24

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was delineated to encompass known occurrences as well as potential extent of the occurrences. Additionally, the boundary includes sufficient habitat for watershed protection to enable ecosystem processes, especially hydrologic processes including groundwater recharge. Only lands with written landowner permission were surveyed.

Protection Urgency Rank Comments (P3): The site is comprised of both private and public land. Public lands are managed by the BLM for domestic livestock grazing and dispersed recreation.

Management Urgency Rank Comments (M3): Cliff habitat, where the element occurrences are located, is relatively immune from direct grazing impacts, although hydrologic alteration to surrounding hillslopes may impact long-term element viability. Grazing-induced alteration to soils and vegetation in surrounding upland hillslopes has altered the infiltration and runoff regime and local hydrology.

Exotic Species Comments: Alien plants in upland habitat include smooth brome (*Bromus inermis*), cheat grass, (*Bromus tectorum*), and bull thistle (*Cirsium vulgare*). Alien plants in riparian habitat include Canada thistle (*Cirsium arvense*), redtop (*Agrostis gigantea*), red clover (*Trifolium repens*), yellow sweetclover (*Melilotus officinalis*), curly dock (*Rumex crispus*), yellow toadflax (*Linaria vulgaris*), and black medic (*Medicago lupulina*).

Booger Red Hill
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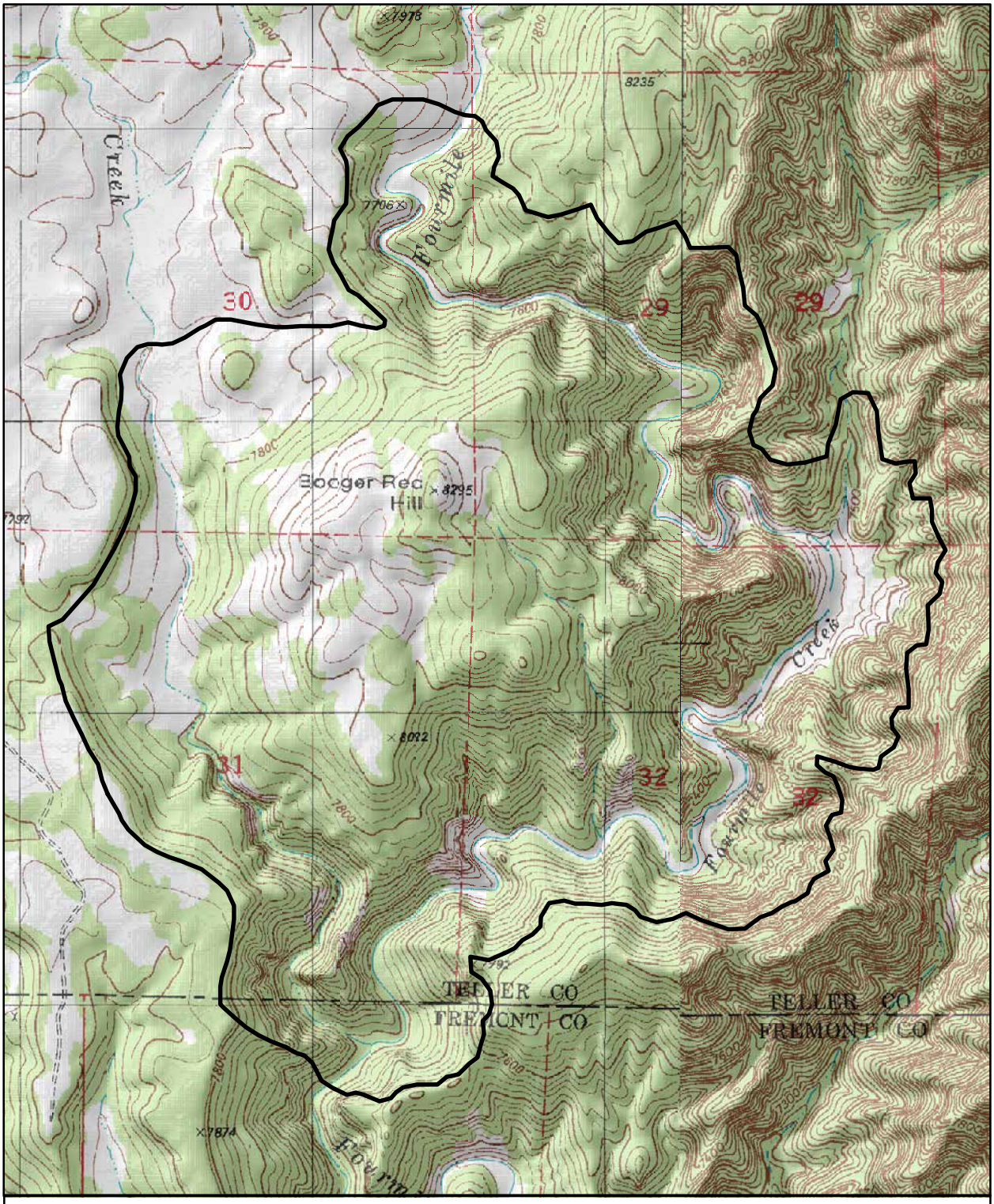

Map 14. Booger Red Hill Potential Conservation Area, B3: High Biodiversity Significance

Cripple Creek

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M1: Essential within 1 Year to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Cripple Creek South

Size: 2,534 acres (1,025 ha) **Elevation:** 6,820 - 9,635 ft. (2,079 - 2,937 m)

General Description: The Cripple Creek site is located in southern portion of the county along the popular Shelf Road (County Road 88). Riparian vegetation is highly variable in the upstream half of the site. The downstream half of the riparian zone is dominated by narrowleaf cottonwood (*Populus angustifolia*) / coyote willow (*Salix exigua*) woodland. The cottonwoods saplings exhibit over 50% mortality. The Cresson Gold Mine and Valley Leach Facility are located several miles upstream in Victor. Another AngloGold facility operates on the site's southern boundary. The floodplain and riparian area consists of mix of sand and gravel, with grazing impacts wherever the floodplain is wide enough to support cattle. Cripple Creek flows southward at a 9% gradient within a relatively sinuous channel that is uncharacteristically narrow for this plant association. However, the natural topography and Shelf Road limit the creek's ability for lateral movement. The adjacent toeslope has a strip of Gambel oak (*Quercus gambelii*), with pinon pine (*Pinus edulis*) / Rocky Mountain juniper (*Juniperus scopulorum*) woodland upslope. There are also areas of ponderosa pine (*Pinus ponderosa*) / mountain mahogany (*Cercocarpus montanus*) woodland. The canyon walls are primarily Pikes Peak granite. There are small areas of intra-ash-flow quartz latitic lavas, breccias, tuffs, and/or conglomerates, and pre-ash-flow andesitic lavas at the eastern edge of the site (Tweto 1979). Soils in the northeastern third of the site consist of moderately deep Guffey very gravelly sandy loam. Shallow Tolex very gravelly sandy loam dominates the rest of the site (USDA NRCS 2008).

Key Environmental Factors: Degener beardtongue (*Penstemon degeneri*) occurs in montane grasslands and pinon pine (*Pinus edulis*) / Rocky Mountain juniper (*Juniperus scopulorum*) woodlands. It grows in rocky soils over igneous bedrock near canyon rims or in cracks of rock slabs (Peterson and Harmon 1981). Front Range alumroot (*Heuchera hallii*) occurs in rock crevices of montane cliffs and rocky slopes (Harrington 1964). Narrowleaf cottonwood (*Populus angustifolia*) / coyote willow (*Salix exigua*) woodland is an early successional plant association that depends on periodic flooding to maintain the population of coyote willow (*Salix exigua*). If flooding decreases in frequency, thinleaf alder (*Alnus incana*) or red-osier dogwood (*Cornus sericea*) are likely to replace coyote willow (*Salix exigua*) as the dominant shrub (Carsey et al. 2003).

Cripple Creek

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: Gold mining began City of Cripple Creek in 1891. The Roosevelt and Carlton Tunnel aqueducts that cross the site were built in 1907 and 1941, respectively, to drain water from mines into Cripple Creek to facilitate access to ore deep below the water table. The Cripple Creek and Victor Gold Mining Company currently mines using a heap-leach process at the Cresson Project, located between the Cities of Cripple Creek and Victor (Cripple Creek and Victor Gold Mining CO website accessed 2010).

Cultural Features: Abandoned mine shafts are scattered throughout the upstream half of the site.

Biodiversity Significance Rank Comments (B3): This site supports an excellent (A-ranked) occurrence of the globally imperiled (G2/S2) plant, Degener beardtongue (*Penstemon degeneri*), a species endemic to south-central Colorado (Spackman et al. 1997). However, none of the three subpopulations at this site could be relocated during a 2010 survey for this species. Thus, the site is down-ranked from B2 to B3. If further field surveys locate the rare plant, the biodiversity rank will be elevated. There is also a fair (C-ranked) occurrence of an apparently globally secure (G4/S4) plant association, narrowleaf cottonwood (*Populus angustifolia*) / coyote willow (*Salix exigua*) woodland.

Cripple Creek

Natural Heritage element occurrences at the Cripple Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia / Salix exigua Woodland	Narrowleaf Cottonwood Riparian Forests	G4	S4				C	2010-09-20
Vascular Plants	Penstemon degeneri	Degener beardtongue	G2	S2			BLM/ USFS	A	2007-07-15

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to include known occurrences of the three elements of biodiversity interest, additional potential habitat, and the local mosaic of plant communities. The boundary was digitized while referencing a one meter digital color orthophoto quad and a 1:100,000 digital quad. Private lands were only visited with written permission from landowners.

Protection Urgency Rank Comments (P3): The land ownership of the site is highly fragmented with roughly 50% private and 50% public lands managed by the BLM, Royal Gorge Field Office. Most of the private holdings appear to be inactive family-owned mining claims, but there is also a ranch at the southwestern edge of the site.

Management Urgency Rank Comments (M1): A lone saltcedar (*Tamarix ramosissima*) shrub must be treated immediately before it infests the rest of the canyon. The herbaceous weed infestation also needs to be addressed. The site would also benefit from reduced grazing impacts upstream.

Natural Hazard Comments: There is a risk of falling into abandoned mine shafts. The active gold mining operation could pose risk of exposure to toxic chemicals in the creek.

Exotic Species Comments: Tamarisk (*Tamarix ramosissima*) is represented by a single shrub. Sweetclover (*Melilotus officinalis*), Canada thistle (*Cirsium arvense*), Dalmatian toadflax (*Linaria dalmatica*), quackgrass (*Elymus repens*), and Russian thistle (*Salsola australis*) are abundant.

Information Needs: Further field surveys are needed to locate the rare Degener beardtongue (*Penstemon degeneri*).

Cripple Creek
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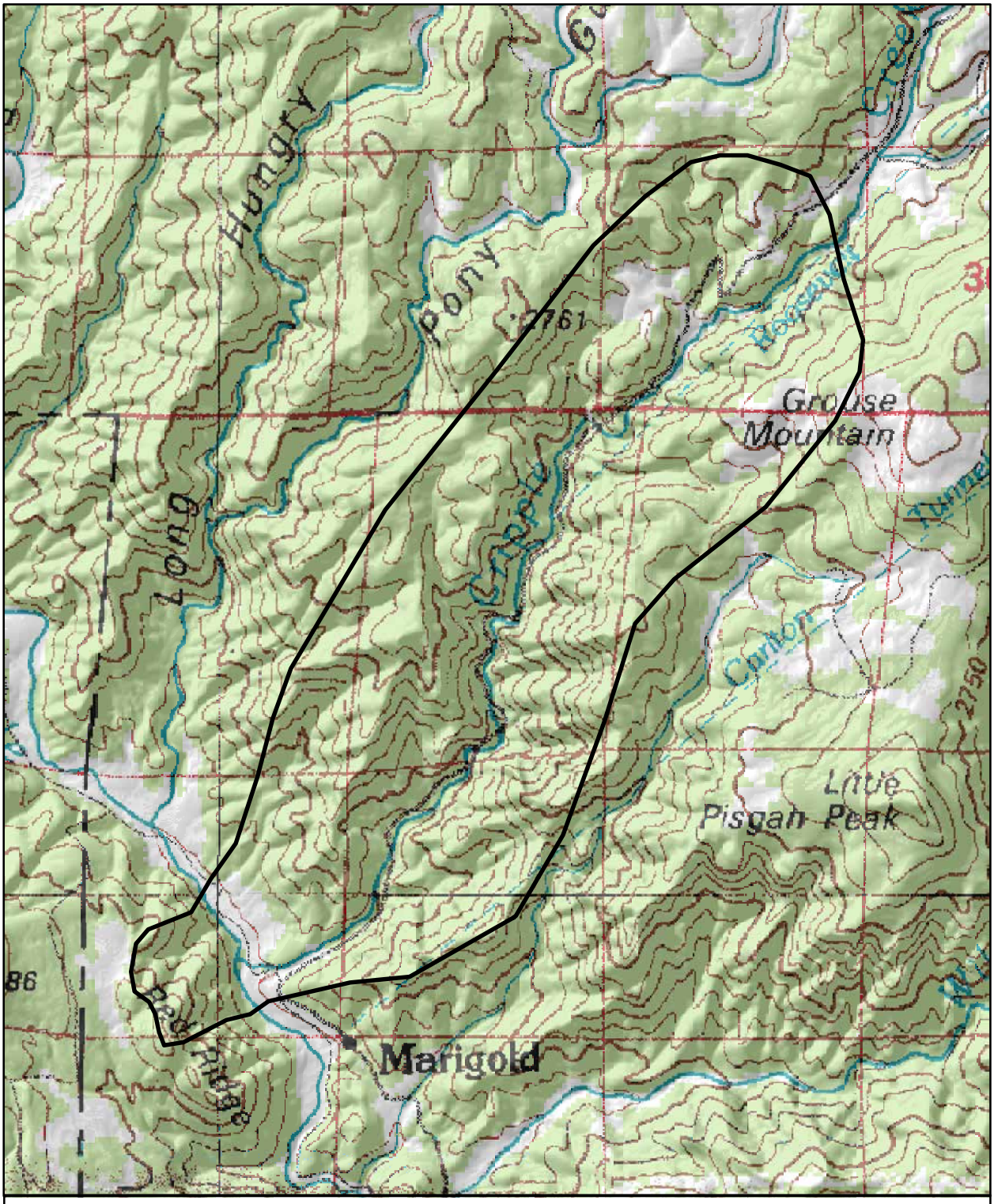

Map 15. Cripple Creek Potential Conservation Area, B3: High Biodiversity Significance

Crystal Creek near Cedar Mountain Road

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Hackett Mountain

Size: 1,845 acres (747 ha) **Elevation:** 8,170 - 9,240 ft. (2,490 - 2,816 m)

General Description: Crystal Creek near Cedar Mountain Road site supports a water birch (*Betula occidentalis)* / mesic graminoid association that creates a narrow corridor of tall shrubs along Crystal Creek within this narrow montane valley. The vegetation of this riparian vegetation was formerly classified as water birch (*Betula occidentalis)* / false Solomon's seal *(Maianthemum stellatum)*. After the Hayman fire, false Solomon's seal (*Maianthemum stellatum)* appears to have disappeared, so the riparian community must now be classified as a water birch (*Betula occidentalis)* / mesic graminoid shrubland even though it is located in a narrow valley instead of the typical broad floodplain and hosts abundant forbs. Immediately upstream from this shrubland are a series of beaver ponds and a manmade pond. The south-facing slope of the valley is a ponderosa pine (*Pinus ponderosa)* woodland that has undergone 75% mortality, leaving bunchgrasses like mountain muhly (*Muhlenbergia montana)* to fill in the gaps. The north-facing slope, formerly occupied by ponderosa pine (*Pinus ponderosa)* / blue spruce (*Picea pungens)* forest, has also undergone high mortality, with quaking aspen (*Populus tremuloides)* seedlings now taking over. Upland soils are classified as the Garber series, which are loamy-skeletal, mixed Pachic Haploborolls (USDA NRCS 2008), derived from Pikes Peak granite (Tweto 1979).

Key Environmental Factors: Water birch (*Betula occidentalis*) requires moist soil, indicating a relatively high groundwater table and/or a natural flood regime along Crystal Creek. Non-native grasses and forbs are abundant, which would normally indicate overgrazing (Carsey et al. 2003). However in this steep and remote area of Pike National Fire, the Hayman fire is more likely to be responsible for the influx of weeds.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the

ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B3): The site hosts a good (B-ranked) occurrence of water birch (*Betula occidentalis*) / mesic graminoid shrubland, a plant association that is globally vulnerable (G3) and imperiled in Colorado (S2). The site also contains a good (B-ranked) population of jeweled blazingstar (*Nuttalia speciosa*), a globally vulnerable (G3/S3) plant. This species' taxonomic status as distinct from other blazingstars (e.g. by Weber & Whitman 2001) has been questioned. If this species is combined with similar species by taxonomists, it could no longer warrant classification as globally vulnerable.

Natural Heritage element occurrences at the Crystal Creek near Cedar Mountain Road PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Betula occidentalis / Mesic Graminoids Shrubland	Lower Montane Riparian Shrublands	G3	S2				B	2010-08-23
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				B	2010-08-23

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was drawn to the adjacent ridgetops with the exception of developed areas in the southeastern edge of the site. This boundary was chosen to incorporate the extent of the immediate watershed that can still be conserved to protect the riparian shrubland below to maintain current water flows. The private lands within the site were not visited because the plant community of interest was limited to Pike National Forest.

Protection Urgency Rank Comments (P3): The site is located in a remote area of Pike National Forest.

Management Urgency Rank Comments (M2): Weeds are abundant along Crystal Creek. Entrenched gullies are dumping excessive gravel into the creek. There is an unofficial campsite and associated ATV vegetation damage adjacent to the creek. Suggested management actions include patrolling against off-road use of ATVs, implementing best management practices against erosion of the adjacent two track, and controlling weeds.

Crystal Creek near Cedar Mountain Road

Natural Hazard Comments: The two tracks traveled to access the site are very steep and require skillful use of 4 Wheel Drive.

Exotic Species Comments: The site abounds with the weeds butter-and-eggs (*Linaria vulgaris)*, Canada thistle (*Cirsium arvensis),* and quackgrass (*Elymus repens).*

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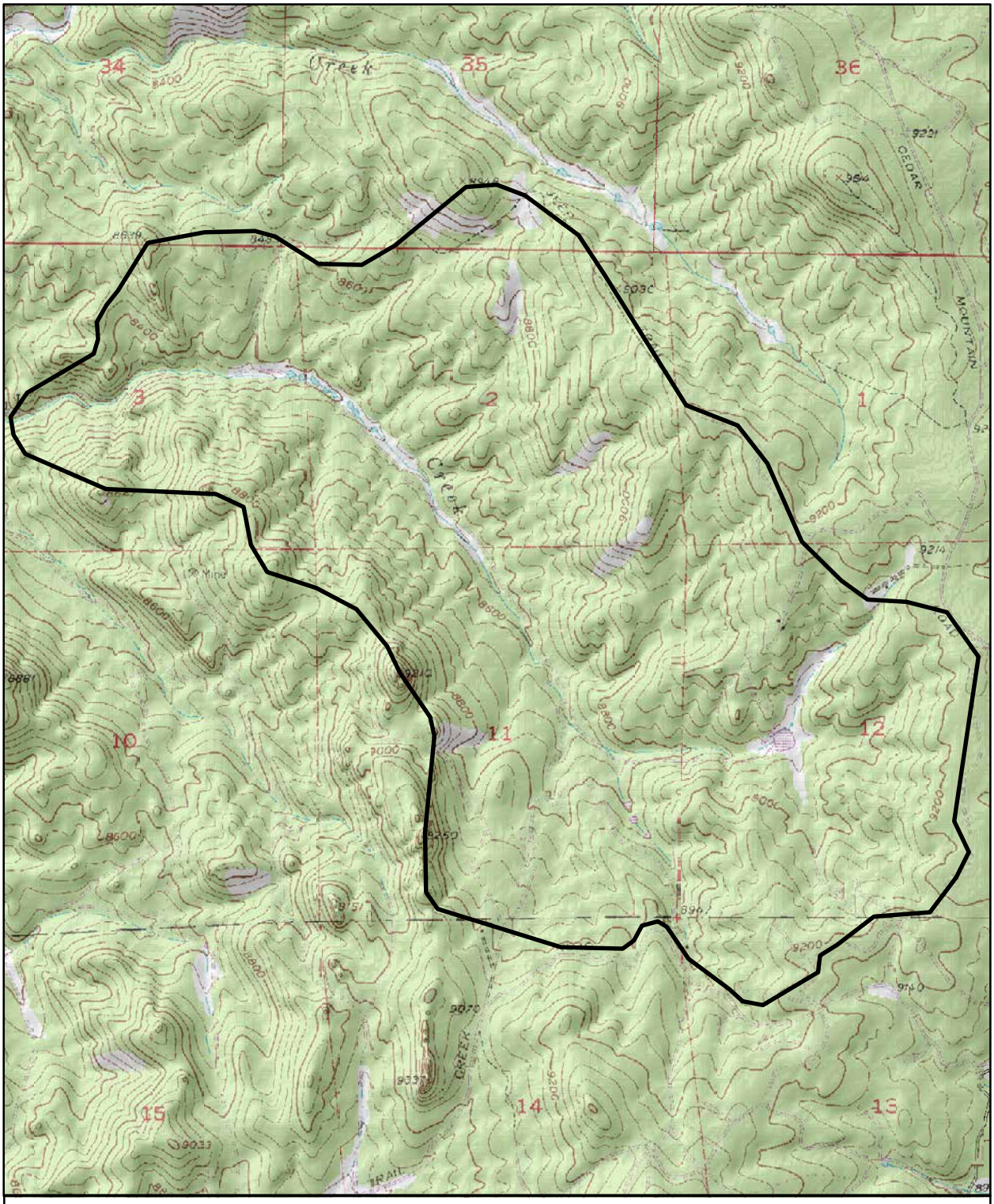
Version Author: Shaw, A.E.

Version Date: 11/30/2010



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Map Date: 03/07/2011

Miles
0 0.2 0.4

N

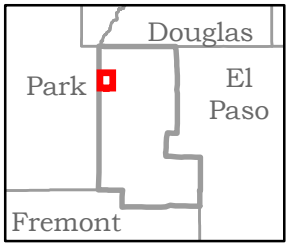
Legend

PCA Boundary

Hackett Mountain, 39105-A3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 16. Crystal Creek near Cedar Mountain Road Potential Conservation Area, B3: High Biodiversity Significance

Florissant

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P5: No Action to be Taken on this Site

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Divide, Lake George

Size: 2,280 acres (923 ha) **Elevation:** 8,400 - 8,800 ft. (2,560 - 2,682 m)

General Description: The Florissant site is located in the montane zone on the west slope of the Front Range and encompasses habitats in Florissant Fossil Beds National Monument. Landscape is characterized by low, rolling hills with intervening broad swales and valleys that are occasionally interrupted by dramatic rock outcrops and ridges. Habitat is characterized by an intricate mosaic of large-patch open stands of ponderosa pine (*Pinus ponderosa*) woodlands and grasslands including Arizona fescue-mountain muhly (*Festuca arizonica-Muhlenbergia montana*) and Parry's oatgrass (*Danthonia parryi*) grasslands. A diversity of forbs such as whole leaf Indian paintbrush (*Castilleja integra),* owl clover *(Orthocarpus luteus),* and beardless sidebells penstemon *(Penstemon virgatus)* are present but in low cover. Riparian habitat and low swales where the water table is at or near the surface are occupied by narrow bands of mesic grasslands and shrublands and quaking aspen (*Populus tremuloides)* woodlands occur on moist, north-facing slopes and also in riparian zones. Chasmophytes occupy moist seeps and crevices in rock outcrops and include maidenhair spleenwort (*Asplenium trichomanes*), Rocky Mountain woodsia (*Woodsia scopulina*), and male fern (*Dryopteris filixmas*). Soils are gravels and sandy loams that have weathered from the extremely friable Pikes Peak granite that underlies the region. Woodland soils are comprised of part soil and part gravel, whereas valley soils are often deep and developed with a thick layer of duff. Geology is a basement layer of pre-Cambrian Pikes Peak Granite (Tweto 1979). Weathered rounded boulders, outcrops and coarse gravels of this granite are visible on the low hills that surround Florissant hills. During the Oligocene, volcanic deposits of mud and lava from the active Guffy volcanoes blocked stream flows and created the ancient Lake Florissant. Subsequent eruptions over the next hundred thousand years deposited volcanic ash over Lake Florissant, trapping plant debris and insects in layers of thin sediments that eventually formed fossils in the fine-grained shale layers. Subsequent uplift and erosion of the of the granite peaks during the Laramide orogeny, starting about 65 mya, scoured down the granite peaks into the broad, rolling uplands that characterize today's Florissant topography (Edwards and Weber 1990). This complex mosaic of natural and connected habitats provides a rich variety of resources for bird species which included Turkey Vulture (*Cathartes aura*), Northern Harrier (*Circus cyaneus*), Sharp-shinned Hawk (*Accipiter striatus*), Red-tailed hawk (*Buteo jamaicensis*), Swainson's Hawk (*Buteo swainsoni*),

Peregrine Falcon (*Falco peregrinus*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Williamson's Sapsucker (*Sphyrapicus thyroideus*), Red-naped Sapsucker (*Sphyrapicus nuchalis*), Northern flicker (*Colaptes auratus*), Hairy Woodpecker(*Picoides villosus*), Olive-sided Flycatcher (*Contopus cooperi*), Western Wood-Peewee (*Contopus sordidulus*), Warbling Vireo (*Vireo gilvus*), Common Raven (*Corvus corax*), American Crow (*Corvus brachyrhynchos*), Steller's Jay (*Cyanocitta stelleri*), Clark's Nutcracker (*Nucifraga columbiana*), Violet-green Swallow (*Tachycineta thalassina*), Tree Swallow (*Tachycineta bicolor*), Pygmy Nuthatch (*Sitta pygmaea*), White-breasted Nuthatch (*Sitta carolinensis*), Red-breasted Nuthatch (*Sitta canadensis*), Mountain Chickadee (*Poecile gambeli*), Golden-crowned Kinglet (*Regulus satrapa*), House Wren (*Troglodytes aedon*), Canyon Wren (*Catherpes mexicanus*), Townsend's Solitaire (*Myadestes townsendi*), Mountain Bluebird (*Sialia currucoides*), Eastern Bluebird (*Sialia sialis*), American Robin (*Turdus migratorius*), Yellow-rumped Warbler (*Dendroica coronata*), Dark-eyed Junco (*Junco hyemalis*), Lark Sparrow (*Chondestes grammacus*), Chipping Sparrow (*Spizella passerina*), Brewer's Sparrow (*Spizella breweri*), Lincoln's Sparrow (*Melospiza lincolnii*), and Pine Siskin (*Carduelis pinus*). Several of these species are vulnerable to climate-change induced population declines. Of the species observed at this site this includes Swainson's Hawk, Olive-sided Flycatcher, and Western Wood-Peewee (NABCI 2010).

Key Environmental Factors: Key environmental variables influencing site biota include environmental conditions and ecological processes. Environmental characteristics, especially climate, are a key determinant of grassland characteristics. Ecological processes including fire disturbance, grazing intensity and prairie dog activity are determinants of floristic and site characteristics.

Climate Description: Although Florissant is located in the montane zone the climate is somewhat dry compared to other more northerly sites at similar elevations. At this montane zone site at an average elevation of 8,400 feet coldest temperatures occurred in January with an average maximum of 39.1 °F and a minimum of 4.3 °F. Warmest temperatures occurred in July with an average maximum of 78.2 °F and an average minimum of 41.2 °F. Annual average maximum precipitation was 14.93 inches. July and August were the wettest months of the year with 3.02 and 3.15 inches of precipitation respectively. Driest months are December, January and February with 0.32, 0.42 and 0.33 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Western Regional Climate Center 2010).

Land Use History: Following the building of the Colorado and Midland Railroad, in the 1880's and 1890's farming and ranching became common throughout the Florissant area. Logging was also prolific and clear cuts were common (Edwards and Weber 1990).

Biodiversity Significance Rank Comments (B3): This site encompasses numerous

elements including a good (B-ranked) occurrence of a globally vulnerable (G3/S2) matrix grassland, Arizona fescue (*Festuca arizonica*) - mountain muhly (*Muhlenbergia montana*), a fair (C-ranked) occurrence of the globally vulnerable (G3/S1) grassyslope sedge (*Carex oreocharis*) and good (B-ranked) occurrences of the state rare (G5/S2S3) prairie goldenrod (*Unamia alba*). Grassyslope sedge is a regional endemic of the southern Rocky Mountains from southeastern Wyoming to northern Arizona (NatureServe 2010). There is also a fair (C-ranked) occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*). This occurrence is within the montane portion of the species population range, which occupies south-central Colorado and north-central New Mexico. The montane population of the Gunnison prairie dog is considered globally imperiled (G5T2) and is designated as a candidate population by the U.S. Fish and Wildlife Service under the Endangered Species Act.

Natural Heritage element occurrences at the Florissant PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Mammals	Cynomys gunnisoni pop. 1	Gunnison's Prairie Dog - Montane Population	G5T2	S2	C		BLM/ USFS	E	2010-07-06
Natural Communities	Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation	Montane Grasslands	G3	S2				B	2010-08-01
Vascular Plants	Carex oreocharis	a sedge	G3	S2				C	2010-08-05
Vascular Plants	Woodsia neomexicana	New Mexico cliff fern	G4?	S2				H	1983-09-17
Vascular Plants	Unamia alba	prairie goldenrod	G5	S2S3				B	2010-08-05
Vascular Plants	Unamia alba	prairie goldenrod	G5	S2S3				B	2010-08-01

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn to include the known occurrences as well as likely potential extent and habitat of the element occurrences. Additionally, a buffer was included in the boundary to protect habitat from disturbance and enable natural migration and dispersal. Permission to go off-trail was acquired from National Park Service before surveying.

Protection Urgency Rank Comments (P5): The site is public land managed by the National Park Service.

Florissant

Management Urgency Rank Comments (M3): Fire suppression has likely allowed brush and trees to invade some areas that were formerly grasslands under a natural fire regime and which were habitat for the elements. Alien plant species should be eradicated as they pose a threat to the long-term persistence of the element occurrences. Also, sylvatic plague (*Yersinia pestis*) is a serious management issue for Gunnison's prairie dogs, which are highly susceptible to plague and dramatic declines in North Park, Colorado have been documented, where population occupancy fell from 915,000 acres in 1945 to 45 acres in 2002 due to reoccurring plaque epizootics. The effects of plague are compounded by the small size and isolation of the montane populations, making recolonization after plague epizootics difficult, and rebounding of the populations unlikely.

Exotic Species Comments: Cheatgrass (*Bromus tectorum*) is scattered throughout uplands. Canada thistle (*Cirsium arvense*) was documented in the riparian habitat.

Information Needs: Current field surveys are needed to locate the state rare plant, New Mexico cliff fern (*Woodsia neomexicana*). It was last observed in the early 1980s.

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Version Author: Malone, D.G. and J.R. Sovell

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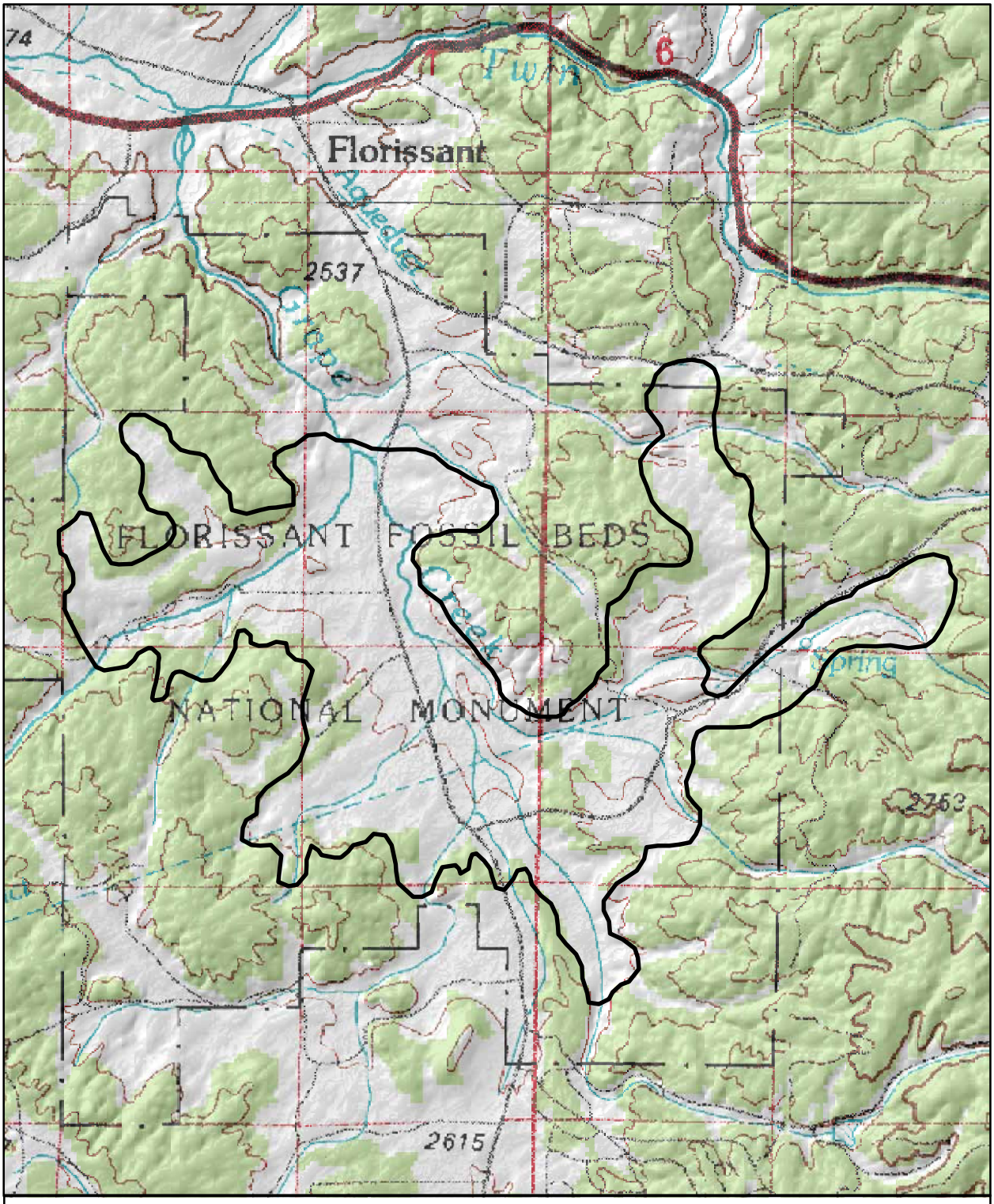

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Miles
0 0.2 0.4

N

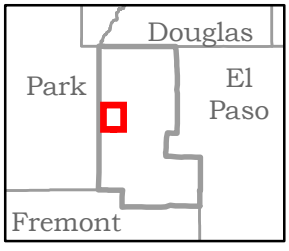
Legend

PCA Boundary

Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 17. Florissant Potential Conservation Area, B3: High Biodiversity Significance

Florissant at Hornbek Homestead

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Lake George

Size: 1,326 acres (537 ha) **Elevation:** 8,240 - 8,820 ft. (2,512 - 2,688 m)

General Description: The site is located within Florissant Fossil Beds National Monument adjacent to a historical homestead that marks the beginning of an era of agriculture in Colorado. Ponderosa pine (*Pinus ponderosa*) woodland covers the hills. Arizona fescue (*Festuca arizonica*) / slimstem muhly (*Muhlenbergia filiculmis*) grassland dominates the adjacent toe slopes. The uplands contain several hiking trails for visitors. Upland soil consists of Guffey very gravelley sandy loam (USDA NRCS 2008). The site's geology consists of Oligocene sedimentary rocks that include the Florissant Lake Beds Formation (Tweto 1979). A population of pale blue-eyed grass (*Sisyrinchium pallidum*) is located in a narrow swale or drainage ditch located below a dam. Within the swale, the dominant plant community is mountain rush (*Juncus arcticus* ssp. *littoralis*) herbaceous vegetation with introduced but non-invasive pasture grasses and forbs. Along the upper bench of the adjacent unnamed tributary, there is a fen dominated by water sedge (*Carex aquatilis*) herbaceous vegetation. The fen's other graminoids include mountain rush, tufted hairgrass (*Deschampsia cespitosa*), slimstem reedgrass (*Calamagrostis stricta*), and patches of analog sedge (*Carex simulata*). Soils within the fen are fibric peat, while surrounding wetlands contain silty clay soil. Immediately downstream from the fen, the tributary empties into Grape Creek. Grape Creek is cutting a new sinuous channel within its downcut stream bed, indicating recovery of the stream's natural geomorphology from historical grazing.

Key Environmental Factors: Water sedge (*Carex aquatilis*) herbaceous vegetation is common on wide flat montane valleys. The fen it inhabits was formed by groundwater seeping from the adjacent slopes, keeping the soil saturated to slow decomposition of plant matter. Pale blue-eyed grass (*Sisyrinchium pallidum*) inhabits meadows with moist to saturated soils. This population is found on the drier margin of a slough.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest

rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: The area was homesteaded in the 1870's. Around 1920, tourism ventures were established with petrified forests and dude ranching as the tourist attractions (NPS Visitor Pamphlet). German prisoners of war later terraced the uplands about 1.5 miles to the southeast of the site to plant potatoes.

Cultural Features: The Hornbek Homestead is located within the site.

Biodiversity Significance Rank Comments (B3): This site rank is driven by a fair (C-ranked) population of pale blue-eyed grass (*Sisyrinchium pallidum*), a plant that that is globally imperiled (G2G3/S2). This species is a regional endemic, ranging from central Colorado to southeastern Wyoming. There is also a good (B-ranked) occurrence of an apparently globally secure (G5/S4) plant association, water sedge (*Carex aquatilis*) herbaceous vegetation.

Natural Heritage element occurrences at the Florissant at Hornbek Homestead PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex aquatilis Herbaceous Vegetation	Montane Wet Meadows	G5	S4				B	2010-09-16
Vascular Plants	Sisyrinchium pallidum	pale blue - eyed grass	G2G3	S2			BLM	C	2010-06-28

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site's boundary is drawn to encompass the immediate drainages of the tributaries that serve as a surface water source for pale blue-eyed grass (*Sisyrinchium pallidum*) and the fen. The hill adjacent to the fen provides groundwater and is included within the site. The site includes the segment of Grape Creek adjacent to the fen because it borders other wet meadows and swales that could potentially serve as habitat for pale blue-eyed grass (*Sisyrinchium pallidum*). Private lands were visited with written permission.

Protection Urgency Rank Comments (P4): The majority of the site is within Florissant Fossil Beds National Monument, but the southwestern corner of the site is privately owned.

Florissant at Hornbek Homestead

Management Urgency Rank Comments (M3): Upstream dam removal could potentially benefit the site's wetland species and communities.

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Culver, D.R., D. Malone, and A. Shaw. 2011. CNHP Final Report: Survey of Critical Biological Resources in Teller County, Colorado. Colorado Natural Heritage Program, Fort Collins, CO.

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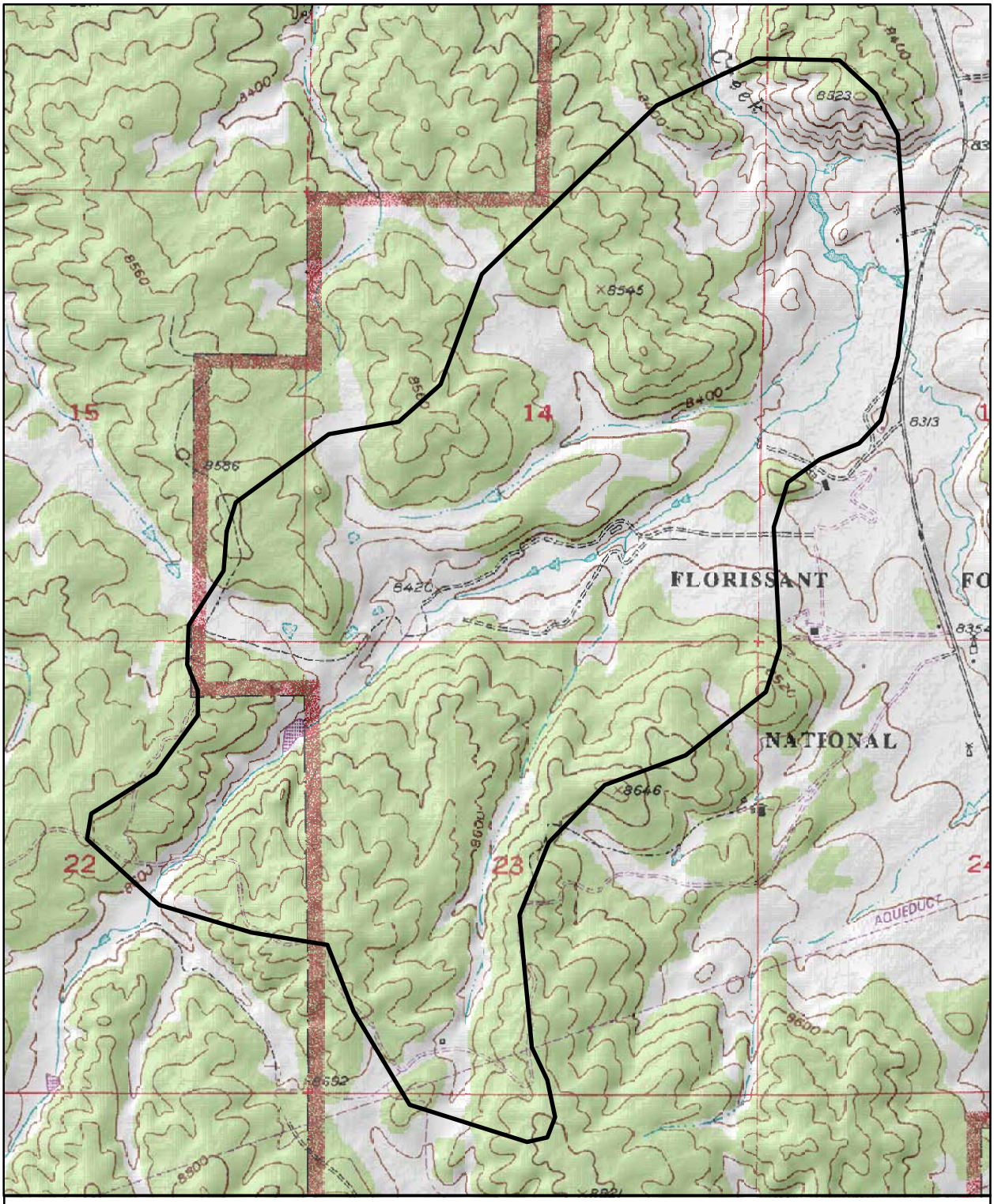
USDA Natural Resource Conservation Service. 2008. Soil Survey Geographic (SSURGO) Database for Teller-Park Area, Parts of Teller and Park Counties, Colorado. Fort Worth, TX: United States Department of Agriculture, Natural Resource Conservation Service.

Version Author: Shaw, A.E. and D.R. Culver

Version Date: 12/03/2010



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Map Date: 03/07/2011

0 0.2 0.4 Miles

N

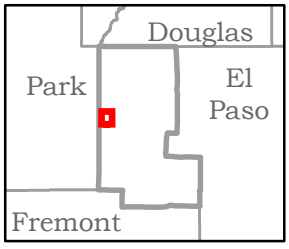
Legend

PCA Boundary

Lake George, 38105-H3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 18. Florissant at Hornbek Homestead Potential Conservation Area, B3: High Biodiversity Significance

Fourmile Creek at Dome Rock

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Cripple Creek North, Wrights Reservoir

Size: 7,957 acres (3,220 ha) **Elevation:** 8,060 - 9,680 ft. (2,457 - 2,950 m)

General Description: Fourmile Creek flows through Dome Rock State Wildlife Area from CO Hwy 67 to CR 1. It follows the natural topography of several large Pikes Peak granite outcrops, e.g., Dome Rock (Tweto 1979). Along flat stretches of Fourmile Creek, the riparian vegetation is dominated by willows, e.g., Geyer willow (*Salix geyeriana*), Rocky Mountain willow (*S. monticola*), Bebb's willow (*S. bebbiana*), and coyote willow (*S. exigua*). The wetter areas within the herbaceous layer contain beaked sedge (*Carex utriculata*), Nebraska sedge (*C. nebrascensis*), analog sedge (*C. simulata*), and wooly sedge (*C. lanuginosa*). Along steeper sections of the creek, the dominant plant community is a water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland, with a large component of Engelmann spruce (*Picea engelmannii*) and Douglas-fir (*Pseudotsuga menziesii*). Each riparian community is profiled in order of appearance from upstream to downstream. Water birch / false Solomon's seal shrublands dominate two sections of the narrow east-west oriented canyon. Spruce and Douglas-fir enter the shrubland from adjacent slopes. The stream channel includes a series of pools and riffles. Stream margins alternate between a narrow bench and giant boulders/ rock walls. Stream bed substrate ranges from sand to boulders. A Rocky Mountain willow / mesic graminoid shrubland occurs in a series of beaver ponds. Intensive upstream land use, beaver dams, and the routing of the trail across the pond have led to massive sedimentation and a braided stream channel. Beavers (*Castor canadensis*) and elk (*Cervus canadensis*) are actively consuming aspen. A Geyer willow / Rocky Mountain willow / mesic forb plant association has an understory dominated by hay grasses and non-native forbs due to season-long grazing. The stream channel is highly sinuous. Stream banks are intact except for a few areas where the granitic soils and topography have fallen away. At the downstream edge of this community, it fades into a Rocky Mountain willow carr. The north-facing slope's forest is composed of quaking aspen (*Populus tremuloides*) at low slope, with Douglas-fir, spruce, and mixed pines (*Pinus* spp.) upslope. The rest of the uplands are dominated by ponderosa pine (*Pinus ponderosa*) woodlands. In the canyon running east to west at the upstream end of the site, the woodland also includes limber pine (*Pinus flexilis*) and bristlecone pine (*P. aristata*), while the low slope includes mesic shrubs and grasses.

Fourmile Creek at Dome Rock

Key Environmental Factors: Flooding is evident, as there are areas of overbank storage and sediment deposition. Guffey loamy sand covers the vast majority of the site, so it is well drained. The easternmost half-mile of the site contains Adderton fine-loamy soils (USDA NRCS 2008).

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Cultural Features: A chimney from the long-gone Jack Rabbit Lodge is located in the center of the site.

Biodiversity Significance Rank Comments (B3): This site supports a concentration of several species and natural communities. The driving elements include a good (B-ranked) occurrence of the globally vulnerable (G3/S3) Geyer's willow (*Salix geyeriana*) / Rocky Mountain willow (*Salix monticola*) / mesic forbs community and several good (B-ranked) occurrences of the globally vulnerable (G3/S3) jeweled blazingstar (*Nuttalia speciosa*). Other elements include a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) Rocky Mountain willow (*Salix monticola*) / mesic graminoid shrubland, associated with active beaver ponds, a good (B-ranked) occurrence of the state rare (G4?/S2) water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland, and a fair (C-ranked) population of the state imperiled (G5/S1?) birdbill day-flower (*Commelina dianthifolia*). A population of the state rare (G5/S3) northern leopard frog (*Rana pipiens*) was ranked as extant in the absence of a systematic animal survey.

Fourmile Creek at Dome Rock

Natural Heritage element occurrences at the Fourmile Creek at Dome Rock PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Amphibians	Rana pipiens	Northern Leopard Frog	G5	S3		SC	BLM/ USFS	E	2010-09-01
Natural Communities	Salix geyeriana - Salix monticola / Mesic Forbs Shrubland	Geyer's Willow - Rocky Mountain Willow/Mesic Forb	G3	S3				B	2010-09-01
Natural Communities	Salix monticola / Mesic Graminoids Shrubland	Montane Riparian Willow Carr	G3	S3				C	2010-07-19
Natural Communities	Betula occidentalis / Maianthemum stellatum Shrubland	Foothills Riparian Shrubland	G4?	S2				B	2010-08-15
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				B	2010-09-01
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				B	2010-07-26
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				B	2010-08-13
Vascular Plants	Nuttallia speciosa	jeweled blazingstar	G3	S3				C	2010-07-19
Vascular Plants	Commelina dianthifolia	birdbill day - flower	G5	S1?				C	2010-09-01

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: Written permission was obtained to survey private lands. The site boundary is drawn to the adjacent ridgetops except that subdivisions are excluded. This boundary was chosen to incorporate the extent of the immediate watershed that can still be conserved to protect the riparian shrublands below by maintaining current stream flows and minimizing erosion.

Protection Urgency Rank Comments (P4): Approximately 12% of the site is private land under conservation easement with the Palmer Land Trust. A similar percentage is unprotected private land. The majority of the site is within the Dome Rock State Wildlife Area.

Management Urgency Rank Comments (M3): The creek could benefit from fewer trail crossings or the addition of log bridges to existing creek crossings to reduce erosion and sedimentation. Native vegetation would benefit from control of weeds

that have not fully invaded Teller County yet, i.e. cheatgrass (*Bromus tectorum*) and oxeye daisy (*Leucanthemum vulgare*).

Exotic Species Comments: The invasive species cheatgrass (*Bromus tectorum*), Canada thistle (*Cirsium arvense*), butter-and-eggs (*Linaria vulgaris*), oxeye daisy (*Leucanthemum vulgare*), and common mullein (*Verbascum thaspsus*) are present.

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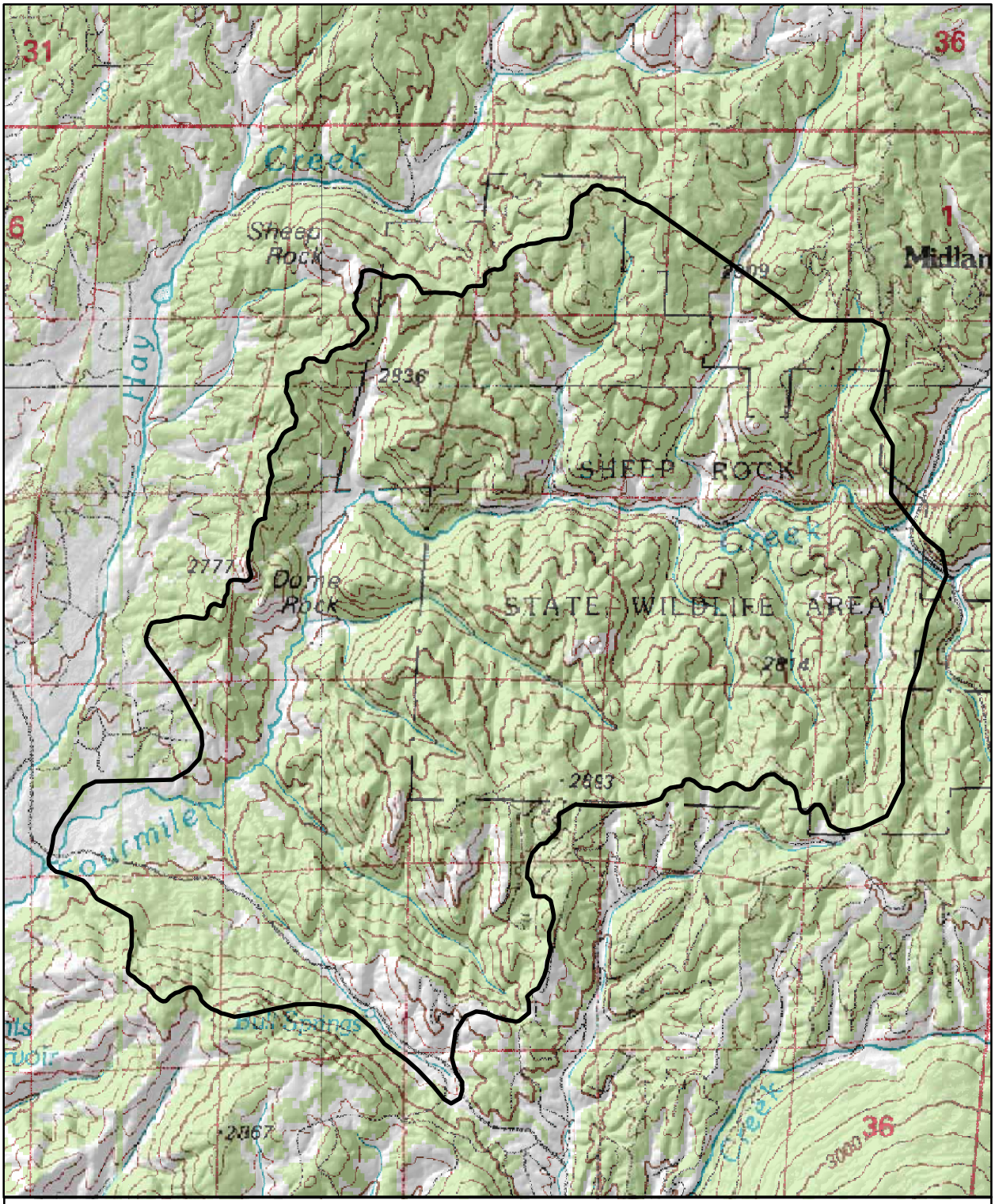
Version Author: Shaw, A.E. and D.R. Culver

Version Date: 12/03/2010



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Map Date: 03/07/2011

0 0.5 1 Miles

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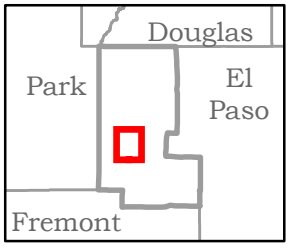
Legend

PCA Boundary

Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 19. Fourmile Creek at Dome Rock Potential Conservation Area, B3: High Biodiversity Significance

High Park

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: High Park

Size: 2,029 acres (821 ha) **Elevation:** 7,684 - 7,792 ft. (2,342 - 2,375 m)

General Description: The High Park site is located in the lower montane zone foothills on the west slope of the Front Range in the south western region of Teller County and is characterized by low rolling hills cut by deep canyons and drained by several ephemeral and perennial streams. Habitat variety is high in this topographically complex landscape with a mosaic of grasslands, woodlands and shrublands. Pinon pine - Rocky Mountain juniper (*Pinus edulis - Juniperus scopulorum*) woodlands occupy ridgetops, hilltops and east-facing slopes. West-facing slopes and canyon rims are characterized by a mosaic of ponderosa pine (*Pinus ponderosa*) woodlands and shrublands which include communities of Gambel oak (*Quercus gambelii*) and mountain mahogany (*Cercocarpus montanus*). Grasslands occur in forest and shrubland openings occupying lowslopes, valleys and terraces and ridge, where grazing intensity is low, are often dominated by Parry's oatgrass (*Danthonia parryi*). Moist canyon walls and gullies are occupied by Douglas-fir (*Pseudotsuga menziesii*) whereas drier sites are characterized by a variably dense cover of shrubs and herbs with a few scattered conifers. Riparian habitat in canyon bottoms is dominated by an overstory canopy of narrowleaf cottonwood (*Populus angustifolia*) with an understory of willow (*Salix* spp.) and non-willow shrubs. Local hydrology is driven by soil characteristics, precipitation and infiltration. The natural hydrologic regime has been altered by fire suppression-induced changes to vegetation and by grazing-induced changes to soil and vegetation. Geology is comprised of Tertiary age Wall Mountain tuff, age 35 to 36 m.y. (Tweto 1979). Soils are a patchy mosaic of classes including Teaspoon-Rock outcrop complex, 5 to 45 percent slopes, Jode loam, 0 to 6 percent slopes, Corpen-High complex, 5 to 25 percent slopes, Cathedral very gravelly sandy loam, warm, 20 to 50 percent slopes and Catamount-Guffey complex, 15 to 40 percent slopes (USDA NRCS 2008). This patchy mosaic of varied habitats provides a diversity of resources for bird species. Observed birds included Red-tailed Hawk (*Buteo jamaicensis*), Mourning Dove (*Zenaida macroura*), Northern Flicker (*Colaptes auratus*), Downy Woodpecker (*Picoides pubescens*), Cordilleran Flycatcher (*Empidonax occidentalis*), Western Kingbird (*Tyrannus verticalis*), Loggerhead Shrike (*Lanius ludovicianus*), Pinyon Jay (*Gymnorhinus cyanocephalus*), Western Scrub Jay (*Aphelocoma californica*), Common Raven (*Corvus corax*), Mountain Chickadee (*Poecile gambeli*), Bushtit (*Psaltriparus*

minimus), Red-breasted Nuthatch (*Sitta canadensis*), Mountain Bluebird (*Sialia currucoides*), American Robin (*Turdus migratorius*), Eastern Bluebird (*Sialia sialis*), Black-headed Grosbeak (*Pheucticus melanocephalus*), Lazuli Bunting (*Passerina amoena*), Spotted Towhee (*Pipilo maculatus*), Green-tailed Towhee (*Pipilo chlorurus*), Brewer's Sparrow (*Spizella breweri*), Vesper's Sparrow (*Pooecetes gramineus*), Chipping Sparrow (*Spizella passerina*), Western Meadowlark (*Sturnella neglecta*), Pine Grosbeak (*Pinicola enucleator*) and Pine Siskin (*Carduelis pinus*). Several of these species are vulnerable to climate-change induced population declines. At this site, of the species observed, this includes Cordilleran Flycatcher, Western Kingbird, Pinyon Jay, Lazuli Bunting and Western Meadowlark (NABCI 2010).

Key Environmental Factors: Key factors that influence site biota include environmental processes, especially fire and grazing intensity (Rondeau 2001). Fire has been suggested as a management tool in some cases where pine is encroaching into the grassland meadows. Parry's oatgrass (*D. parryi*) is considered to be very palatable to livestock, and overgrazing has been reported in some stands to reduce the abundance of *Danthonia parryi* (NatureServe 2010).

Climate Description: Although the site is located in the montane zone the climate is somewhat dry. At this site at an elevation of 7,800 feet coldest temperatures occurred in January with an average maximum of 40.51 °F and a minimum of 11.19 ° F. Warmest temperatures occurred in July with an average maximum of 79.03 °F and an average minimum of 49.42 °F. Annual average maximum precipitation was 17.18 inches. July and August were the wettest months of the year with 2.67 and 3.05 inches of precipitation respectively. Driest months are December, January and February with 0.50, 0.47 and 0.50 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B3): The site is drawn for a good (B-rank) occurrence of the globally vulnerable (G3/S3) Parry's oatgrass (*Danthonia parryi*) grassland. This association has a limited distribution in the Rocky Mountains of Colorado and southern Wyoming. It is suspected that many stands have been altered or destroyed by improper livestock grazing. Many remaining stands are small and/or have been impacted by anthropogenic activities, and are degraded to some degree (NatureServe 2010). The site also includes a fair (C-ranked) occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*). This occurrence of the prairie dog is within the montane portion of the species population range, which occupies south-central Colorado and north-central New Mexico. The montane population of the Gunnison prairie dog is considered globally imperiled (G5T2) and is designated as a candidate population by the U.S. Fish and Wildlife Service under the Endangered Species Act.

High Park

Natural Heritage element occurrences at the High Park PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Mammals	Cynomys gunnisoni pop. 1	Gunnison's Prairie Dog - Montane Population	G5T2	S2	C		BLM/ USFS	E	2010-08-24
Natural Communities	Danthonia parryi Herbaceous Vegetation	Montane Grasslands	G3	S3				B	2010-08-24

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was delineated to encompass the known and potential extent of the occurrence and to provide a buffer for protection. Only those areas with written landowner permission were surveyed.

Protection Urgency Rank Comments (P3): Lands are a combination of private and public parcels. Public lands are managed by the BLM for grazing and dispersed recreation. Private lands are managed for grazing. Grazing stress may reduce the viability of the element if protective action is not taken and an altered fire regime may result in the loss of the occurrence due to encroachment of woodlands into grasslands.

Management Urgency Rank Comments (M3): Ungrazed or lightly grazed stands of this association are characterized by dense Parry's oatgrass (*D. parryi*) cover. Mountain muhly (*Muhlenbergia montana*) may be more abundant on drier sites or those impacted by livestock grazing (NatureServe 2010). At this site, although native grasses, particularly Parry's oatgrass, dominate, a variety of secondary, smaller grasses are also present, indicating grassland deterioration (Rondeau 2001) which is likely due to overgrazing. Pinon pine (*Pinus edulis*) is encroaching into the grasslands, indicating an altered fire regime. Additionally, bare soil is common and litter cover is low. Reducing grazing intensity and implementing controlled burns that mimic a natural fire regime would benefit the viability of this element occurrence as well as the condition of the surrounding habitat. In addition, sylvatic plague (*Yersinia pestis*) is a serious management issue for Gunnison's prairie dogs, which are highly susceptible to plague and dramatic declines in North Park, Colorado have been documented, where population occupancy fell from 915,000 acres in 1945 to 45 acres in 2002 due to reoccurring plague epizootics. The effects of plague are compounded by the small size and isolation of the montane populations of the prairie dog, making recolonization after plague epizootics difficult, and rebounding of the populations unlikely.

Exotic Species Comments: Non-native plants documented included cheat grass (*Bromus tectorum*) and bull thistle(*Cirsium vulgare*).

High Park

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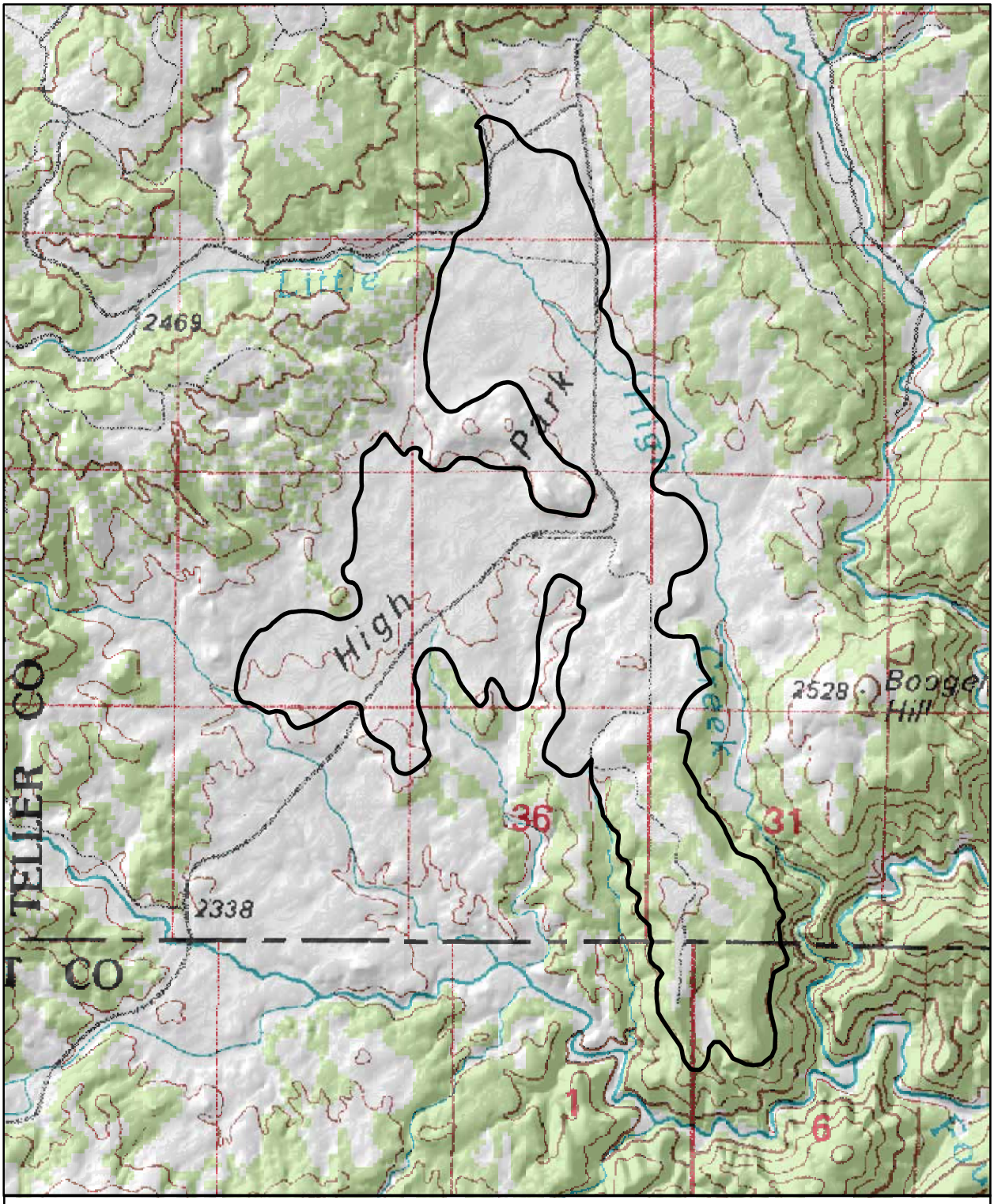
Version Author: Malone, D.G. and J.R. Sovell

Version Date: 12/28/2010



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Map Date: 03/07/2011

Miles
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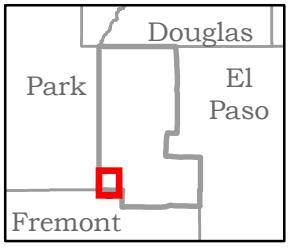
Legend

PCA Boundary

Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 20. High Park Potential Conservation Area, B3: High Biodiversity Significance

Mitre Peak at Carlin Gulch

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Cripple Creek South, Cooper Mountain

Size: 2,622 acres (1,061 ha) **Elevation:** 7,000 - 8,564 ft. (2,134 - 2,610 m)

General Description: The Mitre Peak at Carlin Gulch site is located in the lower montane zone foothills on the west slope of the Front Range at the southern border of Teller County. The site encompasses rugged and large landscape with steep hillslopes, rocky ridges and deep canyons. Wilson Creek drains the sub-watershed in this narrow, southwest-trending valley which, in September, had a dry stream channel. The valley was historically ranched but now the valley bottom has been overtaken by weeds. Habitat is a complex mosaic of coniferous and deciduous woodlands, shrublands, grasslands, cliff habitat and, along stream corridors, riparian vegetation characterized by a mosaic of willow shrublands and narrow-leaf and lance-leaf cottonwood (*Populus angustifolia* and *P. acuminata*) gallery forests. Shrublands are characterized by a variably dense cover of Gambel oak (*Quercus gambelii*) in association with mountain mahogany (*Cercocarpus montanus*) with a sparse tree cover of mixed conifers including pinon pine (*Pinus edulis*), Rocky Mountain juniper (*Juniperus scopulorum*) and Doulas-fir (*Pseudotsuga menziesii*) with an herbaceous layer dominated by graminoids such as Geyer sedge (*Carex geyeri*). Steep rocky ridges crown the mountain tops. Here rock-loving herbs and shrubs find protected habitat along crevices and seeps including species such as Fendler's cloak fern (*Argyrochosma fendleri*), slender lip fern (*Cheilanthes feei*) and waxflower (*Jamesia americana*). Local hydrology is driven by soil characteristics, precipitation and infiltration. Geology is predominantly Precambrian age igneous granitic rock of the 1,700 m.y. age group but also includes some Pre-Pennsylvanian Paleozoic age sedimentary carbonate rock from Ordovician formations (Tweto 1979). Soils on hillslopes are predominantly Cathedral-Rock outcrop complex, warm, 25 to 70 percent slopes with Cathedral very gravelly sandy loam, warm, 20 to 50 percent slopes on south-facing hillslopes. Valley floor soils are a mosaic of Cumulic Endoaquolls, 0 to 5 percent slopes, Pendant extremely gravelly loam, 5 to 35 percent slopes and High loam, 3 to 10 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Fire is important in maintaining these montane shrublands. Burning eliminates the invasion of trees such as Rocky Mountain juniper (*Juniperus scopulorum*) and pinon pine (*Pinus edulis*) trees, but not the more fire-adapted shrub species which sprout vigorously from stembases or from underground rhizomes following fire. Gambel oak (*Quercus gambelii*) is a

fire-adapted species with a well-developed root system used to draw moisture from a large volume of soil allowing for rapid re-sprouting after fire and oak cover often increases after fire (NatureServe 2010, Rondeau 2001).

Climate Description: The site is located in the lower montane zone and the climate is somewhat dry. At this site at an elevation of 7,200 feet coldest temperatures occurred in January with an average maximum of 41.59 °F and a minimum of 15.46 ° F. Warmest temperatures occurred in July with an average maximum of 81.27 °F and an average minimum of 52.68 °F. Annual average maximum precipitation was 18.15 inches. July and August were the wettest months of the year with 3.21 and 3.39 inches of precipitation respectively. Driest months are December, January and February with 0.47, 0.37 and 0.39 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B3): The site was drawn for a good (B-ranked) occurrence of the globally and state vulnerable (G3/S3) Gambel oak-mountain mahogany (*Quercus gambelii - Cercocarpus montanus*) shrubland. These shrubland associations are threatened with vegetation alteration due to the invasion of trees and non-native forbs as a result of an altered fire regime or grazing disturbance (Rondeau 2001). This site also contains historical occurrences of plant communities which are vulnerable on a global scale: two-needle pinon / Scribner's needle grass (*Pinus edulis / Achnatherum scribneri*) woodland (G3/S2) and ponderosa pine/ spike fescue (*Pinus ponderosa / Leucopoa kingii*) woodland (G3/S3).

Natural Heritage element occurrences at the Mitre Peak at Carlin Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Pinus edulis / Achnatherum scribneri Woodland	Two - needle Pinyon/Scribner's Needle Grass	G3	S2				H	1985-99-99
Natural Communities	Pinus ponderosa / Leucopoa kingii Woodland	Foothills Ponderosa Pine Savannas	G3	S3				H	1985-99-99
Natural Communities	Quercus gambelii - Cercocarpus montanus / (Carex geyeri) Shrubland	Mixed Mountain Shrublands	G3	S3				B	2010-09-08

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: Site boundaries were delineated along ridgelines to encompass the watershed boundaries and associated ecological processes, especially

hydrology and fire, essential to long-term viability of the occurrence. Only those private lands with written permission from landowners were surveyed.

Protection Urgency Rank Comments (P4): This site is in private ownership. The landowner is conservation-minded and manages the land for wildlife values.

Management Urgency Rank Comments (M3): Alien plant species in riparian and valley floor habitat diminish habitat value and sustainability. Eradicating alien plant species is essential to restore habitat and wildlife potential.

Exotic Species Comments: Alien plant cover <1% in upland shrub habitat includes red clover (*Trifolium pratense*); valley habitat >50% of the valley floor is dominated by Russian thistle (*Salsola iberica);* and in riparian habitat 5% cover of tamarisk (*Tamarix ramosissima*).

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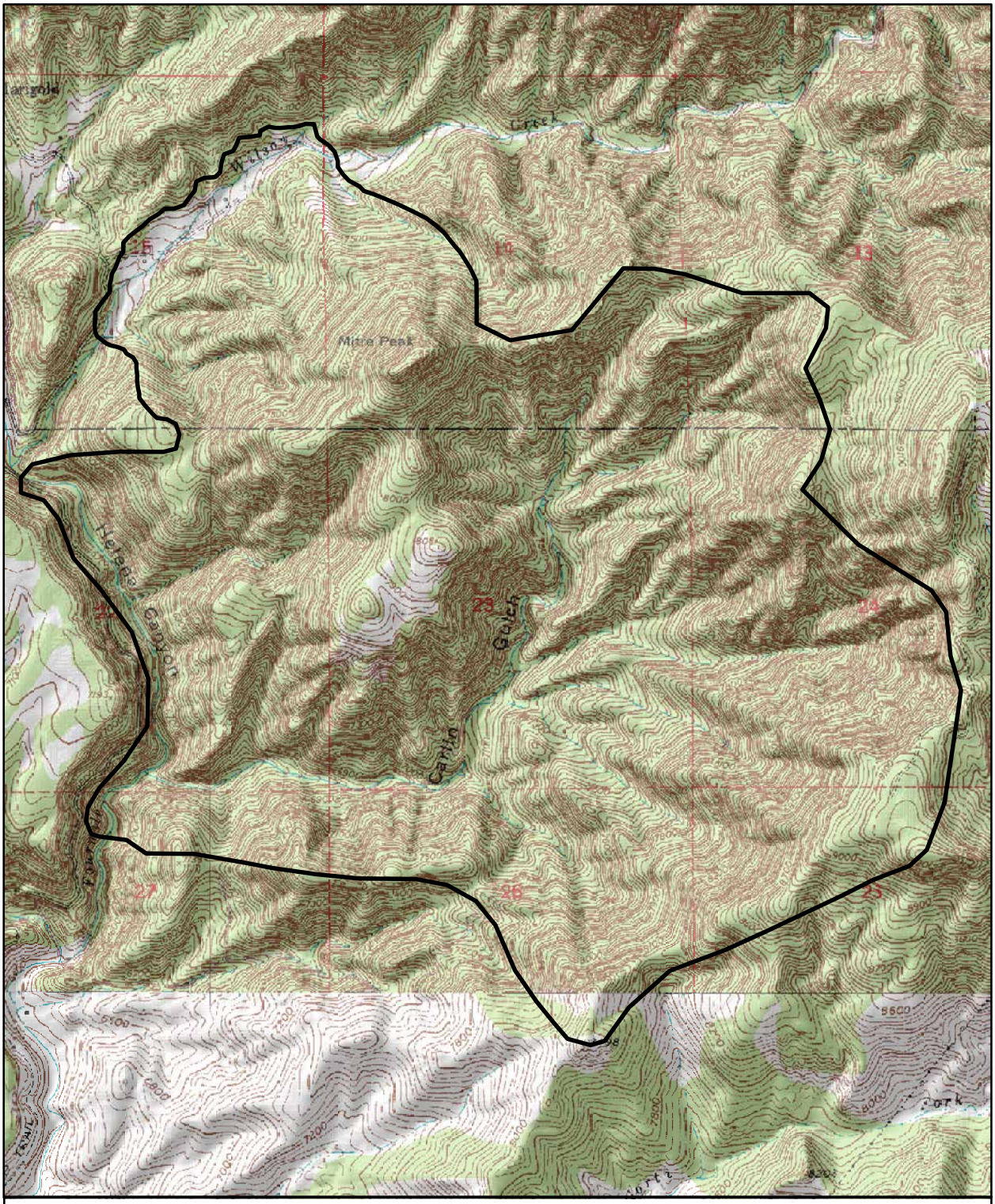
Version Author: Malone, D.G.

Version Date: 01/12/2011



Map 21. Mitre Peak at Carlin Gulch Potential Conservation Area, B3: High Biodiversity Significance

Rule Creek

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M4: Not Needed Now; No Current Threats; May Need in Future

U.S.G.S. 7.5-minute quadrangles: Divide, Woodland Park

Size: 2,340 acres (947 ha) **Elevation:** 9,000 - 9,600 ft. (2,743 - 2,926 m)

General Description: Rule Creek site is located in the lower montane foothills zone in the central region of Teller County. The site encompasses montane grassland at a lower elevation relative to the surrounding area. Habitat is a complex mosaic of forests, woodlands, xeric and mesic grasslands and riparian habitat with moist meadows and willow carrs. Domestic livestock grazing occurs throughout the property and varies in intensity from moderate to heavy. Habitat on northwest-facing slopes at the mountain-foothill transition on the southeast side of the property is occupied by quaking aspen (*Populus tremuloides*) woodlands. Elk browse is heavy in these woodlands and impacts aspen vigor and recruitment. Hilltops at the mountain-foothill ecotone are occupied by small stands of ponderosa pine (*Pinus ponderosa*) with an understory grasses including Arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montana*), slimstem muhly (*M. filiculmis*) and blue grama (*Bouteloua gracilis*). Swales and slopes at this transition zone are often occupied by small patches of Parry's oatgrass (*Danthonia parryi*) in a mosaic with patches of mesic graminoids and forbs such as bluejoint reedgrass (*Calamagrostis canadensis*) and marsh felwort (*Lomatogonium rotatum*) in moist swales. Arizona fescue - mountain muhly (*Festuca arizonica - Muhlenbergia montana*) grasslands dominate the expansive, open, low rolling hills that lie to the northwest and at the base of steeper mountain slopes. Uplands surrounding the site include a complex mosaic of forest woodland with quaking aspen woodlands occurring on moist, north-facing slopes and Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), white fir (*Abies concolor*), and Engelmann spruce (*Picea engelmannii*) interlaced throughout the surrounding hills. The soils of the site are deep, which is characteristic of the valley grasslands of the region. These deep valley soils provide perfect habitat for Gunnison's prairie dogs (*Cynomys gunnisoni*), four small colonies of which inhabit the site. This complex of Gunnison's prairie dog occupies portions of the species range located in south-central Colorado and north-central New Mexico that the U.S. Fish and Wildlife Service designated as a candidate population for listing under the Endangered Species Act because threats within this part of the species range are significant and imminent (USFWS 2008). Geology is composed primarily of Precambrian age igneous granitic rocks from the Pikes Peak batholith of

the 1,000 m.y. age group. Additionally, on the west side of the site, there is a patch of Tertiary age Ogallala formation sand and gravel (Tweto 1979). Soils are a complex patchwork of types; soils on steeper forested hillslopes on the southwest side of the site are Catamount-Guffey complex, 15 to 40 percent slopes, and Guffey-Herbman association, 5 to 50 percent slopes; stream channels soils are Rosane taxadjunct loam, 0 to 3 percent slopes; soils on low grassland hillslopes on the southwest and north sides of the site are Goth gravelly loam, 8 to 40 percent slopes and Tellura-Seitz complex, 10 to 30 percent slopes (USDA NRCS 2008). Bird species observed at this site included Prairie Falcon (*Falco mexicanus*), Red-tailed Hawk (*Buteo jamaicensis*), Turkey Vulture (*Cathartes aura*), Black-chinned Hummingbird (*Archilochus alexandri*), Belted Kingfisher (*Ceryle alcyon*), Eastern Kingbird (*Tyrannus tyrannus*), Common Raven (*Corvus corax*), Horned Lark (*Eremophila alpestris*), Barn Swallow (*Hirundo rustica*), Mountain Bluebird (*Sialia currucoides*), Yellow-rumped Warbler *(Dendroica coronata*), Western Meadowlark (*Sturnella neglecta*) and House Wren (*Carpodacus mexicanus*). Several of these species are vulnerable to climate-change induced population declines (NABCI 2010).

Key Environmental Factors: The presence of the Gunnison's prairie dogs at this site is attributable to unfragmented native montane grassland that has experienced only moderate disturbance. Ecological processes including climate, fire disturbance, grazing intensity, and Gunnison's prairie dog (*Cynomys gunnisoni*) activity are key determinants of floristic and site characteristics. Key environmental factors influencing biota at this site are ecological processes including especially fire frequency and grazing intensity. Frequent fires help to maintain the grassland dominants and may play a role in restricting the invasion of trees and shrubs. Overgrazing can result in grassland deterioration indicated by a decrease in primary grasses such as Arizona fescue (*Festuca arizonica*) (Rondeau 2001).

Climate Description: This site at an average elevation of approximately 9,200 feet experiences its coldest temperatures in January with an average maximum of 34.75 ° F and a minimum of 9.21 °F. Warmest temperatures occurred in July with an average maximum of 71.94 °F and an average minimum of 45.32 °F. Annual average maximum precipitation is 18.86 inches. July and August are the wettest months of the year with 3.69 and 3.65 inches of precipitation respectively. The driest months are December, January and February with 0.48, 0.43 and 0.46 inches of precipitation respectively. March through June and September through November have an intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B3): The site is drawn for a good (B-ranked) occurrence of the globally vulnerable (G3/S2) grassland community, Arizona fescue - Mountain muhly (*Festuca arizonica - Muhlenbergia montana*). This grassland association is reported from Texas and southern Colorado, and possibly occurs in northern New Mexico with isolated localities in central New Mexico, and in northern and eastern Arizona. Many occurrences have been degraded by heavy

livestock grazing. Some stands may have converted to nearly closed canopy coniferous forests with fire suppression and/or heavy grazing (NatureServe 2010). Additionally, there is a fair (C-ranked) occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*). The montane population of the Gunnison prairie dog is considered globally imperiled (G5T2) and is designated as a candidate population by the U. S. Fish and Wildlife Service under the Endangered Species Act. Recently the U.S. Fish and Wildlife Service found that the Gunnison's prairie dog is warranted for listing under the Endangered Species Act and assigned a listing priority number of 2 because threats have a high magnitude and are imminent (U.S. Fish and Wildlife Service 2010). Also a Prairie Falcon (*Falco mexicanus*), currently watchlisted by CNHP, was observed.

Natural Heritage element occurrences at the Rule Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Mammals	Cynomys gunnisoni pop. 1	Gunnison's Prairie Dog - Montane Population	G5T2	S2	C		BLM/ USFS	E	2010-08-27
Natural Communities	Festuca arizonica - Muhlenbergia montana Herbaceous Vegetation	Montane Grasslands	G3	S2				B	2010-08-27

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary encompasses the entire extent of the prairie dog complex, surrounding montane grassland, and the (mostly) unoccupied space among these colonies. The site is bounded on all sides by land that is unsuitable for use by prairie dogs because it is much too hilly and wooded. The boundary also includes unoccupied habitat outside of the edge of the prairie dog complex and is intended to allow for suitable areas into which the population can expand. Only sites with written landowner permission were surveyed.

Protection Urgency Rank Comments (P3): The site includes land that is in both private and public ownership. Public lands are sufficiently protected. The private lands in parts of this site have the potential to be developed in the future, which may impact the long-term viability of the occurrence.

Management Urgency Rank Comments (M4): Sylvatic plague (*Yersinia pestis*) is the most serious management issue. Gunnison's prairie dog are highly susceptible to plague and dramatic declines in North Park, Colorado have been documented, where declines in occupancy from 915,000 acres in 1945 to 45 acres in 2002 was attributable to plague. The effects of plague are compounded by the small size and

isolation of the montane populations of the prairie dog, making recolonization after plague epizootics difficult, and rebounding of the populations unlikely. Management issues for vegetation address overgrazing and the absence of fire have resulted in some deterioration of the grasslands. Reducing grazing intensity and restoring a natural fire regime through prescribed burns would enhance the long-term viability of these grasslands.

Exotic Species Comments: Alien plant species include: Kentucky bluegrass (*Poa pratensis),* smooth brome *(Bromus inermis),* cheatgrass *(Bromus tectorum),* common timothy *(Phleum pratense),* white clover *(Trifolium repens),* Canada thistle (*Cirsium arvense*), yellow toadflax *(Linaria vulgaris*), and musk thistle (*Carduus nutans*).

Off-Site Considerations: There is some exurban development within the surrounding landscape and depending upon the density of future developments this could be detrimental to the long term viability of the prairie dog population at this site.

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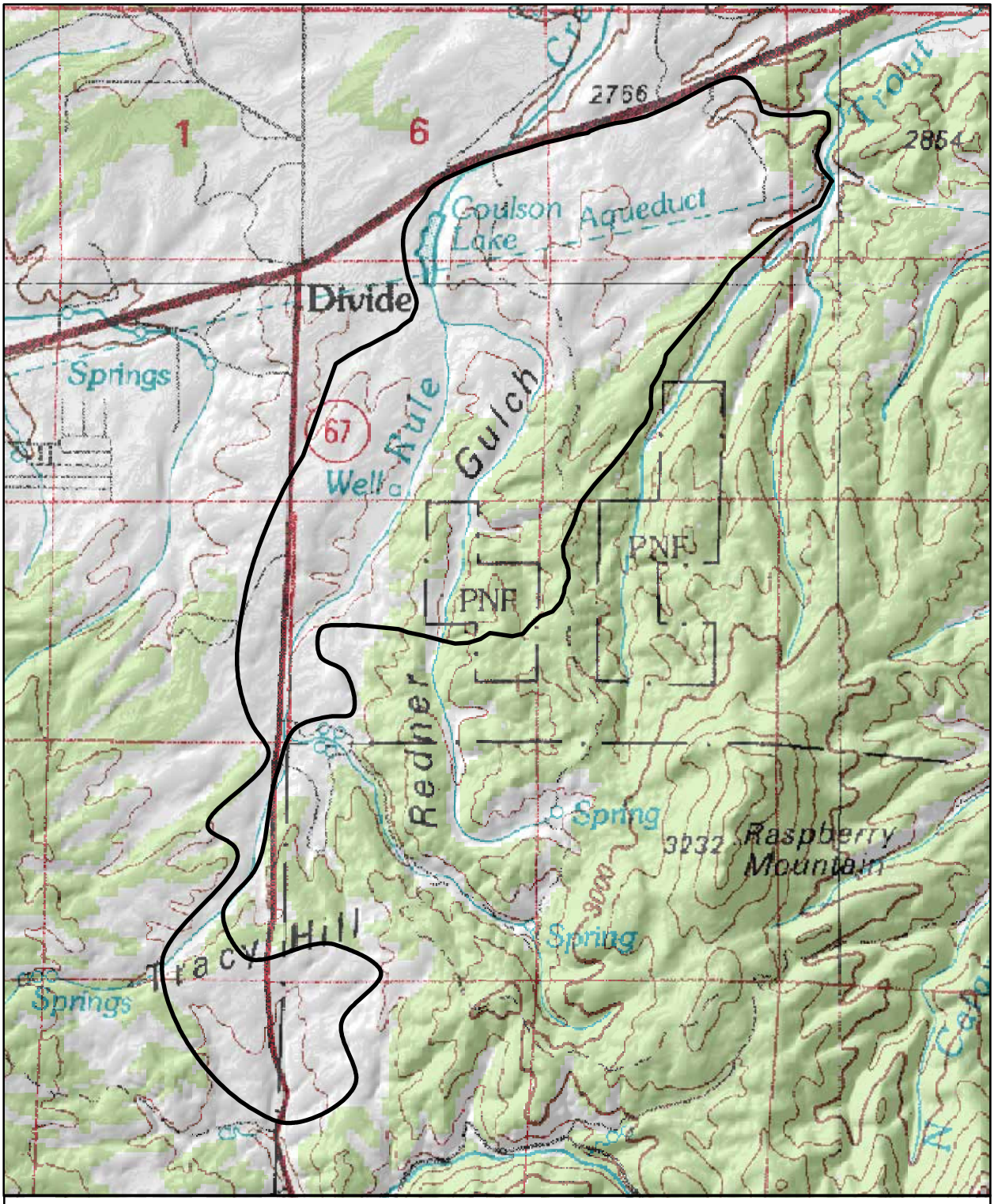
Version Author: Sovell, J.R. and D.G. Malone

Version Date: 12/30/2010



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Map Date: 03/07/2011

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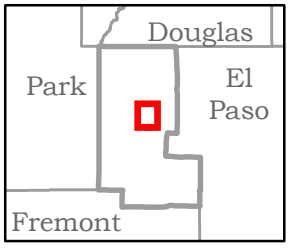
Legend

PCA Boundary

Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 22. Rule Creek Potential Conservation Area, B3: High Biodiversity Significance

Sheep Mountain at Bison Reservoir

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Pikes Peak

Size: 325 acres (131 ha) **Elevation:** 10,400 - 11,800 ft. (3,170 - 3,597 m)

General Description: The Sheep Mountain at Bison Reservoir site is located on the west slope of the Front Range on the southwest flanks of Sheep Mountain. The site encompasses ecosystems from the alpine down into the upper montane zone and includes an unnamed stream that is confluent with Bison Creek. The landscape is characterized by steep mountain slopes, sheer-walled cliffs, benches, gullies and swales. Alpine habitat is a complex mosaic of alpine communities including forb meadows, turf meadows, gopher gardens, and boulder fields with plant species such as snowball saxifrage (*Saxifraga rhomboidea*), Parry lousewort (*Pedicularis parryi*), and curly sedge (*Carex rupestris*), rocky ridges and outcrops with species including James' telesonix (*Telesonix jamesii*), and shrublands characterized by wolf willow (*Salix wolfii*) / mesic forb carrs. Alpine soils are a patchy mosaic of gravel and thin turf where cushion plants have established and have begun to develop an organic soil layer. Krummholz stands of Engelmann spruce (*Picea engelmannii*) occur at the lower limit of the alpine zone and mark the transition to the subalpine. Subalpine and montane habitat is characterized by steep, narrow slopes, bordered by sheer-walled cliffs, alternating with low gradient, wider benches. Mixed stands of Engelmann spruce and quaking aspen (*Populus tremuloides*) occupy slopes while benches are vegetated by shrublands that are dominated by willow species including Bebb's willow (*Salix bebbiana*). An unnamed stream that has its beginnings as shallow groundwater discharge flows in a southeast direction down these steep slopes. Where slope gradient decreases and low gradient benches occur, shrub and herbaceous wetlands have developed in response to stream and shallow groundwater discharge. In these wetland sites soils are moist with a deep layer of humus but in surrounding uplands, soils are coarse gravels or occasionally a thin layer of soil on top of exposed bedrock. Bedrock is composed of Pikes Peak granite (Tweto 1979) which has eroded into the coarse gravels that are the origins of the soils in this site.

Key Environmental Factors: Hydrology is the key ecological process that sustains the willow shrubland element occurrences in this site. Also important is climate, and specifically climate change which, in Colorado, is expected to result in changes in the timing of precipitation and runoff which may reduce late summer stream flows and warmer temperatures which will affect evaporation rates in rivers, streams and

reservoirs (CWCB 2010). Direct consequences of climate change include altered stream flows and groundwater regime. Indirect consequences of climate change include vegetation changes including an increase in treelimit which will eliminate many alpine habitats and changes in both riparian and upland community species' composition in response to an altered moisture regime.

Climate Description: Due primarily to elevational changes and topographic complexity, wide climate variations occur within short distances and local climate in the higher elevations of the Front Range is dramatically different from climate at relatively nearby locations which are at lower elevations. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. At this site on this west slope of the Front Range and southwest flanks of Sheep Mountain at an average elevation of 11,100 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 30.99 °F and a minimum of 7.90 °F. Warmest temperatures occurred in July with an average maximum of 68.02 °F and an average minimum of 42.49 °F. Annual average precipitation was 23.87 inches. July and August were the wettest months of the year with 4.49 and 4.28 inches of precipitation respectively. Driest months are January and February with 0.57 and 0.54 inches of precipitation respectively (Prism 2010).

Biodiversity Significance Rank Comments (B3): The Sheep Mountain site is drawn for a good (B-ranked) occurrence of a globally vulnerable (G3?/S2) riparian shrubland Bebb's willow (*Salix bebbiana*) and a good (B-ranked) occurrence of the globally vulnerable (G3/S3) riparian shrubland wolf willow (*Salix wolfii)* /mesic forb. Bebb's willow shrublands have been altered by changes in historic natural processes, including flooding, and more recent human impacts, such as grazing. Wolf willow / mesic forb shrublands are a widespread association, known from Colorado, Utah, Wyoming and Idaho, although never very abundant where it occurs and is threatened by overuse by livestock and changes in the hydrologic regime that can result in a lower water table (NatureServe 2010).

Natural Heritage element occurrences at the Sheep Mountain at Bison Reservoir PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix wolfii / Mesic Forbs Shrubland	Subalpine Riparian Willow Carr	G3	S3				B	2010-07-18
Natural Communities	Salix bebbiana Shrubland	Montane Willow Carrs	G3?	S2				B	2010-07-16

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn to include the known element

occurrences as well as sufficient landscape to enable hydrologic processes, especially shallow groundwater recharge, that are essential to the long-term sustainability of the elements.

Protection Urgency Rank Comments (P4): The site is publicly owned lands managed by the USFS, the State of Colorado, and the BLM.

Management Urgency Rank Comments (M3): Climate change in Colorado is predicted to result in altered precipitation patterns (CWCB 2010). Protecting sufficient landscape to enable recharge of shallow groundwater, which is essential to maintaining wetland function, will help ensure the long-term persistence of these critical wetland habitats.

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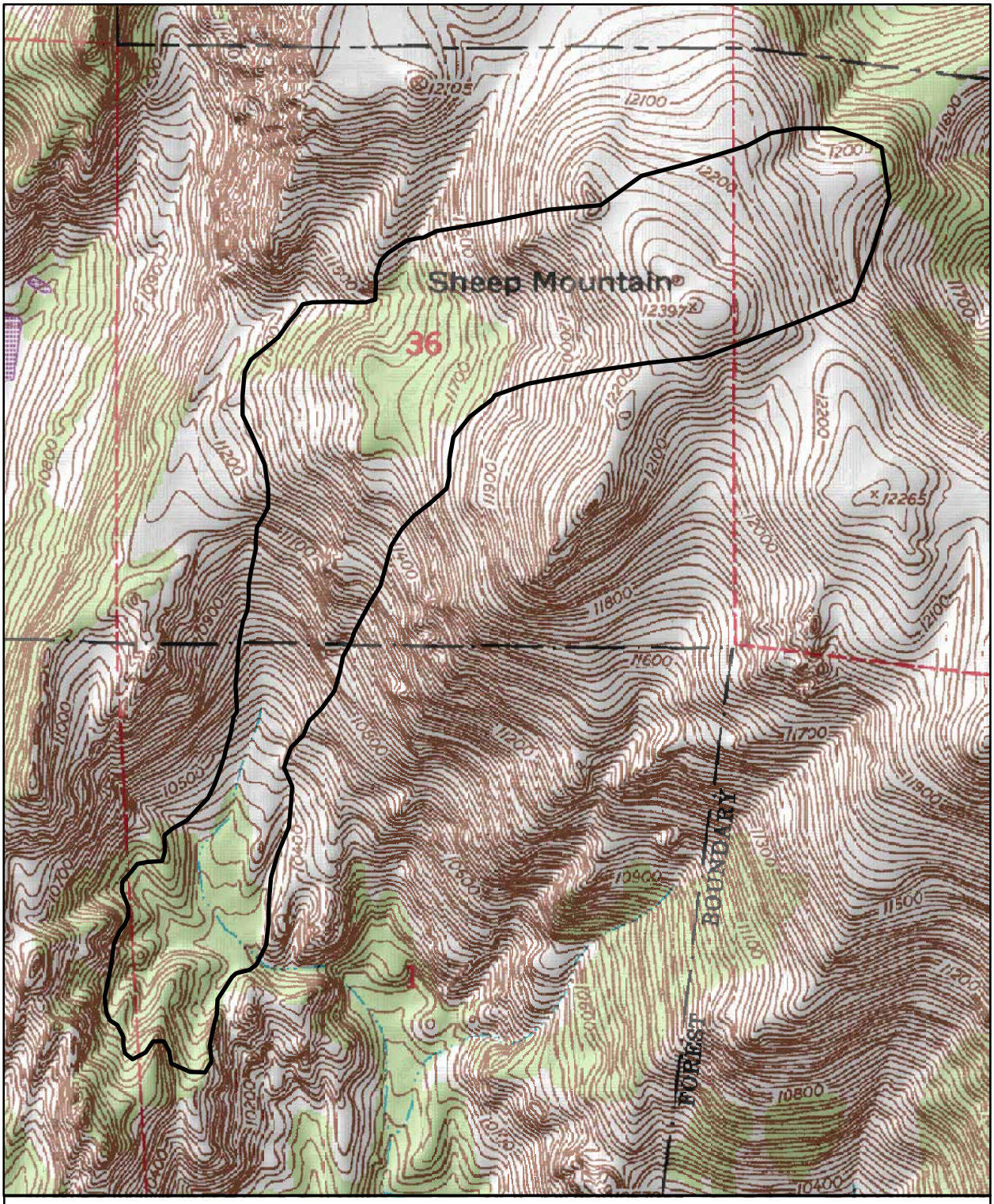

Map 23. Sheep Mountain at Bison Reservoir Potential Conservation Area, B3: High Biodiversity Significance

South Slope

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Manitou Springs, Pikes Peak

Size: 2,488 acres (1,007 ha) **Elevation:** 10,700 - 12,000 ft. (3,261 - 3,658 m)

General Description: The South Slope site consists of numerous lakes and wetlands carved by glacial erosion during the Pleistocene Ice Age (Chronic and Williams 2002). The surface geology of the site consists of the ubiquitous Pikes Peak granite in the uplands. Glacial drift of Pinedale and Bull Lake glaciations dominates the wetlands (Tweto 1979). The majority of soils of the site are Aquolls, poorly drained soils high in organic matter derived from alluvium (USDA NRCS 2008). Other soils in the vicinity include well-drained very gravelley sandy loam and very gravelly loamy coarse sand. Above 11,000 feet, the site contains alpine tundra with shallow black soil above the permafrost subsoil. The tundra is dominated by planeleaf willow (*Salix planifolia*), Wolf's willow (*Salix wolfii*), Rocky Mountain willow (*Salix monticola*), tufted hairgrass (*Deschampsia caespitosa*), and marsh marigold (*Caltha leptosepala*). Upper subalpine forest includes Engelmann spruce (*Picea engelmannii*), bristlecone pine (*Pinus aristata*), and limber pine (*P. flexilis*). The lower subalpine zone consists of Engelmann spruce forest with quaking aspen (*Populus tremuloides*) in patches. Willow carrs and fens are abundant along streams in the South Slope area. The landscape is in a relatively natural state except for the reservoirs that inundate some of the naturally occurring lakes and wetlands to store water for nearby Colorado Springs. Roads onsite are used by utility and heavy equipment for the maintenance of the reservoirs.

Key Environmental Factors: Analog sedge (*Carex simulata*) fens occur in deep quaking saturated peat soils in low-gradient moderate to wide valleys (Carsey et al. 2003). Mud sedge (*Carex limosa*) occurs in subalpine Sphagnum fens and wet meadows (Weber and Wittmann 2001). Spiny-spore quillwort (*Isoetes setacea* ssp. *muricata*) is found in cool, shallow lakes that are slightly acidic and low in nutrients (FNA Ed. Comm. 1993). The occurrences of planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland and Wolf's willow (*Salix wolfii*) / mesic forb occur on peat soils that are present due to undisturbed and saturated soils.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon

rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B3): The element driving the site is a good (B-ranked) occurrence of a globally vulnerable (G3/S3) plant association, Wolf's willow (*Salix wolfii*) / mesic forb shrubland. There is also an excellent (A-ranked) occurrence of the globally common (G5/S4) planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland and a good (B-ranked) occurrence of the state rare (G4/S3) analog sedge (*Carex simulata*) herbaceous vegetation. In addition, the site supports rare plants including a good (B-ranked) occurrence of the state rare (G5/S2) mud sedge (*Carex limosa*) and a good (B-ranked) population of spiny-spored quillwort (*Isoetes setacea* ssp. *muricata*), a plant tentatively ranked as globally demonstrably secure (G5?/T5?) but imperiled in Colorado (S2). The scientific name *Isoetes setacea* ssp. *muricata* is synonymous with *Isoetes echinospora* and *I. tenella* (www.plants.usda.gov), which are also globally demonstrably secure, so a change in taxonomy should not affect the biodiversity significance of this site.

Natural Heritage element occurrences at the South Slope PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix wolfii / Mesic Forbs Shrubland	Subalpine Riparian Willow Carr	G3	S3				B	2010-07-18
Natural Communities	Carex simulata Herbaceous Vegetation	Wet Meadow	G4	S3				B	2010-08-25
Natural Communities	Salix planifolia / Carex aquatilis Shrubland	Subalpine Riparian Willow Carr	G5	S4				A	2010-08-25
Vascular Plants	Carex limosa	mud sedge	G5	S2				B	2010-08-25
Vascular Plants	Isoetes setacea ssp. muricata	spiny - spored quillwort	G5?T5?	S2				B	2010-08-24

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The western boundary is drawn to encompass the headwaters of Middle Beaver Creek that host the occurrences of Wolf's willow (*Salix*

wolfii) / mesic forbs and planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*). The northern boundary is drawn to incorporate the intermittent stream that feeds into the analog sedge (*Carex simulata*) fen as well as the steep slopes on either side that provide groundwater to maintain the fen. The ridgeline surrounding McReynolds Reservoir serves as the eastern boundary. This small and steep watershed maintains water levels in the reservoir, which in turn feeds into the pond that supports spiny-spore quillwort (*Isoetes setacea* ssp. *muricata*). Permission from Colorado Springs Utilities was obtained for access to the site.

Protection Urgency Rank Comments (P3): The site is owned by the City of Colorado Springs Utilities and is managed by Colorado Springs Utilities for water storage and distribution to the City of Colorado Springs. Many of the naturally occurring lakes have been consolidated and dammed to store water. As of 2010, the area has very restricted access, but there are plans to open the area to public for recreation in the near future. The plan for recreational uses of municipal watershed lands that will guide recreational development of this area was created to provide protection to this environmentally sensitive area, so there should be little to no impact on existing wetlands.

Management Urgency Rank Comments (M3): Trail and road improvements could alter hydrology. Horses watering at the ponds would disturb the population of spiny-spored quillwort (*Isoetes setacea* ssp. *muricata*), so equestrian trails are not recommended in the vicinity of the ponds.

Exotic Species Comments: No exotic plants were observed.

South Slope
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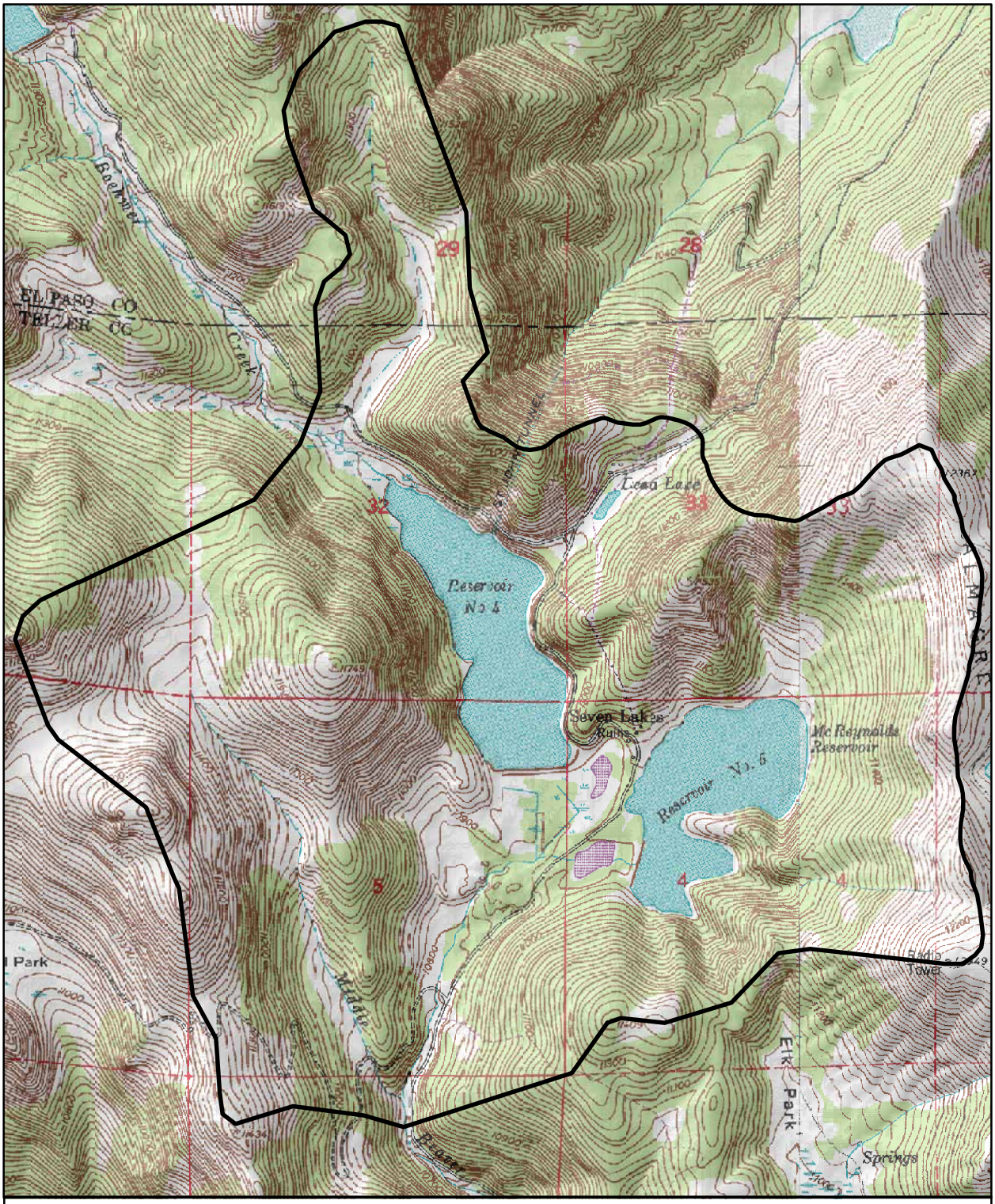

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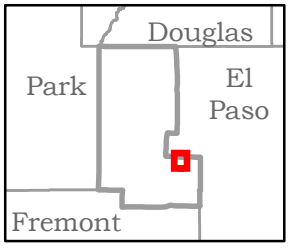
Legend

PCA Boundary

Manitou Springs, 38104-G8
Pikes Peak, 38105-G1

7.5 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 24. South Slope Potential Conservation Area, B3: High Biodiversity Significance

The Crags

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 152 acres (61 ha) **Elevation:** 10,400 - 10,817 ft. (3,170 - 3,297 m)

General Description: The site is located in the upper montane zone on the western flanks of Pikes Peak and encompasses a broad valley ringed by incredibly steep rock outcrops composed of Pikes Peak Granite (Tweto 1979). This granite is extremely friable, readily eroding into the gravel that characterizes upland soils. Riparian soils are more developed with a moderately thick organic horizon that still contains some gravel and sand. Four Mile Creek has its headwaters at the north end of this valley in the rock outcrops. In this reach, the stream flows southeast, draining a variably broad, low gradient mountain valley. The creek varies from a Rosgen type A stream at the north end of the valley where it flows through rock cliffs to a Rosgen type C stream when it emerges onto and meanders across the valley floor. Upland habitat includes a mosaic of rock cliff habitat with widely spaced shrubs and coniferous trees and a sparse herbaceous cover that is typically limited to crevices and seeps; valley walls with thin soils which are dominated by Engelmann spruce (*Picea engelmannii*) forest with aspen (*Populus tremuloides*) in moist gullies and limber pine (*Pinus flexilis*) on rocky ridges; low slopes which are characterized by open graminoid meadows and shrublands. Riparian habitat is a mosaic of willow (*Salix* spp.) carrs and mesic forb - graminoid meadows.

Key Environmental Factors: Physical characteristics and environmental gradients exert a major influence on site biota. Specifically, bedrock geology, which is composed of Pikes Peak granite, erodes into dramatic hoodoo-like cliffs and gravel soils that are major determinants of upland and riparian communities.

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on the west-facing flanks of Pikes Peak at an elevation of 10,600 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 28.17 °F and a minimum of 6.69 ° F. Warmest temperatures occurred in July with an average maximum of 63.55 °F and an average minimum of 38.01 °F. Annual average precipitation was 25.77 inches. April through August are the wettest months of the year with July having the greatest average precipitation with 4.66 inches. Driest months are November through February with January and February having the least precipitation with 0.62 and 0.67 inches respectively (Prism 2010).

The Crags

Biodiversity Significance Rank Comments (B3): There is a good to fair (BC-ranked) occurrence of the globally imperiled (G2/S2) James' telesonix (*Telesonix jamesii*) which is considered to be only in Colorado and New Mexico. In Colorado, it is scattered sporadically on granite tors of the easternmost mountains. In northern New Mexico, it has been reported from one mountain area (NatureServe 2010).

Natural Heritage element occurrences at the The Crags PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Telesonix jamesii	James' telesonix	G2	S2				BC	2010-06-30

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to include the known and likely potential extent of the targeted plant species and also includes the matrix plant communities that are important to maintaining site ecological sustainability.

Protection Urgency Rank Comments (P4): The site is mostly managed by Pike National Forest, with no special designation. There are a couple of small private parcels and plans of the land owners are unknown.

Management Urgency Rank Comments (M2): A designated hiking trail traverses the site where the element plant species occur. Social trails emanate from the established trail and off-trail trampling threatens the occurrences with physical damage. Likelihood for long-term persistence of the plant species occurrences would be greatly enhanced by management that prohibited off-trail hiking.

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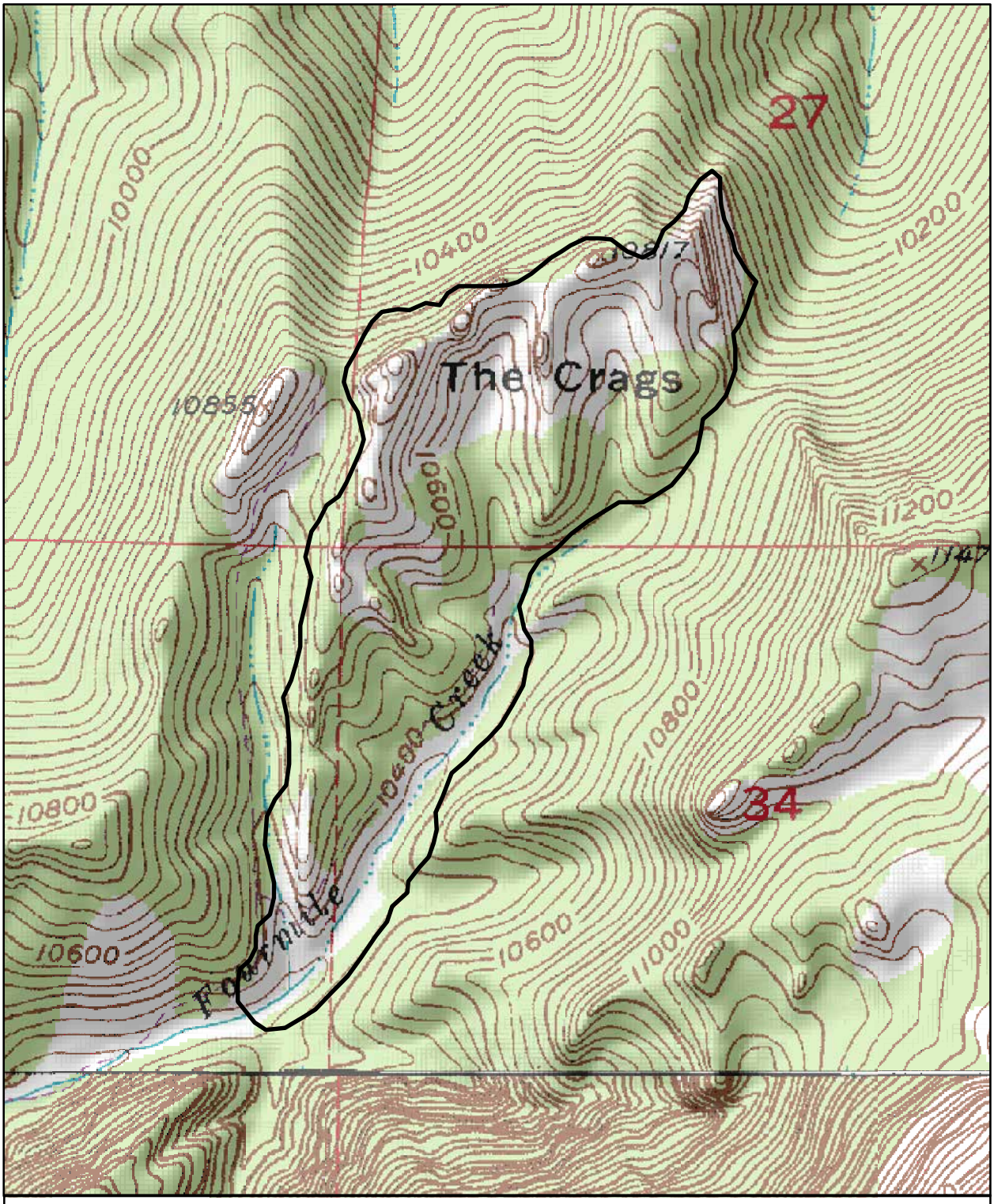
Version Author: Malone, D.G.

Version Date: 01/03/2011



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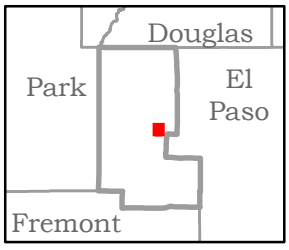
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 25. The Crags Potential Conservation Area, B3: High Biodiversity Significance

Trout Creek at Manitou Experimental Forest

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Mount Deception

Size: 189 acres (77 ha) **Elevation:** 7,600 - 7,735 ft. (2,316 - 2,358 m)

General Description: The Trout Creek at Manitou Experimental Forest site is located immediately below the dam at Manitou Lake. The site is bisected by a road culvert that provides access to Manitou Experimental Forest and housing developments. Trout Creek consists of a low-gradient Rosgen C class stream channel. Beaver dams have been breached, but beavers (*Castor canadensis*) are active. Other wildlife includes elk (*Cervus canadensis*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Mallard (*Anas platyrhynchos*), and Gray Catbird (*Dumetella carolinensis*). A small wet meadow dominated by mountain rush (*Juncus arcticus* ssp. *littoralis*) and shrubby cinquefoil (*Dasiphora floribunda*) appears to augment streamflow, draining into the stream from the East. Point bars and small islands of mud, sand, and gravel are sparsely covered with graminoids, willow (*Salix* spp.) seedlings, and woody debris. The dominant riparian plant community is strapleaf willow (*Salix ligulifolia*) shrubland. Rocky Mountain willow (*S. monticola*) and coyote willow (*S. exigua*) are codominant with strapleaf willow (*S. ligulifolia*). The majority of strapleaf willow (*S. ligulifolia*) and Rocky Mountain willow (*S. monticola*) shrubs are located on a terrace raised approximately 0.5-2 meters above the streambanks in dry soil. Shrub cover on the terrace is patchy, with openings of exposed gravel with sparse cover of upland plants like fringed sage (*Artemisia frigida*) and blue grama (*Bouteloua gracilis*). Terrace soil consists of silty clay over course gravel and sand. The stream bank soil profile is similar except that it contains a layer of loamy sand between these two layers. Upland soil is Pendant cobbly loam (USDA NRCS 2008). The site's geology consists of Fountain Formation Arkosic sandstone and conglomerate (Tweto 1979). A grassland surrounds the riparian zone, which is in turn surrounded by ponderosa pine (*Pinus ponderosa*) woodland on modest slopes.

Key Environmental Factors: Strapleaf willow (*Salix ligulifolia*) shrubland is found in saturated soils with beaver (*Castor canadensis*) activity (Carsey et al. 2003). Trout Creek has apparently been downcutting, which might be a result of cattle grazing. Downcutting has lowered the water table such that the majority of the shrubland is on a terrace 0.5-2 meters above bankful, where flood waters no longer reach. Flooding is needed to maintain riparian shrublands (Rondeau 2001), so this strapleaf willow (*Salix ligulifolia*) shrubland may not persist on the terrace.

Trout Creek at Manitou Experimental Forest

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B3): The site is drawn for a fair viability (C-ranked) occurrence of strapleaf willow (Salix *ligulifolia*) shrubland, a plant association ranked as globally imperiled (G2G3/S2S3). This montane plant association is currently known from just Colorado, Utah, and Wyoming, but may yet be found in New Mexico (NatureServe 2010).

Natural Heritage element occurrences at the Trout Creek at Manitou Experimental Forest PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix ligulifolia Shrubland	Montane Willow Carr	G2G3	S2S3				C	2010-06-03

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site is drawn to incorporate the floodplain of Trout Creek surrounding a strapleaf willow (*Salix ligulifolia*) shrubland. The Manitou Lake dam serves as a barrier to this plant association's upstream expansion. The downstream boundary is drawn at a comparable distance from the end of the occurrence, where the willow carr becomes increasingly patchy.

Protection Urgency Rank Comments (P3): The U.S. Forest Service manages this public land. They have partnered with other organizations for river restoration in nearby Park County, so this could be a candidate site for a similar restoration partnership.

Management Urgency Rank Comments (M3): Stream restoration and weed control may be necessary to maintain the size and quality of this strapleaf willow (*Salix ligulifolia*) shrubland.

Exotic Species Comments: Weeds observed include cheatgrass (*Bromus tectorum*)

and musk thistle (*Carduus nutans*).

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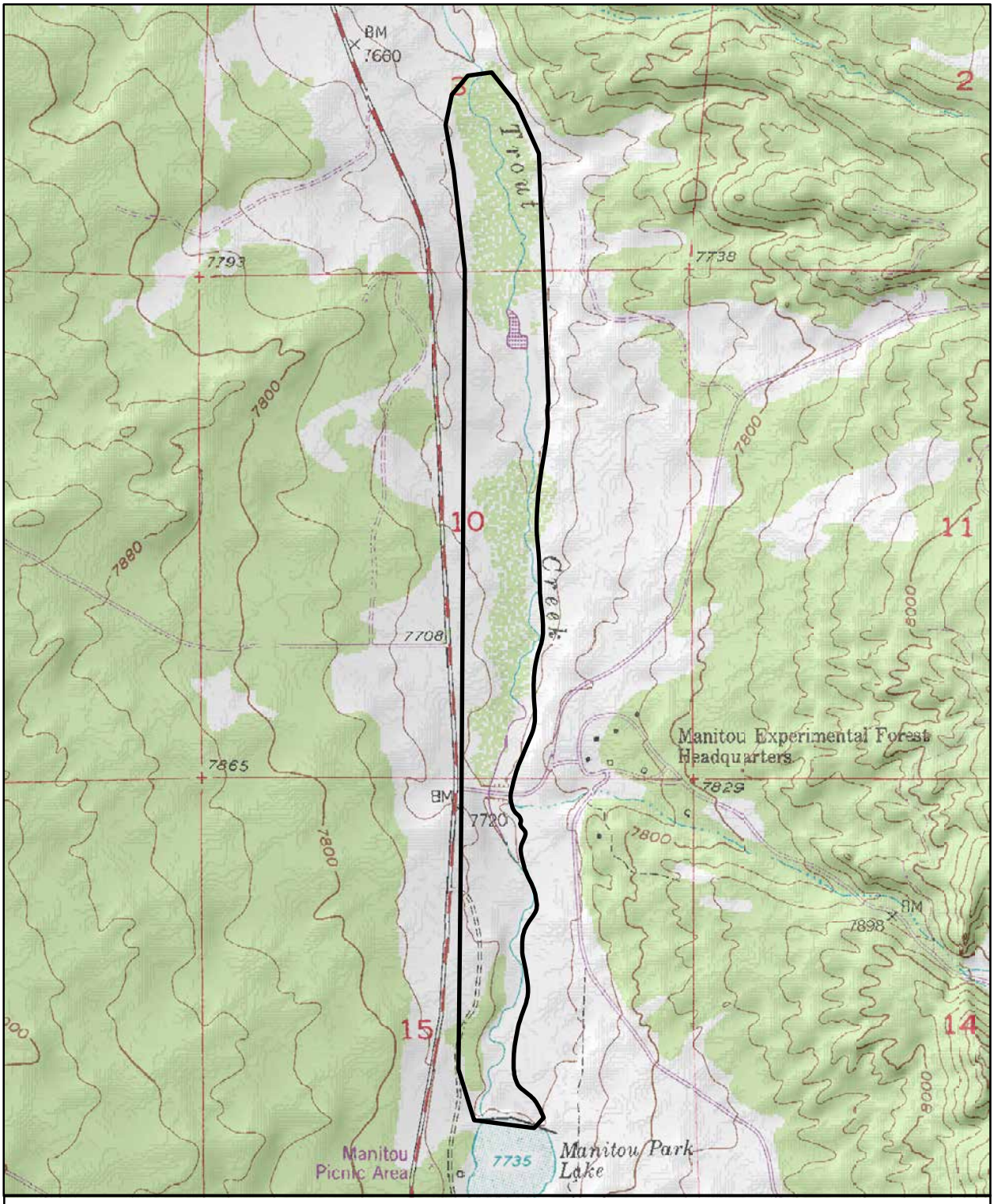
Version Author: Shaw, A.E.

Version Date: 12/17/2010



Colorado Natural Heritage Program
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/07/2011

Miles
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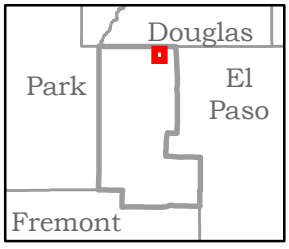
Legend

PCA Boundary

Mount Deception, 39105-A1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 26. Trout Creek at Manitou Experimental Forest Potential Conservation Area, B3: High Biodiversity Significance

West Fourmile Creek

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Wrights Reservoir

Size: 76 acres (31 ha) **Elevation:** 8,040 - 8,400 ft. (2,451 - 2,560 m)

General Description: West Fourmile Creek passes through a narrow steep-walled canyon that is less than 0.6 miles long. The creek gradient is not particularly steep because most of the elevation drop is in the form of a waterfall. Swimmers have built a simple rock dam to enlarge the plunge pool below the waterfall. The canyon is quite popular for outdoor recreation because of its easy access from Guffey Road. Above and below the canyon, the creek passes through a very wide, flat, wet meadow. Because the meadow is used for cattle grazing, there are stock ponds at the eastern edge of the site. Within the canyon, there are two groves of Douglas-fir (*Pseudotsuga menziesii*) / blue spruce (*Picea pungens*) forest on non-vertical sections of the north-facing canyon wall. Other non-vertical canyon walls contain ponderosa pine (*Pinus ponderosa*) woodlands. Vertical walls have a sparse cover of shrubs such as waxflower (*Jamesia americana*), Boulder raspberry (*Rubus deliciosus*), and fringed sage (*Artemisia frigida*). The riparian plant communities within the site include beaked sedge (*Carex utriculata*) herbaceous vegetation upstream from the waterfall and a coyote willow (*Salix exigua*) / mesic graminoid shrubland below the waterfall. An American Dipper (*Cinclus mexicanus)* was observed above the waterfall, suggesting high quality riparian habitat. The site's soil is classified as Adderton cumulic cryaquolls, which are deep, very poorly drained soils on stream terraces (USDA NRCS 2008). The canyon walls are Pikes Peak granite outcrops (Tweto 1979).

Key Environmental Factors: Fendler's cloak-fern (*Argyrochosma fendleri*) is limited to crevices in the dry south-facing granite canyon wall. It depends on crevices where vertical solid rock limits competition from other plants and disturbance.

Climate Description: Average annual precipitation is 16.2 inches. Snowfall is greatest in April and May. Monsoon rains peak in July and August. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July. (http://www.worldclimate.com.)

Biodiversity Significance Rank Comments (B3): This site is drawn for a good

West Fourmile Creek

(B-ranked) occurrence of the globally vulnerable (G3/S3) plant Fendler's cloak-fern (*Argyrochosma fendleri*), which spans the Southern Rocky Mountains.

Natural Heritage element occurrences at the West Fourmile Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Argyrochosma fendleri	Fendler cloak - fern	G3	S3				B	2010-08-06

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to include the entire length and depth of the canyon because the entire extent of the canyon walls is appropriate habitat for the rare plant. No private property was surveyed at this site because the plant populations of interest are located on Bureau of Land Management (BLM) public land.

Protection Urgency Rank Comments (P3): The majority of the site is owned by the Bureau of Land Management. The Royal Gorge Field Office does not currently employ a real estate specialist. As the Town of Cripple Creek and the private landowner on the eastern edge of the site were not contacted, it is unknown whether those tracts face any immediate threats.

Management Urgency Rank Comments (M3): The riparian vegetation could benefit from control of invasives like Canada thistle (*Cirsium arvense*), possible quackgrass (*Elymus repens*), and reed canary grass (*Phalaris arundinacea*). The primitive rock dam is probably not a major threat to the creek's hydrology because it is permeable like a beaver dam. No threats were observed. There was no clear evidence of rock climbing, the primary potential threat to species that live in crevices on vertical rock walls.

Exotic Species Comments: Exotic plants were not observed on the granite walls hosting the rare plant, but were abundant in the riparian vegetation. Riparian exotics include timothy (*Phleum pratense*), Canada thistle (*Cirsium arvense*), Kentucky bluegrass (*Poa pratensis*), redtop (*Agrostis gigantea*), field pennycress (*Thlaspi arvense*), possible quackgrass (*Elymus repens*), smooth brome (*Bromus inermis*), black medic (*Medicago lupulina*), and red clover (*Trifolium pratense*).

West Fourmile Creek
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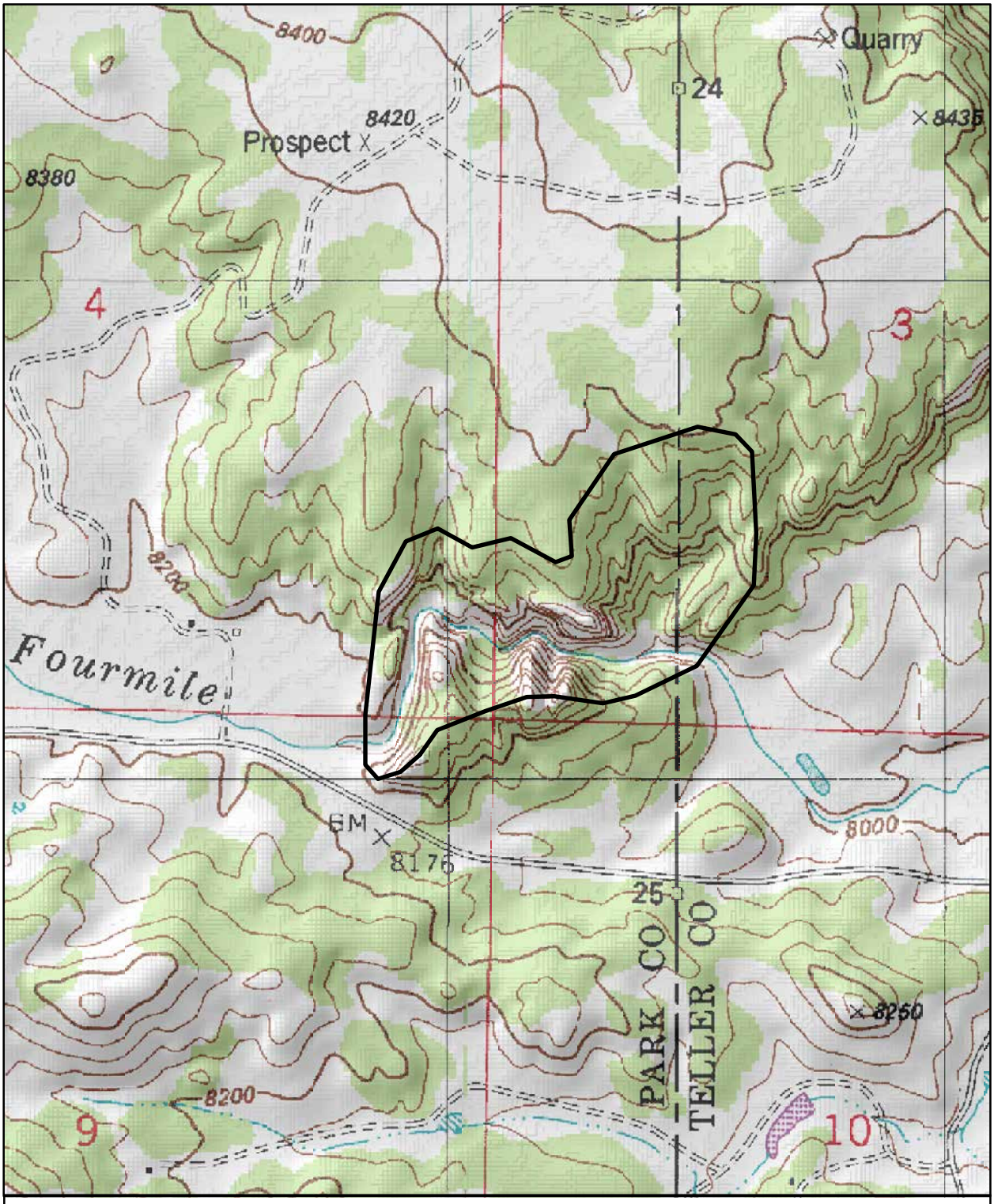

Colorado Natural Heritage Program
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Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/07/2011

0 0.1 0.2 Miles

N

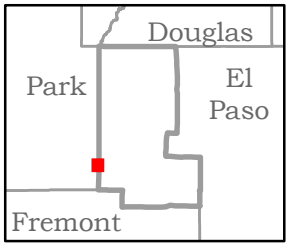
Legend

PCA Boundary

Wrights Reservoir, 38105-G3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 27. West Fourmile Creek Potential Conservation Area, B3: High Biodiversity Significance

Wilson Creek

Biodiversity Rank - B3: High Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Cripple Creek South

Size: 3,973 acres (1,608 ha) **Elevation:** 6,650 - 9,930 ft. (2,027 - 3,027 m)

General Description: Within this site, Wilson Creek is braided and has an average gradient of 8%. The combination of a moderately steep slope and braided channels is unusual, but can be explained by this steep narrow canyon's occasional massive floods that drop boulders in the middle of the creek. Islands of boulders colonized by upland vegetation separate the two channels. In the downstream third of the site, the channels are widely spaced and the riparian community and adjacent upland pasture and are dominated by non-native plants. The canyon walls in the downstream portion of the site are dominated by Gambel oak (*Quercus gambelii*) shrubland and pinon pine (*Pinus edulis*) / Rocky Mountain juniper (*Juniperus scopulorum*) woodland. Canyon walls in the upstream portion of the site are dominated by limber pine (*Pinus flexilis*) with Engelmann spruce (*Picea engelmannii)* and typical montane grasses e.g., mountain muhly (*Muhlenbergia montana*), Thurber's fescue (*Festuca thurberi*), Arizona fescue (*F. arizonica*), and blue grama (*Bouteloua gracilis*). Animals inhabiting Wilson Creek canyon include plateau lizard (*Sceloporus undulatus*), bighorn sheep (*Ovis canadensis*), and a high density of black bear (*Ursus americanus*). Beaver (*Castor canadensis*) is no longer present. Wilson Creek goes dry in September, perhaps due to upstream diversions. The headwaters of Wilson Creek are grazed, contain stock ponds, and drain the massive Cresson Gold Mine and Valley Leach Facility and the town of Victor. AngloGold has much smaller mining operations both in the middle of the site and next to Cripple Creek 1.4 miles above its junction with Wilson Creek. The site's geology is dominated by Pikes Peak granite. High elevations within the northern section of the site contain intra-ash-flow quartz latitic lavas, breccias, tuffs, and/or conglomerates, early ash-flow Wall Mountain tuff, and pre-ash-flow andesitic lavas. The southwestern corner of the site includes Harding sandstone (Tweto 1979). The far southwestern tip of the site within the Fourmile Creek floodplain contains deep well-drained Nunn clay loam. Soils below 7,960 feet consist of shallow Tolex very gravelly sandy loam. Soils above 9,380 feet consist of moderately deep Guffey very gravelly sandy loam. The elevational range between 7,960 and 9,380 feet includes both Tolex and Guffey soils (all soil information taken from USDA NRCS 2008).

Key Environmental Factors: Narrowleaf cottonwood (*Populus angustifolia*) / bluestem willow (*Salix irrorata*) woodland is an early successional plant association

that develops after flooding (Carsey et al. 2003). The floodplain is narrow upstream and wide downstream. Where it is narrow, an impenetrable thicket of willows (*Salix* spp.) covers the creek, indicating frequent flooding (Carsey et al. 2003). Where it is wider, weeds dominate the understory because the water dries up, leaving bare sand they can quickly colonize. As more floods deposit sediment over the years, the vegetation will shift to a later successional plant association (Carsey et al. 2003). Degener beardtongue (*Penstemon degeneri*) occurs in montane grasslands and pinon pine (*Pinus edulis*) / Rocky Mountain juniper (*Juniperus scopulorum*) woodlands. It grows in rocky soils over igneous bedrock near canyon rims or in cracks of rock slabs (Peterson and Harmon 1981).

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30° F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Cultural Features: Mining within the canyon has a long history, based on artifacts found in the creek and tributaries. Homestead buildings and corrals remain in the wide floodplain. A few homestead remnants are scattered in the creek, e.g. rusting car chassies.

Biodiversity Significance Rank Comments (B3): The site supports a fair (C-ranked) occurrence of a globally imperiled (G2/S2) plant association, narrowleaf cottonwood (*Populus angustifolia*) / bluestem willow (*Salix irrorata)* woodland. This plant association is endemic to the southern Rocky Mountains (NatureServe 2010). The site also contains a fair (C-ranked) population of the globally imperiled (G2/S2) plant, Degener beardtongue (*Penstemon degeneri*), a species endemic to south-central Colorado (Spackman et al. 1997).

Wilson Creek

Natural Heritage element occurrences at the Wilson Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus angustifolia / Salix irrorata Woodland	Foothills Riparian Woodland	G2	S2				C	2010-09-24
Vascular Plants	Penstemon degeneri	Degener beardtongue	G2	S2			BLM/ USFS	C	2010-08-18

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn at the ridgeline surrounding the occurrence of narrowleaf cottonwood (*Populus angustifolia*) / bluestem willow (*Salix irrorata*) woodland to protect it from additional mining operations that could alter the creek's geomorphology, water quality, and vegetation. The upstream boundary is drawn to incorporate the previously documented extent of the narrowleaf cottonwood (*Populus angustifolia*) / bluestem willow (*Salix irrorata*) woodland occurrence, which the community may no longer inhabit. The downstream boundary is drawn where Wilson Creek ends at its convergence with Cripple Creek. Private lands were only visited with written permission from landowners.

Protection Urgency Rank Comments (P2): Given the current (2010) high price of gold, it is possible that mining operations would be expanded within the next five years, which could further degrade the narrowleaf cottonwood (*Populus angustifolia*) / bluestem willow (*Salix irrorata*) woodland.

Management Urgency Rank Comments (M3): The site would benefit from reduced grazing intensity upstream. The effects of mining on Wilson Creek are unknown but could potentially be problematic. The weed infestation may be too advanced to control.

Natural Hazard Comments: There is a risk of falling into abandoned mine shafts. The active gold mining operation could pose risk of exposure to toxic chemicals.

Exotic Species Comments: The exotic species black medic (*Medicago lupulina*), butter-and-eggs (*Linaria vulgaris*), Dalmatian toadflax (*L. dalmatica*), Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgare*), red clover (*Trifolium pratense*), white clover (*T. repens*), common mullein (*Verbascum thapsus*), Russian thistle (*Salsola australis*), cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), redtop (*Agrostis gigantea*), and quackgrass (*Elymus repens*) are the dominant herbaceous plants on the canyon floor.

Wilson Creek
References

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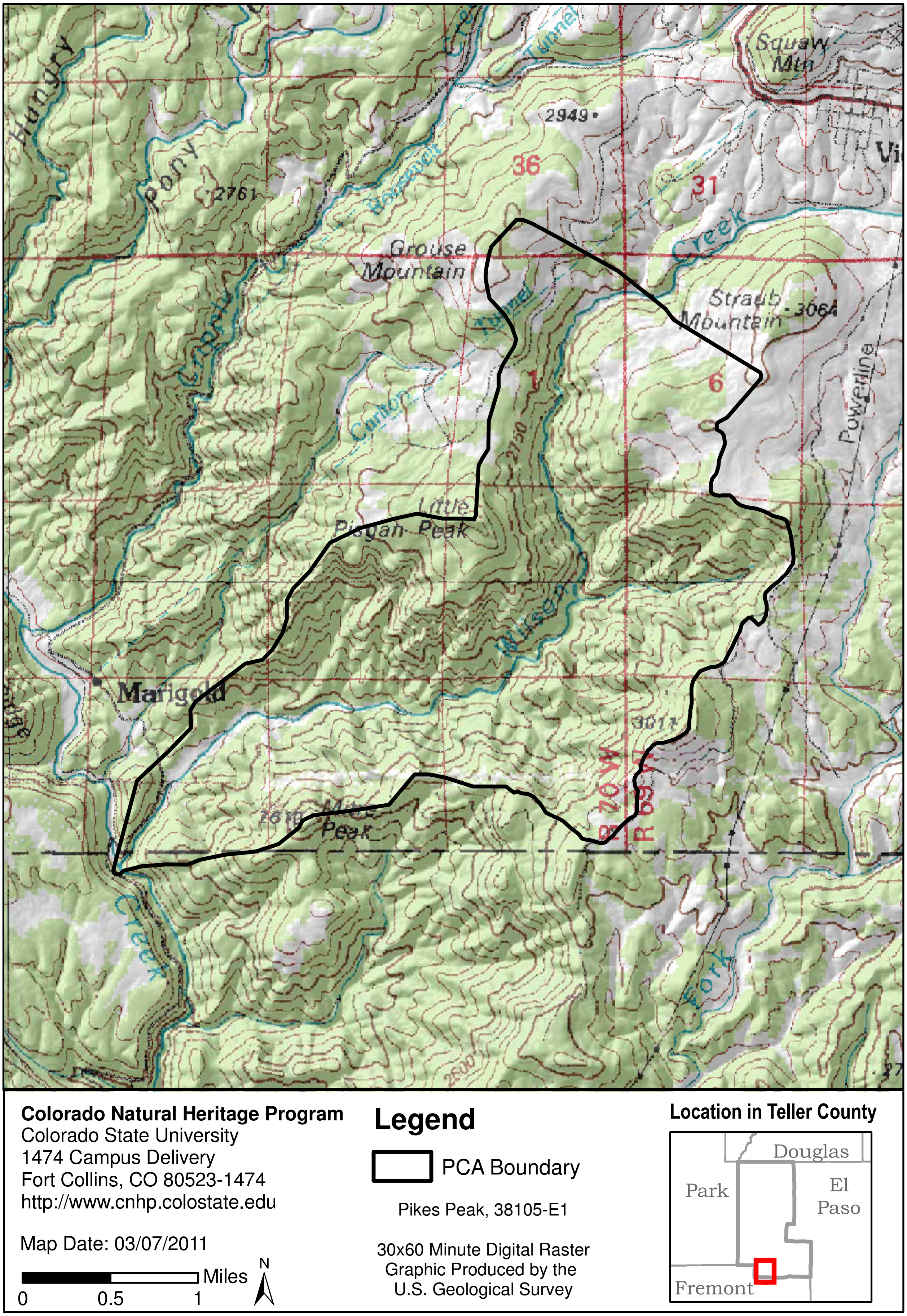

Map 28. Wilson Creek Potential Conservation Area, B3: High Biodiversity Significance

Barnard Creek in Box Canyon

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Wrights Reservoir, Cripple Creek North

Size: 1,175 acres (476 ha) **Elevation:** 7,840 - 8,840 ft. (2,390 - 2,694 m)

General Description: Barnard Creek is a first order stream, originating within an active gold mining area, its headwaters located north of Cripple Creek and joining Fourmile Creek approximately seven miles later. Barnard Creek flows through three miles of residential development before encountering another mile of active mining claims. The Barnard Creek at Box Canyon site encompasses the area owned by BLM below the mining and residential areas. Barnard Creek is a meandering, moderate gradient stream winding through a narrow vertical canyon. Barnard Creek includes pools and riffles within the Box Canyon but becomes channelized once the canyon opens up into the relatively flat valley below. The majority of the canyon has vertical walls, but where slopes are less extreme, a pinon pine (*Pinus edulis*) / Rocky Mountain juniper (*Juniperus scopulorum*) woodland is present with Douglas-fir (*Pseudotsuga menziesii)*. Gambel oak (*Quercus gambelii*) groves alternate with thickets of gooseberry and currant (*Ribes* spp.) and Boulder raspberry (*Rubus deliciosus*) along the canyon toeslope. Below the canyon, the valley bottom serves as cattle pasture with numerous introduced pasture grasses. The dominant riparian community is a degraded thinleaf alder (*Alnus incana*) shrubland, with the majority of alders dead. Many surviving alders have resprouted modestly at the base of their tall dead branches. The riparian vegetation is as narrow as one foot on either side of the creek in places. Upland plants are encroaching on the riparian zone, likely due to infrequent flooding. There is cattle grazing within the wide downstream section. Beavers were likely present in the past, based on what appear to be old beaver dams. A subdivision has installed seven small ponds two miles upstream from the site. There are stock ponds on some of the unnamed tributaries of Barnard Creek. The canyon's rock walls consist of Pikes Peak granite (Tweto 1979). Upland soil of the easternmost portion of the site is classified as Tolex very gravelly sandy loam. The majority of the site's upland soil is Guffey very gravelly sandy loam (USDA NRCS 2008). Riparian zone soil is sandy clay loam over gravel and bedrock.

Key Environmental Factors: Beaver dams, surface flow, and flooding are the factors that generally maintain montane shrublands (Rondeau 2001). The absence of beaver and the presence of numerous manmade dams upstream from the site may explain the poor condition of its riparian vegetation. There is a possibility that upstream mining and development have degraded water quality and harmed the site's

wildlife, but bears and birds are still present.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: An old wagon road, barely visible, travels the length of the canyon.

Biodiversity Significance Rank Comments (B4): The site is drawn for a fair (C-ranked) occurrence of a globally vulnerable (G3/S3) plant association, thinleaf alder (*Alnus incana*) / mesic graminoids shrubland. This riparian community has fluctuated in viability over the years. In 1997 it was ranked as historically degraded but it has since recovered. The alders that were then thought to be making a come-back have for the most part stayed in a tenuous state of resprouting but not thriving.

Natural Heritage element occurrences at the Barnard Creek in Box Canyon PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Alnus incana / Mesic Graminoids Shrubland	Montane Riparian Shrubland	G3	S3				C	2010-08-05

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was delineated to encompass known element occurrences and contiguous habitat that potentially supports the elements. Additionally, sufficient habitat to enable essential ecosystem processes, specifically hydrologic and geologic processes, and topography.

Protection Urgency Rank Comments (P3): The majority of the site is owned by the Bureau of Land Management. As of 2010, the Royal Gorge Field Office does not currently employ a real estate specialist. Private lands were not visited.

Barnard Creek in Box Canyon

Management Urgency Rank Comments (M3): It may be beneficial to reduce grazing pressure below Box Canyon. Beaver reintroduction could help revive dying alders.

Exotic Species Comments: Weeds such as butter-and-eggs (*Linaria vulgaris*) and Canada thistle (*Cirsium arvense*) are abundant.

References

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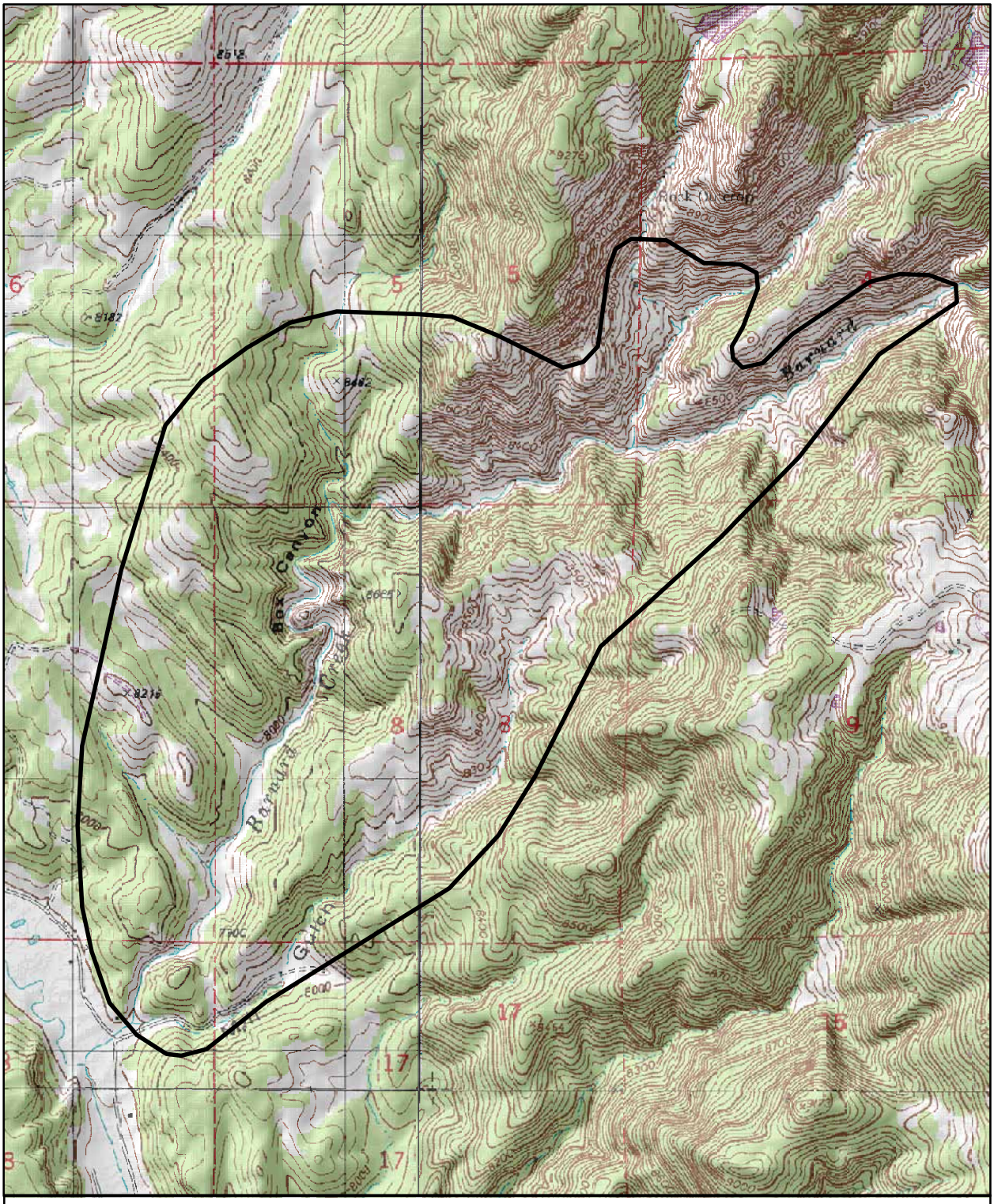
Version Author: Shaw, A.E.

Version Date: 11/30/2010



Map 29. Barnard Creek in Box Canyon Potential Conservation Area, B4: Moderate Biodiversity Significance

Blue Springs

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity within 5 Years

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Woodland Park, Divide

Size: 653 acres (264 ha) **Elevation:** 8,840 - 9,190 ft. (2,694 - 2,801 m)

General Description: The Blue Springs site is located in a broad shallow valley among rolling forested hills adjacent to CO Highway 24. The majority of the site is utilized for livestock production. North-facing slopes support blue spruce (*Picea pungens*) / Douglas-fir (*Pseudotsuga menziesii*) forests. A grove of quaking aspen (*Populus tremuloides*) is located on a low hill in the middle of the site. Ponderosa pine (*Pinus ponderosa*) woodlands dominate the south-facing slopes. Upland soils are primarily well drained Adderton fine dark loam (USDA NRCS 2008). The underlying geology is mostly Ogallala formation sandstone, but Pikes Peak granite is found in the north and east ends of the site (Tweto 1979). Upstream there is a small but dense Rocky Mountain willow (*Salix monticola*) / beaked sedge (*Carex utriculata*) shrubland containing autumn willow (*Salix serissima*) in areas of saturated mucky peat soil. The willow carr narrows abruptly into a Bebb's willow (*Salix bebbiana*) shrubland along a straight low-gradient tributary that empties into a stock pond. The soil along the tributary is silty clay loam. In the creek immediately to the south, beaver (*Castor canadensis*) have disappeared and their ponds are filling in with planeleaf willow (*Salix planifolia*) / beaked sedge (*Carex utriculata*) shrubland. Human-made ponds have replaced beaver ponds.

Key Environmental Factors: Willow (*Salix* spp.) twigs exhibit browse pressure from livestock and wildlife. Further subdivision construction and well installation could potentially dry up the water source for both species of willow. Decker (2006) lists hydrological alteration allowing peat (in this case mucky peat) decomposition as the primary threat to autumn willow (*Salix serissima*) in the southern Rocky Mountains.

Climate Description: Teller County is relatively cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum

temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9° F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): This site is drawn for a fair viability (C-ranked) occurrence of autumn willow (*Salix serissima*), which is apparently globally secure (G4) but critically imperiled in Colorado (S1). Colorado is the southernmost extent of the species' range, which is primarily across the northern U.S. and Canada. There is also a fair (C-ranked) occurrence of Bebb's willow (*Salix bebbiana*) shrubland. This plant association is tentatively ranked as globally vulnerable (G3?) but imperiled in Colorado (S2).

Natural Heritage element occurrences at the Blue Springs PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix bebbiana Shrubland	Montane Willow Carrs	G3?	S2				C	2010-09-13
Vascular Plants	Salix serissima	autumn willow	G4	S1			USFS	C	2010-09-13

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site is drawn to include Blue Springs Creek and two intermittent tributaries, to incorporate occurrences of Bebb's willow (*Salix bebbiana*) shrublands, autumn willow (*Salix serissima*), and two other streams that could potentially host these elements in the future. The site boundary is drawn at the ridgelines surrounding the three streams except for exclusion of a subdivision. This boundary incorporates the portion of the catchment area that could still be protected from development to maintain surface and groundwater flows. Only private lands with written permission were visited at this site.

Protection Urgency Rank Comments (P2): The site is privately owned in an area experiencing rapid development. The long-term viability of site is dependent on protection of contiguous habitat for riparian plant communities and groundwater.

Management Urgency Rank Comments (M2): Bebb's willow (*Salix bebbiana*) is sensitive to grazing (Carsey et al. 2003). It is still dominant in the channelized part of the stream, but is limited to a narrow band of riparian vegetation. The native vegetation and long-term cattle forage value would benefit from weed control, reduced grazing pressure, and/or fencing around the streams. Keeping the dense willow carr intact may help keep weeds from penetrating it.

Exotic Species Comments: The weeds butter-and-eggs (*Linaria vulgaris*) and Canada thistle (*Cirsium arvense*) are abundant throughout the riparian area.

Blue Springs
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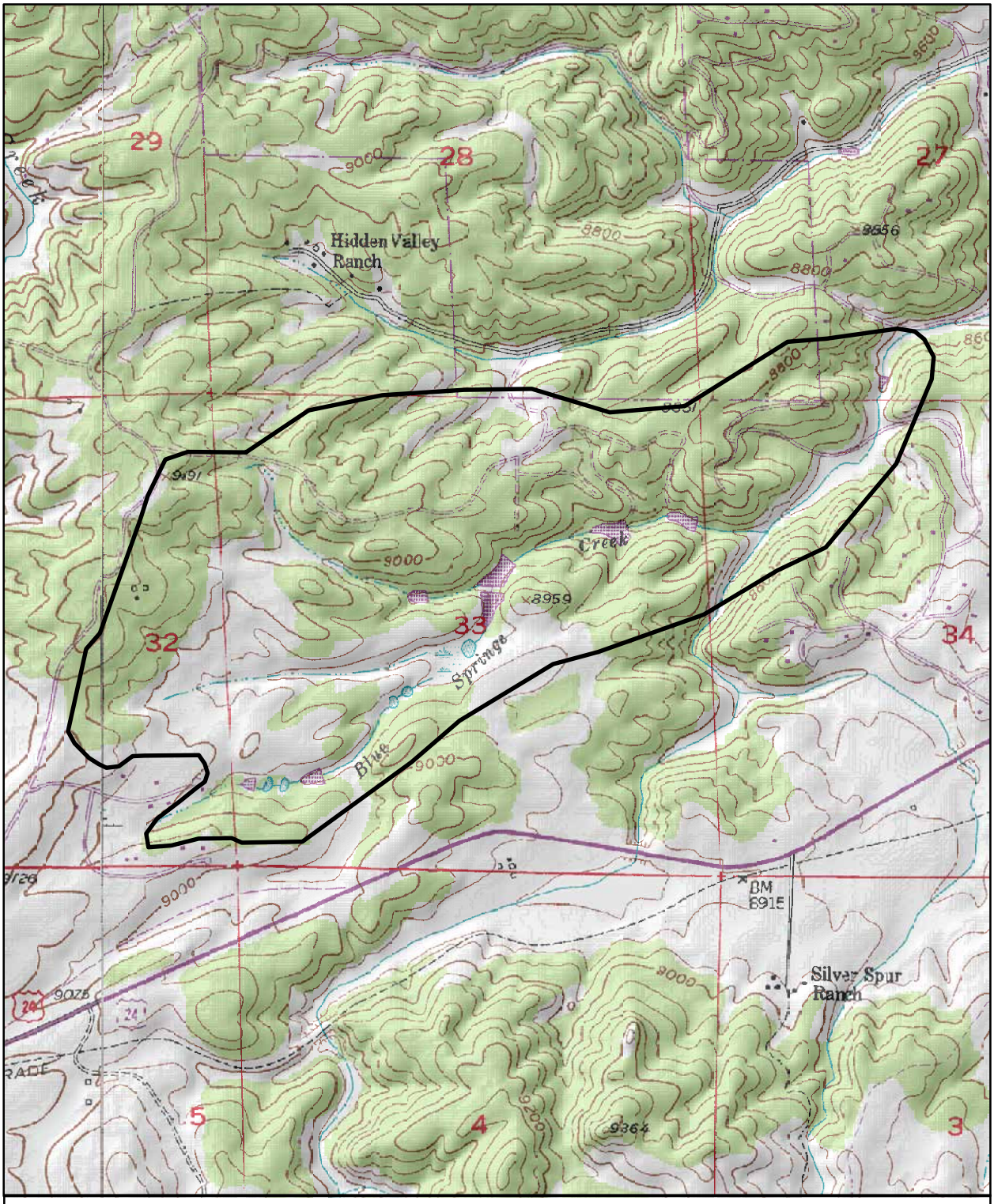
Version Author: Shaw, A.E.

Version Date: 12/13/2010



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Map Date: 03/07/2011

0 0.2 0.4 Miles

N

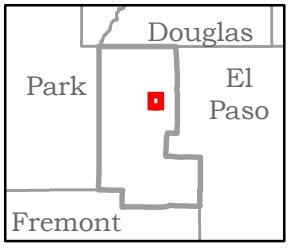
Legend

PCA Boundary

Woodland Park, 38105-H1
Divide, 38105-H2

7.5 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 30. Blue Springs Potential Conservation Area, B4: Moderate Biodiversity Significance

Catamount Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 283 acres (114 ha) **Elevation:** 8,000 - 9,400 ft. (2,438 - 2,865 m)

General Description: This site is located in the montane zone on the east slope of the Front Range west of the Town of Green Mountain Falls and east of North Catamount Reservoir. The Catamount Creek site encompasses steep, forested hillslopes and a low gradient, east-trending valley that abruptly transitions to a steep, rock-walled canyon drained by Catamount Creek. Stream type varies dramatically with the landscape. At the top of the site, where the stream flows through a low gradient valley, the channel is a meandering, Rosgen type C channel. At the head of the canyon the stream plunges down a steep cataract to the valley floor. Here the channel is a Rosgen type Aa+ bedrock controlled channel with waterfalls, cascades and plunge pools. Where the stream reaches the valley floor, the channel type transitions again to a moderate-gradient, bedrock/boulder controlled Rosgen type B3c stream with a step-pool structure. Riparian habitat at the top of the site, in the low-gradient valley, is characterized by a wide willow carr with a patchy and open tree canopy. Tree species here include quaking aspen (*Populus tremuloides*), Engelmann spruce (*Picea engelmannii*) and Douglas-fir (*Pseudotsuga menziesii*). Willow species include mountain willow (*Salix monticola*), and strapleaf willow (*Salix ligulifolia*). Where the gradient steepens, Douglas-fir / river birch (*Pseudotsuga menziesii / Betula occidentalis*) woodlands characterize riparian vegetation in the narrow, rock-walled canyon. On the valley floor, historic riparian habitat was characterized by blue spruce/river birch (*Picea pungens/Betula occidentalis*) forest but which has been converted to residential habitat. Uplands are dominated by Douglas-fir forests on north facing slopes and by ponderosa pine / Arizona fescue (*Pinus ponderosa / Festuca arizonica*) woodlands on south facing slopes. Geology is composed of Precambrian age granitic rocks of the Pikes Peak batholith of the 1,000 m.y. age group (Tweto 1979). Soils are aquolls that are well drained gravels derived from the extremely friable Pikes Peak granite (USDA NRCS 2008).

Key Environmental Factors: The key environmental factor determining biota in this site are ecologic processes, especially hydrology (Rondeau 2001) and specifically constant and sufficient stream flows, out of bank flows and shallow ground and surface water flow.

Catamount Creek

Climate Description: Due to elevation and complex topography climate in the Pikes Peak area is dramatically different from climate at relatively nearby locations at lower elevations. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. At this site on the east-facing slope of the Front Range at an elevation of 8,583 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 37.42 °F and a minimum of 12.9 6°F. Warmest temperatures occurred in July with an average maximum of 74.44 °F and an average minimum of 48.31 °F. Annual average maximum precipitation was 23.20 inches. July and August were the wettest months of the year with 3.66 and 3.96 inches of precipitation respectively. Driest months are December, January and February with 0.74, 0.50, and 0.68 inches of precipitation respectively. March through June and September through November have intermediate amounts of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B4): This site is drawn for a fair (C-ranked) occurrence of the globally vulnerable (G3?/S3) riparian woodland Douglas-fir / river birch (*Pseudotsuga menziesii / Betula occidentalis*). This association is limited to perennial streams where the cold-air drainage and perennial stream flow provide a cool and moist environment to support a diverse shrub canopy (Carsey et al. 2003). This woodland association is documented from the eastern slope of the Colorado Rockies with less than 20 occurrences expected. One site has been documented in Utah and it may occur in Nevada (NatureServe 2010).

Natural Heritage element occurrences at the Catamount Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Pseudotsuga menziesii / Betula occidentalis Woodland	Montane Riparian Forest	G3?	S3				C	2010-07-02

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn along adjacent ridgelines, which includes the watershed boundary to the north and south, for immediate watershed protection and to capture hydrologic processes essential to the long-term maintenance of the element. Private lands were surveyed only with written permission.

Protection Urgency Rank Comments (P3): The site contains both public land which is managed by the USFS as National Forest and private land owned by the Town of Green Mountain Falls and managed for low-impact recreation. Stream flows are altered by controlled releases from North and South Catamount Creek. Recreational

use is high and has resulted in physical vegetation damage.

Management Urgency Rank Comments (M3): The Douglas-fir / river birch community in this site appears to be limited to perennial streams where cold-air drainage and perennial water provide a cool, moist environment to support a diverse shrub canopy. This plant association is highly threatened by development, road maintenance and improvements, and heavy recreational use (NatureServe 2010). Maintaining a natural flow regime complete with natural springtime flooding flows is essential to the long-term viability of the element in this site. Additionally, recreational trail use is high and off-trail use has resulted in vegetation trampling. Trail management that eliminates recreational-induced vegetation trampling would greatly benefit this element occurrence.

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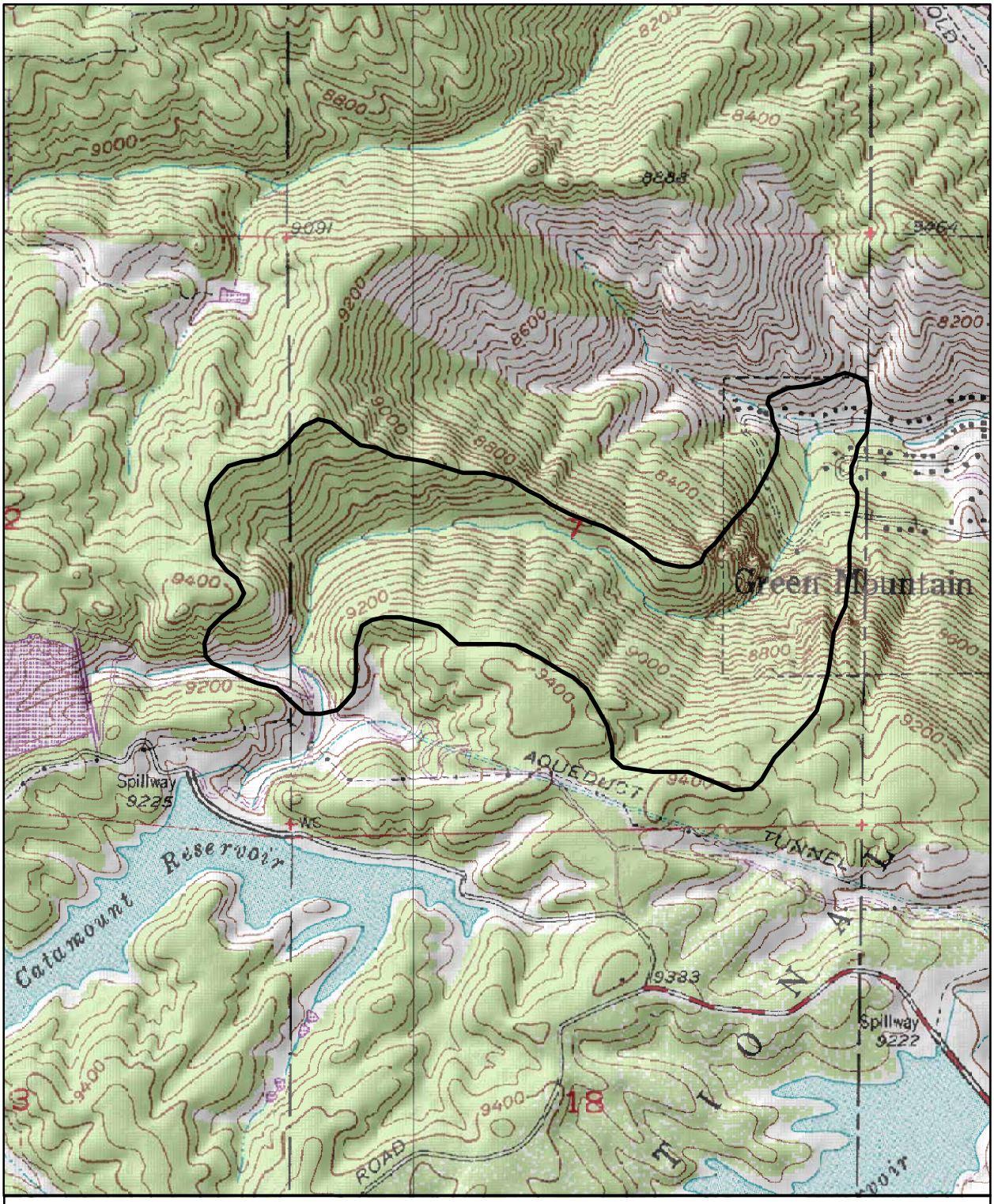
Version Author: Malone, D.G.

Version Date: 12/28/2010



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Map Date: 03/08/2011

Miles
0 0.1 0.2

N

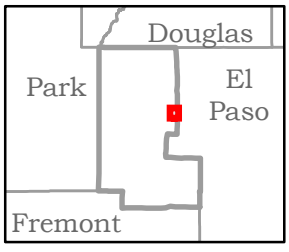
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 31. Catamount Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

Crazy Gulch

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Divide

Size: 1,487 acres (602 ha) **Elevation:** 9,000 - 9,085 ft. (2,743 - 2,769 m)

General Description: This site is located in montane zone foothills on the west slope of the Front Range to the north of Pikes Peak. The surrounding landscape is characterized by low, rolling hills. Habitat is characterized by a large-patch mosaic of xeric grasslands, forests and moist swales. Hilltops are a patch mosaic of mixed coniferous-deciduous forest and grasslands. Hilltop grasslands are typically characterized by a mix of graminoids including blue grama (*Bouteloua gracilis*), mountain muhly (*Muhlenbergia montana*), slimstem muhly (*Muhlenbergia filiculmis*) and Arizona fescue (*Festuca arizonica*). Forested sites are characterized by an association of Engelmann spruce (*Picea engelmannii*) and quaking aspen (*Populus tremuloides*). Other conifers, including Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*), are also present and dominate the upper canopy layer. Low gradient swales and hillslopes are occupied by Parry's oatgrass (*Danthonia parryi*) grasslands. Riparian habitat is characterized by mesic grasslands dominated by herbaceous species such as clustered field sedge (*Carex praegracilis*) and beaked sedge (*C. utriculata*) with small patches of shrubs including planeleaf willow (*Salix planifolia*) and shrubby cinquefoil (*Dasiphora floribunda*).

Key Environmental Factors: Key factors that influence site biota include environmental processes, especially fire and grazing intensity (Rondeau 2001). Fire has been suggested as a management tool in some cases where pine is encroaching into the grassland meadows. Parry's oatgrass (*D. parryi*) is considered to be very palatable to livestock, and overgrazing has been reported in some stands to reduce the abundance of Parry oatgrass (*Danthonia parryi*) (NatureServe 2010).

Climate Description: Broad elevational changes and complex topography in the Pikes Peak region result in broad differences in the local climate. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. On this north-facing site at an average elevation of 9,100 feet 1971 to 2000, coldest temperatures occurred in January with an average maximum of 35.96 °F and a minimum of 8.80 °F. Warmest temperatures occurred in July with an average maximum of 73.08 °F and an average minimum of 45.27 °F. Annual average maximum precipitation was 19.30 inches. July and August are the wettest months of the year with 3.42 and 3.50 inches of precipitation respectively. Driest months are

December through February with 0.55, 0.47 and 0.52 inches of precipitation respectively. March through June and September through November have intermediate amounts of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B4): This site is drawn for a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) grassland community Parry's oatgrass (*Danthonia parryi*) herbaceous vegetation and for a fair (C-ranked) occurrence of the globally vulnerable (G3/S2) grassyslope sedge (*Carex oreocharis*). The Parry's oatgrass association has a limited distribution in the Rocky Mountains of Colorado and southern Wyoming. It is suspected that many stands have been altered or destroyed by improper livestock grazing. Many remaining stands are small and/or have been impacted by anthropogenic activities, and are degraded to some degree (NatureServe 2010). Grassyslope sedge is a regional endemic of the southern Rocky Mountains from southeastern Wyoming to northern Arizona (NatureServe 2010).

Natural Heritage element occurrences at the Crazy Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Danthonia parryi Herbaceous Vegetation	Montane Grasslands	G3	S3				C	2010-08-26
Vascular Plants	Carex oreocharis	a sedge	G3	S2				C	2010-08-26

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary was drawn to include the known occurrences as well as likely potential extent and habitat of the element occurrences. Additionally, a buffer was included in the boundary to protect ecological processes including hydrology and natural migration and dispersal. Only lands with access permission from landowners were surveyed.

Protection Urgency Rank Comments (P3): This site is in private ownership. Agricultural and rural residential development has fragmented the landscape and altered ecological processes essential to system sustainability including migration, hydrologic and soil processes.

Management Urgency Rank Comments (M3): Domestic livestock grazing is moderate to heavy and has resulted in grassland deterioration. Reducing the intensity of the grazing regime would benefit the occurrence. Gunnison prairie dogs (*Cynomys gunnisoni*) were recently abundant on this property but were eradicated. Prairie dogs are keystone species and an essential part of these ecosystems that provide essential ecosystem services.

Crazy Gulch

Exotic Species Comments: Alien plant species include smooth brome (*Bromus inermis*), yellow toadflax (*Linaria vulgaris*) and wooly mullein (*Verbascum thapsus*).

References

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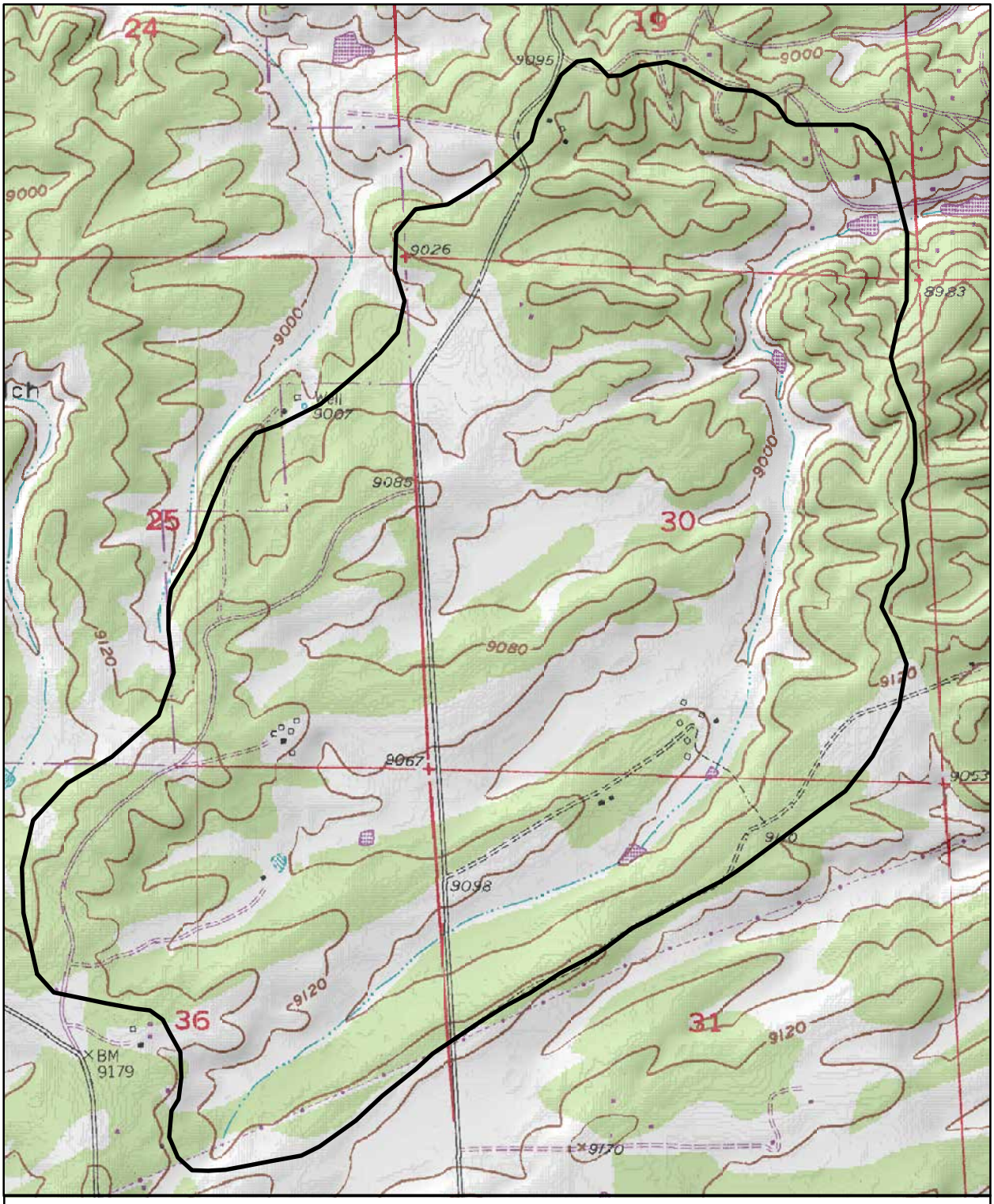
Version Author: Malone, D.G.

Version Date: 12/28/2010



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Miles
0 0.1 0.2

N

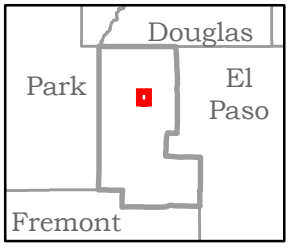
Legend

PCA Boundary

Divide, 38105-H2

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 32. Crazy Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

Crystola

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 410 acres (166 ha) **Elevation:** 7,880 - 9,200 ft. (2,402 - 2,804 m)

General Description: The Crystola site is located 0.3 miles southwest of the community of Crystola. At the eastern edge of the site, an unnamed stream flows into Fountain Creek at Highway 24. There are networks of access roads within residential areas in various stages of construction to the west and northeast of the site's boundaries. Colorado Springs Utilities has built three reservoirs in the watershed immediately south of the Crystola site. The main unnamed stream is classified as a Rosgen Class A with abundant coarse woody debris throughout the stream channel. The floodplain ranges from narrow to non-existent in steeper stretches with numerous boulders defining the stream banks. The central area of the site has a stream gradient of 35% and numerous small water cascades flow among the large boulders. The stream is dry in the flatter (8% slope) downstream end where it flows into a willow carr. Ponds have been constructed on the site's waterways. There is a small water diversion located at the western site boundary. Riparian vegetation is dominated by a Douglas-fir (*Pseudotsuga menziesii*) / red-osier dogwood (*Cornus sericea*) woodland. The northwest-facing slope is a coniferous forest of Engelmann spruce (*Picea engelmannii*), ponderosa pine (*Pinus ponderosa*), and limber pine (*Pinus flexilis*). The southeast-facing slope is a boulder field with sparse cover of bunchgrasses and shrubs that grades into a woodland upslope. The endemic plant, Front Range alumroot (*Heuchera hallii*), grows on the site's Pikes Peak granite canyon walls. Soil consists of deep, poorly drained Aquolls (USDA NRCS 2008).

Key Environmental Factors: Steep, narrow canyons with cold air drainage create a moist microclimate for Douglas-fir (*Pseudotsuga menziesii*) (Carsey et al. 2003). This site is unusual for the Douglas-fir / red-osier dogwood (*Cornus sericea*) plant association in lacking well-drained loamy soil and for its extreme steepness in places. Red-osier dogwood is more abundant on level ground (Carsey et al. 2003), which may explain why it is sparse at this site

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and

sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: Cabins were built by a cooperative of Colorado College professors in the early 20th century and are currently used by members.

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) occurrence of a plant association, Douglas-fir (*Pseudotsuga menziesii*) / red-osier dogwood (*Cornus sericea*) woodland, that is rare in Colorado (G4/S2).

Natural Heritage element occurrences at the Crystola PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Pseudotsuga menziesii / Cornus sericea Woodland	Lower Montane Riparian Forests	G4	S2				B	2010-09-06

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to the adjacent ridgeline except where residential development has caused significant landscape fragmentation at the ridgeline. This boundary would protect the Douglas-fir (*Pseudotsuga menziesii*) / red-osier dogwood (*Cornus sericea*) woodland from further development that could affect its water quality and quantity. The upstream and downstream boundaries are drawn where riparian woodlands change into shrublands. Ecological systems (such as woodlands vs. shrublands) are unified by similar ecological processes, abiotic factors, and environmental gradients (Rondeau 2001), so delimiting a site based on an ecological system of interest (i.e. riparian woodlands) creates a more cohesive site. Only private lands with written permission were visited.

Protection Urgency Rank Comments (P2): Pike National Forest owns at least half of the site. Several private landowners, including a bank, own the remainder. When the housing market recovers, construction may resume on the private developments on the western site boundary. Further ridgeline development could cause erosion and stream sedimentation.

Management Urgency Rank Comments (M3): Continued vigilance is suggested to control Canada thistle (*Cirsium arvense*) and butter-and-eggs (*Linaria vulgaris*).

Crystola

Exotic Species Comments: Canada thistle (*Cirsium arvense*) and butter-and-eggs (*Linaria vulgaris*) are present.

References

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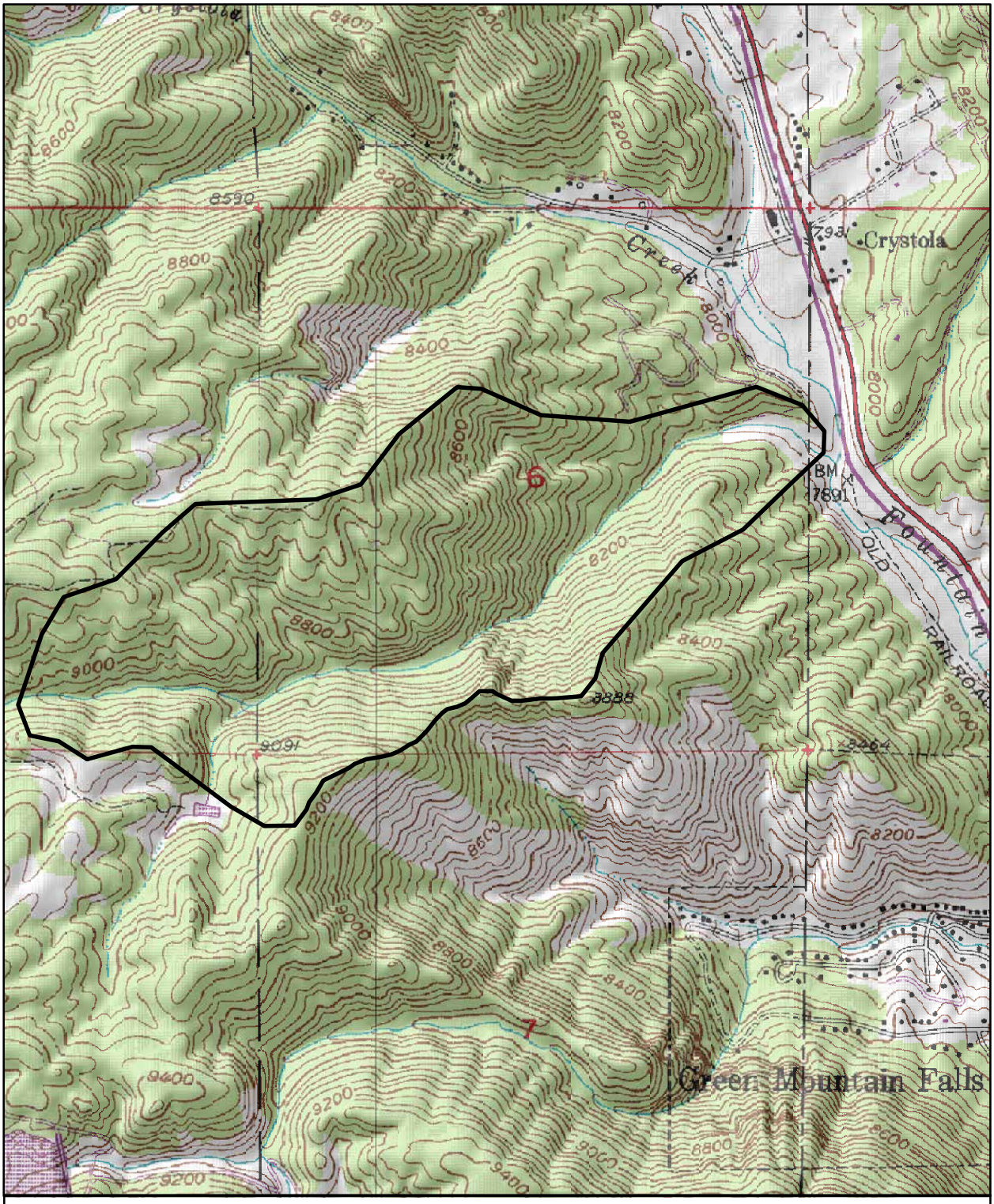
Version Author: Shaw, A.E.

Version Date: 12/28/2010



Map 33. Crystola Potential Conservation Area, B4: Moderate Biodiversity Significance

East Fork of West Beaver Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M4: Not Needed Now; No Current Threats; May Need in Future

U.S.G.S. 7.5-minute quadrangles: Pikes Peak

Size: 607 acres (246 ha) **Elevation:** 10,420 - 11,720 ft. (3,176 - 3,572 m)

General Description: The East Fork of West Beaver Creek site consists of a U-shaped glaciated subalpine valley. Wetland habitat diversity includes: active beaver ponds for aquatic habitat, an open planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland with areas of peat accumulation, a shortfruit willow (*Salix brachycarpa*) / mesic forbs shrubland, and a small patch of shrubby cinquefoil (*Dasiphora fruticosa* spp. *floribunda*) / tufted hairgrass (*Deschampsia cespitosa*) shrubland. Riparian vegetation is narrowly ringed by young stands of quaking aspen (*Populus tremuloides*) with limber pine (*Pinus flexilis*) and Engelmann spruce (*Picea engelmannii*) trees interspersed. Above treeline, the exposed faces of Sheep Mountain and associated ridges and peaks surround the valley. The cliffs surrounding the valley are Pikes Peak granite. The valley has filled in with glacial drift from the Pinedale and Bull Lake glaciations (Tweto 1979). Soils in the northeastern third of the site are mapped as deep, well-drained Bross gravelly sandy loam, while the rest of the site is mapped as deep, poorly drained Aquolls (USDA NRCS 2008). There is peat accumulation in the valley bottom, consistent with the soil map. However in places within the shortfruit willow / mesic forbs shrubland on side slopes, there are only 1-2 inches of duff on top of bedrock. A social trail leads up the valley bottom. Less than a mile upstream from the site, the Strickler Tunnel Aqueduct leads from the East Fork of West Beaver Creek to Colorado Springs Utilities' Reservoir No. 2. What water remains in the creek, feeds into a complex of active beaver ponds below which are supplemented by numerous natural springs that drain through the shortfruit willow / mesic forbs shrubland. As it exits the wetland, water enters one of two reservoirs of the City of Victor.

Key Environmental Factors: Shortfruit willow (*Salix brachycarpa*) habitat includes lateral moraines and coarse-textured stream banks (Carsey et al. 2003). At the valley floor the slope's shortfruit willow / mesic forbs shrubland grades into a planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland as a result of saturated to inundated soil associated with a matrix of peat soils and active beaver ponds.

Climate Description: Teller County is cool and dry although Pikes Peak has the

topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Cultural Features: There is an abandoned log cabin indicating a history of human habitation.

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) occurrence of an apparently globally secure (G4/S4) plant association, shortfruit willow (*Salix brachycarpa*) / mesic forbs shrubland. This plant association is relatively common in the southern Rocky Mountains, specifically Colorado and Wyoming (NatureServe 2010).

Natural Heritage element occurrences at the East Fork of West Beaver Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix brachycarpa / Mesic Forbs Shrubland	Alpine Willow Scrub	G4	S4				B	2010-07-20

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to the top of the cirque to incorporate all the springs that provide water to the shortfruit willow (*Salix brachycarpa*) / mesic forbs wetland community, because most of the community is too high up the slope to benefit from the East Fork of West Beaver Creek. The downstream boundary is the reservoir, to incorporate the matrix of high quality shortfruit willow and planeleaf willow (*S. planifolia*) dominated shrublands below the pure stand of shortfruit willow / mesic forbs shrubland. Private lands were not visited because they are inaccessible.

Protection Urgency Rank Comments (P3): Land ownership includes Pike National Forest, Bureau of Land Management, City of Victor, and several private landowners. The private lands are located on the cliffs at the north end of the site.

Management Urgency Rank Comments (M4): Avoidance of future water diversions is encouraged.

East Fork of West Beaver Creek

Exotic Species Comments: No exotic plants were observed.

References

Carsey, K., G. Kittel, K. Decker, D. Cooper, and D. Culver. 2003. Field guide to the wetland and riparian plant associations of Colorado. Prepared for the Colorado Department of Natural Resources, Denver, CO by the Colorado Natural Heritage Program, Fort Collins, CO.

Culver, D.R., D. Malone, and A. Shaw. 2011. CNHP Final Report: Survey of Critical Biological Resources in Teller County, Colorado. Colorado Natural Heritage Program, Fort Collins, CO.

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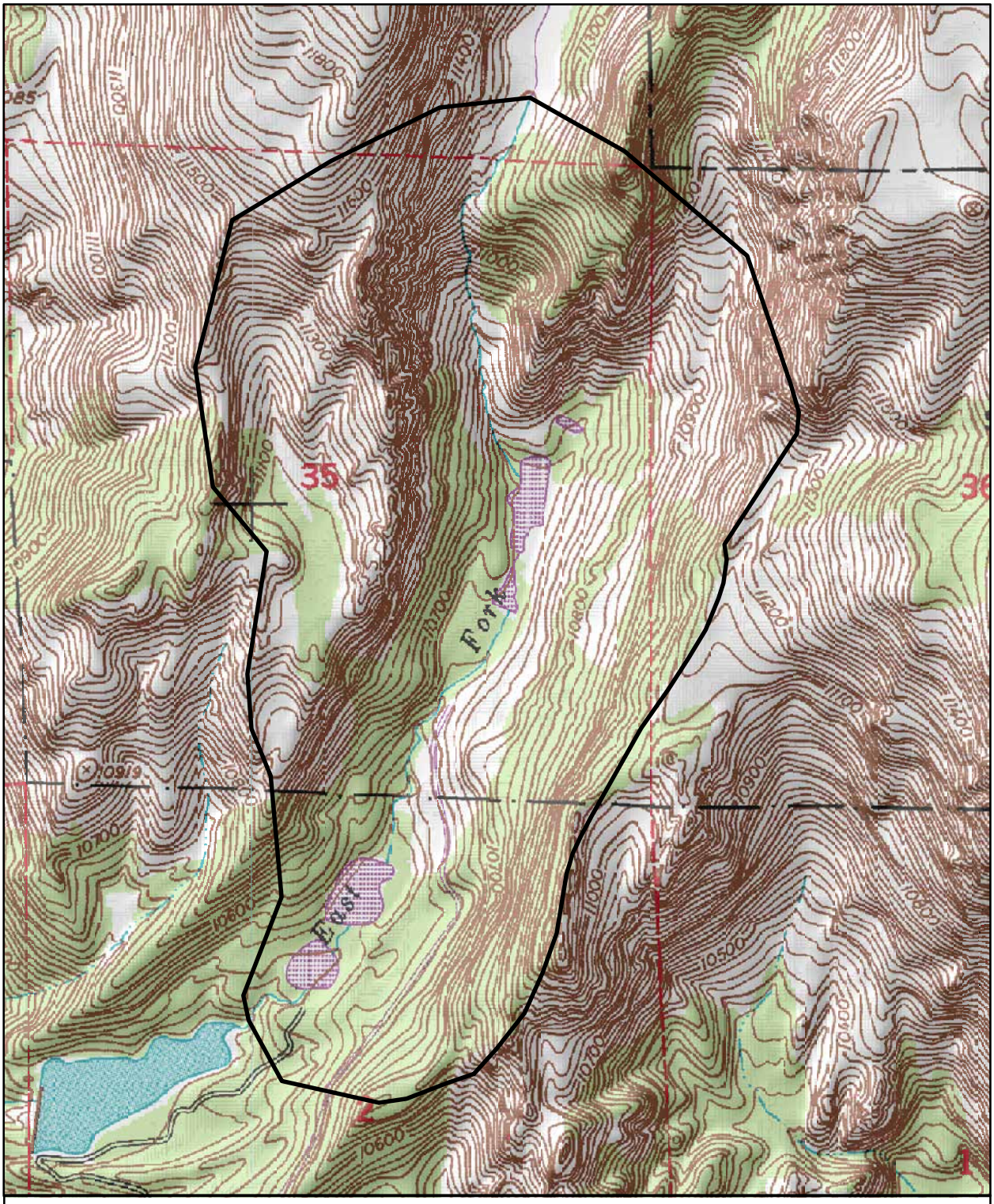
Version Author: Shaw, A.E.

Version Date: 12/17/2010



Map 34. East Fork of West Beaver Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

Halfway Picnic Ground

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 199 acres (81 ha) **Elevation:** 9,400 - 10,400 ft. (2,865 - 3,170 m)

General Description: This site lies on the north slope of Pikes Peak between 9,400 and 10,400 feet. Lodgepole pine (*Pinus contorta*) forests dominate the hillsides. The understory is very sparse with gravel and a dense layer of litter. The west-facing slopes are more moist and support strawberry and moss in the understory. The drainages are filled with aspen. Halfway Picnic Ground is directly adjacent to the site, along with the Pikes Peak Highway.

Biodiversity Significance Rank Comments (B4): This site includes a fair (C-ranked) occurrence of a globally vulnerable (G3/S3) plant, reflected moonwort (*Botrychium echo*), a poor occurrence of a state rare (G4/S2) plant, western moonwort (*Botrychium herperium*), and a historical occurrence of a globally vulnerable (G3/S2) plant, pale moonwort (*Botrychium pallidum*).

Natural Heritage element occurrences at the Halfway Picnic Ground PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Botrychium echo	reflected moonwort	G3	S3				C	1998-07-07
Vascular Plants	Botrychium pallidum	pale moonwort	G3	S2				H	1989-06-23
Vascular Plants	Botrychium hesperium	western moonwort	G4	S2				D	1998-07-07

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to protect the occurrences from direct impacts, and to provide the plants with suitable habitat where additional individuals can become established over time. Little is known about the habitat needs or biology of Botrychium species. Additional information may expand the boundary. The current boundary is considered the least amount of area needing some protection.

Protection Urgency Rank Comments (P4): Site is publically owned and managed by

Halfway Picnic Ground

Pike National Forest.

Management Urgency Rank Comments (M2): The plants are on a slope above a dry drainage just outside the picnic area, therefore, probably not in danger of expansion of the picnic area. The Pikes Peak Highway runs across the top of the drainage. Sediments are accumulating in the drainage and may degrade the site over time. Toadflax (*Linaria vulgaris*) is growing along the Pikes Peak Highway and should not be allowed to spread off the road. The Halfway Picnic Ground is heavily used. Management should include cooperation with the USFS to ensure appropriate long-term protection. Two of the four rare plant species are on the USFS sensitive species list. However, a specific protection plan has not been developed and the plants may be threatened by recreational uses.

Information Needs: In 1998, *Botrychium pallidum* was not found but *B. echo*, *B. lanceolatum* and *B. hesperium* were. This may not be the precise location Peter Root visited in 1983. This should be verified so the entire population may be defined.

References

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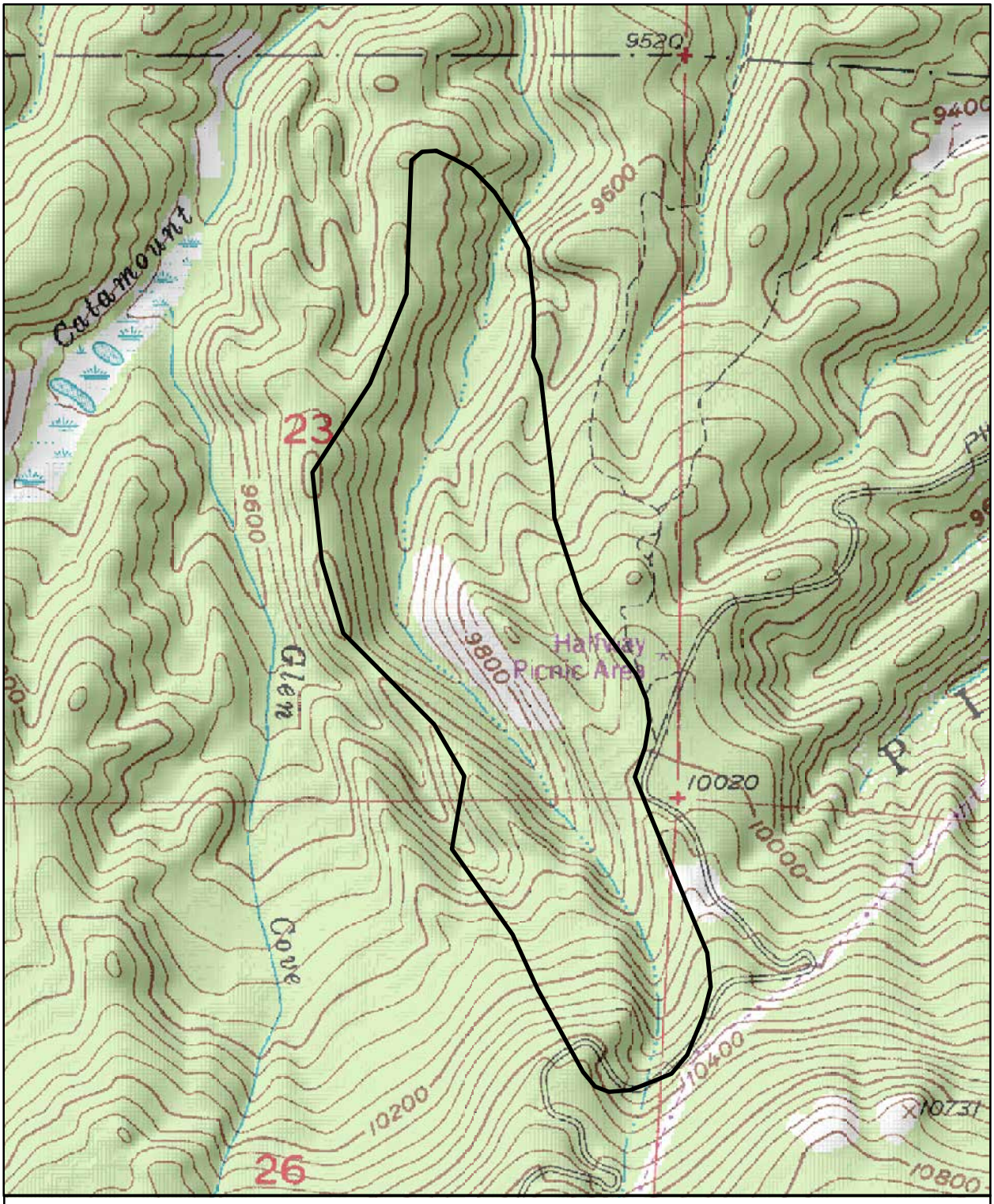
Version Author: Spackman, S.C.

Version Date: 04/28/1997



Colorado Natural Heritage Program
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80523-1474
http://www.cnhp.colostate.edu

Map Date: 03/08/2011

Miles
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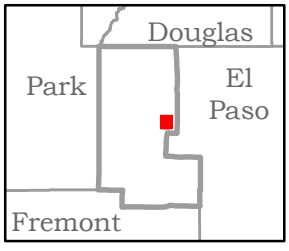
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 35. Halfway Picnic Ground Potential Conservation Area, B4: Moderate Biodiversity Significance

Horsethief Park

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Cripple Creek North, Pikes Peak

Size: 518 acres (210 ha) **Elevation:** 10,080 - 10,900 ft. (3,072 - 3,322 m)

General Description: The Horsethief Park site is located within a wide glaciated subalpine valley. Uplands are a mosaic of Engelmann spruce (*Picea engelmannii*) and quaking aspen (*Populus tremuloides*) in moist swales and limber pine (*Pinus flexilis*) on rocky ridgetops. The valley bottom, fed by Fourmile Creek, is characterized by a mosaic of willow carrs and mesic graminoid-dominated wetlands. A planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) fen occurs in the center of the site. This plant community exhibits abundant shrub recruitment, but some saplings have yellow leaves, indicating physiological stress or nutrient deficiency. The short shrub layer is composed of planeleaf willow with approximately 25% cover and shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) with less than 10% cover. Graminoid cover is 50%, dominated by water sedge (*Carex aquatilis*) with 40% cover. Other graminoids include silvery sedge (*Carex canescens*) and tufted hairgrass (*Deschampsia cespitosa*). Forb cover is 5%, including elephant head lousewort (*Pedicularis groenlandica*), queen's crown (*Rhodiola rhodantha*), felwort (*Swertia perennis*), and marsh marigold (*Caltha leptocephala*). The sapric peat soil is saturated by an unnamed snowmelt-fed stream of pH 6.3. There are active beaver dams on the stream above and below the fen. A narrow band of shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) / tufted hairgrass (*Deschampsia cespitosa*) shrubland occurs on the southeastern edge of the fen. Below the fen, a dense shortfruit willow (*Salix brachycarpa*) / water sedge willow carr lines the stream on mucky peat and gravel soils. The Pikes Peak granite cliffs on the eastern lobe of the site contain Bross gravelly sandy loam. Soils on the rest of the site are deep, poorly-drained Aquolls (USDA NRCS 2008). Upland habitat is a mosaic forests, grasslands and cliff habitat. Engelmann spruce (*Picea engelmannii*) forest characterizes hillslopes, quaking aspen (*Populus tremuloides*) occurs in moist slopes and gullies, limber pine (*Pinus flexilis*) typically occupies rocky ridgetops, open meadow grasslands occupy forest openings and include species such as Parry's oatgrass (*Danthonia parryi*), Arizona fescue (*Festuca arizonica*) and Thurber's fescue (*Festuca thurberi*) and rock outcrops are occupied by chasmophytes (plants that inhabit rock crevices) such as Front Range alum-root (*Heuchera hallii*). A Parry's oatgrass (*Danthonia parryi*) grassland occupies the toeslope between woodlands on the valley's east/southeast facing slope and riparian vegetation below. Parry's oatgrass is the dominant graminoid but Arizona fescue and other grasses are also common. Grassland soils have a deep organic layer

with 80% litter cover and 20% bare dirt. Although the site was likely impacted by historic grazing and mining, the area has mostly recovered as indicated by the species composition, habitat condition, and moderately thick litter layer. Geology is composed of Precambrian age, igneous granite of the Pikes Peak batholith of the 1,000 m.y. age group (Tweto 1979). Soils are aquolls that are well drained gravels derived from the extremely friable Pikes Peak granite. Local hydrology is driven by soil characteristics, precipitation and infiltration and modified by plant communities and animal activity, especially beaver.

Key Environmental Factors: Key factors that influence site biota include environmental processes, especially fire and grazing intensity (Rondeau 2001) and hydrological processes related to groundwater recharge and soil moisture. Fire has been suggested as a management tool in some cases where pine is encroaching into the grassland meadows. Parry's oatgrass (*D. parryi*) is considered to be very palatable to livestock, and overgrazing has been reported in some stands to reduce the abundance of Parry's oatgrass (*D. parryi*) (NatureServe 2010). According to Carsey et al. (2003), planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrublands occur on peat soils that are saturated throughout the growing season. The fen community has good viability as long as beaver (*Castor canadensis*) do not disrupt its ability to maintain intact, saturated peat soils.

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: The only current anthropogenic disturbances are a hiking trail that runs adjacent to the fen and an unauthorized campsite.

Biodiversity Significance Rank Comments (B4): The site is drawn for a fair (C-ranked) occurrence of the globally vulnerable (G3/S3) Parry's oatgrass (*Danthonia parryi*) herbaceous vegetation. The Parry's oatgrass herbaceous vegetation association has a limited distribution in the Rocky Mountains of Colorado and southern Wyoming. It is suspected that many stands have been altered or destroyed by improper livestock grazing. Many remaining stands are small and/or have been impacted by anthropogenic activities, and are degraded to some degree

(NatureServe 2010). There is also a good (B-ranked) occurrence of globally common (G5/S4) planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland and an extant occurrence of the state rare (G5/S3B) Grace's Warbler (*Dendroica graciae*). The site is significant hydrologically, as it supports a fen with groundwater supplementing surface water to maintain saturated soils year-round.

Natural Heritage element occurrences at the Horsethief Park PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Birds	Dendroica graciae	Grace's Warbler	G5	S3B				E	2010-07-06
Natural Communities	Danthonia parryi Herbaceous Vegetation	Montane Grasslands	G3	S3				C	2010-07-06
Natural Communities	Salix planifolia / Carex aquatilis Shrubland	Subalpine Riparian Willow Carr	G5	S4				B	2010-08-08

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to encompass the valley and adjacent side slopes that support the fen with surface water drainage and groundwater seepage.

Protection Urgency Rank Comments (P4): The site is within Pike National Forest except for a small inactive mining inholding. Lands are public parcels managed by the USFS for recreation. Habitat is recovering from historic grazing-induced vegetation changes but an altered fire regime may contribute to the loss of the grassland element due to encroachment of woodlands into grasslands. No private lands were visited at this site.

Management Urgency Rank Comments (M3): Ungrazed or lightly grazed stands of the Parry's oatgrass (*Danthonia parryi*) element association are characterized by dense cover of Parry's oatgrass (*D. parryi*) whereas more grazing tolerant native grasses such as mountain muhly (*Muhlenbergia montana*) may be more abundant on drier sites or those impacted by livestock grazing (NatureServe 2010). Although this site is characterized by a moderately dense cover of native grasses dominated by Parry's oatgrass, woodlands are encroaching into grassland habitat. Potential for long-term viability of the grassland element may be enhanced by restoration of a natural fire regime. The site would benefit from monitoring to detect additional butter-and-eggs (*Linaria vulgaris*) plants and unauthorized campsites. Monitoring of foot trail is advised to prevent soil erosion and disruption of wildlife.

Exotic Species Comments: Only one plant of butter-and-eggs (*Linaria vulgaris*) was encountered.

Horsethief Park

References

Carsey, K., G. Kittel, K. Decker, D. Cooper, and D. Culver. 2003. Field guide to the wetland and riparian plant associations of Colorado. Prepared for the Colorado Department of Natural Resources, Denver, CO by the Colorado Natural Heritage Program, Fort Collins, CO.

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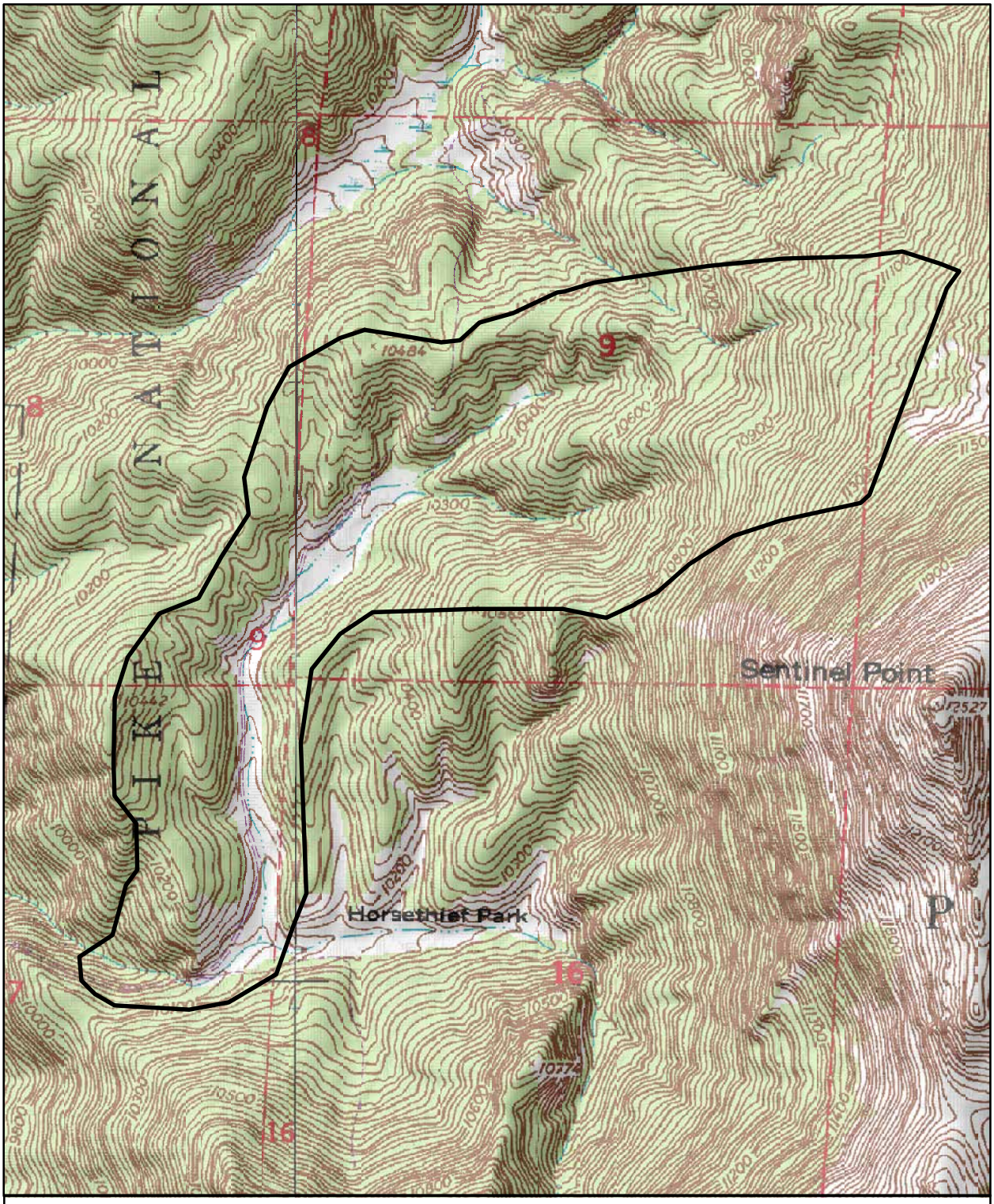
Version Author: Shaw, A.E. and D.G. Malone

Version Date: 12/17/2010



Map 36. Horsethief Park Potential Conservation Area, B4: Moderate Biodiversity Significance

Hungry Gulch

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M1: Essential within 1 Year to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Cripple Creek South

Size: 3,889 acres (1,574 ha) **Elevation:** 7,800 - 9,600 ft. (2,377 - 2,926 m)

General Description: The Hungry Gulch site is located in the montane zone foothills on the west slope of the Front Range and south of the City of Cripple Creek. Topography is characterized by rolling hills topped by rocky ridges and cut by steep, narrow, and deep, south-trending canyons. Streams draining these canyons begin in the upper canyon reaches as shallow groundwater discharge that coalesces into low gradient Rosgen type C streams and, as the canyons deepen in lower reaches, transition to type B streams with the channel characterized by large boulders, plunge pools and waterfalls. Surrounding upland habitat is a mosaic of communities that vary with aspect and soil conditions. Ponderosa pine / Arizona fescue (*Pinus ponderosa / Festuca arizonica*) woodlands and savannas dominate mesas, hilltops and slopes in a complex mosaic with shrublands, dry grasslands and moist forests. Rocky ridges are dominated by limber pine (*Pinus flexilis*) while northwest-facing slopes and canyon walls, where soil moisture is higher, are dominated by mixed Douglas-fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*) forests and drier, south-facing canyon walls are characterized by shrubland communities with species such as Gambel oak (*Quercus gambelii*) and mountain mahogany (*Cercocarpus montanus*). These remote, deep, steep-walled canyons provide protected habitat for Peregrine Falcons (*Falco peregrinus*) as well as American black bears (*Ursus americanus*) and mountain lions (*Felis concolor*). Quaking aspen (*Populus tremuloides*) woodlands occupy moist gullies Riparian habitat is characterized by willow (*Salix* spp.) shrublands and mesic herbaceous meadows. Bedrock geology is comprised of igneous granitic rocks of 1,700 to 1,400 m.y. and includes Cripple Creek granite (Tweto 1979). Soils are typically moist with a thick litter and duff layer. A variety of soil types occur in this site including Rogert-Rock outcrop complex and very sandy loam, Cathedral-Rock outcrop complex, warm, Cathedral very gravelly sandy loam, warm, and Ivywild-Catamount complex (USDA NRCS 2010).

Key Environmental Factors: Key ecological processes that impact site biota include, fire, hydrology and grazing and logging. The fire regime at this site fire has been altered. Grazing is ubiquitous throughout the site and variously impacts vegetation composition and structure as well as local hydrology. Historic logging has altered forest age class distribution, species composition and system hydrology.

Hungry Gulch

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on in the montane zone site at an average elevation of 8,700 feet, from 1971 through 2000, coldest temperatures occurred in January with an average maximum of 34.50 °F and a minimum of 11.41 °F. Warmest temperatures occurred in July with an average maximum of 72.72 °F and an average minimum of 46.71 °F. Annual average maximum precipitation was 17.67 inches. July and August were the wettest months of the year with 3.59 and 3.56 inches of precipitation respectively. Driest months are December, January and February with 0.41, 0.38 and 0.36 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Land Use History: The City of Cripple Creek, which is located north of Hungry Gulch site, was a gold mining camp and the site of the last great Colorado gold rush which occurred in 1894. Prior to the gold rush the area was ranching country with fewer than 500 residents. By 1900, with the discovery of gold, the population in and around Cripple Creek had increased to over 55,000 people. Gold mining declined after 1900 and so did the population (Cripple Creek History 2010). Recently, although underground mines were exhausted, open pit mining began in 1994. This open pit operation, which is the largest gold mining site in the United States (Cripple Creek and Victor Gold Mining Company 2010), has dramatically altered the landscape. Historically, surrounding habitats were ranched and logged. Market hunting was also common throughout the region and was a key cause of the extirpation of many native wildlife species (Fitzgerald et al. 1994).

Biodiversity Significance Rank Comments (B4): The Hungry Gulch site was drawn for a good (B-ranked) occurrence of a globally apparently secure (G4/S4) ponderosa pine / Arizona fescue (*Pinus ponderosa / Festuca arizonica*) woodland. A century of anthropogenic changes have altered the density and distribution of ponderosa pines (Rondeau 2001). Heavy grass cover in ponderosa pine / Arizona fescue grasslands favors surface fires which tend to reduce canopy cover. The absence of fire could result in denser tree canopy cover and subsequently reduced grass cover. High intensity grazing has been widespread and has reduced, and in many cases even eliminated, Arizona fescue (*F. arizonica)* from stands in western United States (NatureServe 2010).

Hungry Gulch

Natural Heritage element occurrences at the Hungry Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Pinus ponderosa / Festuca arizonica Woodland	Lower Montane Forests	G4	S4				B	2010-08-16

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was delineated to encompass the known element occurrences and their potential extent as well as the ecological processes essential to their long-term persistence. Especially essential to this ecosystem is the inclusion of a natural fire regime to shaping sustainable ponderosa pine woodlands (Rondeau 2001). Additional area was included to provide appropriate and sufficient habitat for native wildlife, particularly Peregrine Falcon (*Falco peregrinus*) which was observed at this site. Only those sites with written permission from the landowner were surveyed. In Colorado, Peregrine Falcons breed on cliffs and rock outcrops from 1,370 m to more than 2,740 m (4,500-9,000 ft) in elevation. They most commonly choose cliffs that lie within pinon - juniper and ponderosa pine zones and hunt in adjacent open meadows, forested tree top areas, around lakes and rivers, and shrubsteppe (Partners in Flight 2010). It is important to protect not only nesting habitat, but also foraging habitat and a prey base.

Protection Urgency Rank Comments (P3): Site is a patchwork of private and public land. Public lands are managed by the BLM. Management includes grazing but apparently does not include fire. A more conservative management designation may enable a more sustainable management scenario.

Management Urgency Rank Comments (M1): Domestic livestock grazing intensity is excessive in riparian habitats and in some upland sites. Additionally, the natural fire regime has been altered. Long-term sustainability potential of both upland and riparian habitat would be improved by: reducing grazing intensity and fencing cattle out of stream and riparian habitat; and by restoring a natural fire regime by utilizing prescriptive burns as a habitat enhancement/management tool.

Exotic Species Comments: Alien plant species cover total 5% including smooth brome (*Bromus inermis),* cheatgrass (*Bromus tectorum*), common timothy *(Phleum pratense),* Canada thistle (*Cirsium arvense),* yellow sweetclover (*Melilotus officinalis),* white clover (*Trifolium repens)* and redtop (*Agrostis gigantea).*

Hungry Gulch
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Version Author: Malone, D.G.

Version Date: 12/28/2010

Map 37. Hungry Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

John's Gulch

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M4: Not Needed Now; No Current Threats; May Need in Future

U.S.G.S. 7.5-minute quadrangles: Mount Deception

Size: 1,614 acres (653 ha) **Elevation:** 8,600 - 9,300 ft. (2,621 - 2,835 m)

General Description: The John's Gulch site is located in steep foothills on the western slope of the Rampart Range that form the eastern wall of the Trout Creek valley. Several first order streams flow east, out of these foothills to their confluence with Trout Creek which flows to the north. Upland habitat is characterized by a mosaic of dry montane foothill woodlands, shrublands and grasslands. The community mosaic includes ponderosa pine (*Pinus ponderosa*) woodlands, Douglas-fir (*Pseudotsuga menziesii*) forest, mountain mahogany (*Cercocarpus montanus*) shrublands, and graminoid meadows. Streamside riparian habitat is characterized by narrow, bands of tree-dominated riparian communities in a linear mosaic that includes associations of quaking aspen (*Populus tremuloides*) and Douglas-fir with a rich understory of shrubs, forbs and graminoids. Geology is primarily composed of Precambrian age igneous granitic rocks of the Pikes Peak batholith of the 1,000 m.y. age group. Low slopes on the east side of the site are carbonate-dominated sedimentary rocks of Pre-Pennsylvanian Paleozoic age (Tweto 1979). A diversity of foraging and nesting resources and protective cover provides important bird habitat at this site. Observed birds included Sharp-shinned Hawk (*Accipiter striatus*), Red-tailed Hawk (*Buteo jamaicensis*), Dusky Grouse (*Dendragapus obscurus*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Downy Woodpecker (*Picoides pubescens*), Northern Flicker (*Colaptes auratus*), Olive-sided Flycatcher (*Contopus cooperi*), Western Wood-peewee (*Contopus sordidulus*), Steller's Jay (*Cyanocitta stelleri*), Clark's Nutcracker (*Nucifraga columbiana*), Mountain Chickadee (*Poecile gambeli*), Black-capped Chickadee (*Poecile atricapilla*), Pygmy Nuthatch (*Sitta pygmaea*), Red-breasted Nuthatch (*Sitta canadensis*), White-breasted Nuthatch (*Sitta carolinensis*), Townsend's Solitaire (*Myadestes townsendi*),Yellow-rumped Warbler (*Dendroica coronata*), Western Tanager (*Piranga ludoviciana*), Green-tailed Towhee (*Pipilo chlorurus*), Dark-eyed Junco (*Junco hyemalis*) Chipping Sparrow (*Spizella passerina*), Vesper's Sparrow (*Pooecetes gramineus*), and House Wren (*Carpodacus mexicanus*). Several of these species are vulnerable to climate-change induced population declines. Of the species observed at this site these include, Broad-tailed Hummingbird, Olive-sided Flycatcher Western Wood-Pewee, and Western Tanager (NABCI 2010).

Key Environmental Factors: Key environmental factors determining site biota

include fire and hydrology. Fire plays an important role in the mountain mahogany/Muhlenbergia montana shrublands; fire suppression allows an invasion of trees into shrublands and shrubs in to grasslands (Rondeau 2001). The primary ecological process necessary to maintain quaking aspen/river birch woodlands is hydrology and specifically surface and groundwater flow (Rondeau 2001).

Climate Description: Broad elevational changes and complex topography in the Front Range results in broad variability in the local climate. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. At this west-facing site at an elevation of 8,600 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 35.65 ° F and a minimum of 11.12 °F. Warmest temperatures occurred in July with an average maximum of 73.18 °F and an average minimum of 46.36 °F. Annual average maximum precipitation was 27.20 inches. April through August were the wettest months of the year with an average of 3.35 inches of precipitation per month. Driest months are December and January with 0.96, and 0.82 inches of precipitation respectively. Remaining months have intermediate amounts of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B4): The site is drawn for a good (B-ranked) occurrence of the state rare (GU/S2) mountain mahogany / mountain muhly (*Cercocarpus montanus / Muhlenbergia montana*) shrubland and a good to fair (BC-ranked) occurrence of the globally vulnerable (G3/S2) quaking aspen / river birch (*Populus tremuloides / Betula occidentalis*) riparian woodland. The mountain mahogany / mountain muhly shrubland association is currently known to occur only on the east slope of the southern Rocky Mountains in Colorado. The quaking aspen / river birch association is known to occur in eastern Nevada and middle-elevation canyons throughout Colorado and may also occur in southeastern Utah in sheltered canyons with perennial water.

Natural Heritage element occurrences at the John's Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Populus tremuloides / Betula occidentalis Forest		G3	S2				BC	2010-09-03
Natural Communities	Cercocarpus montanus / Muhlenbergia montana Shrubland	Mixed Mountain Shrublands	GU	S2				BC	2010-07-03

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

John's Gulch

Boundary Justification: The boundary encompasses the elements, potential habitat and the watershed boundary to the north, south and east, for immediate watershed protection. Mountain mahogany typically occupies south-facing slopes and, in Colorado, quaking aspen / river birch woodlands occur on seasonally flooded bottoms, terraces and benches of narrow, sheltered canyons. The Colorado stand of aspen / river birch is likely an isolated relict of cooler, wetter climates of the early Holocene. If the groundwater that sustains the Colorado stand is eliminated, the stand would likely be converted to a mesic shrub community (NatureServe 2010). Only those sites with written landowner permission were surveyed.

Protection Urgency Rank Comments (P4): Private landowners are conservation minded. Public lands are managed for recreation and as an experimental forest.

Management Urgency Rank Comments (M4): Alien plant species are poised to invade the element occurrences. Weed control and eradication would greatly benefit the shrubland and animals that rely on these shrublands. Roads fragment the habitat which enable alien plant invasions, alter site hydrology and contribute to the deterioration of stream and riparian habitat. Road closures, where possible, would increase the potential for long-term viability of the occurrence.

Exotic Species Comments: Weeds include yellow toadflax *(Linaria vulgaris),* western salsify (*Tragopogon pratensis),* and wooly mullein (*Verbascum thapsus).*

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Version Author: Malone, D.G.

Version Date: 12/28/2010

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0 0.2 0.4 Miles

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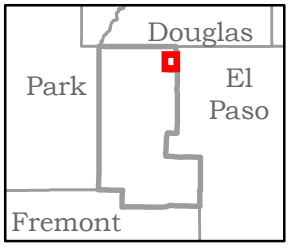
Legend

PCA Boundary

Bailey, 39105-A1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 38. John's Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

Manitou Forest

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P5: No Action to be Taken on this Site

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Mount Deception

Size: 283 acres (114 ha) **Elevation:** 7,680 - 7,880 ft. (2,341 - 2,402 m)

General Description: The Manitou Forest site is a valley site within the lower montane foothills zone in the northeast region of Teller County. The site encompasses montane grassland at lower elevation relative to the surrounding area and lies along the east bank of Trout Creek. Habitat of the site is characterized by large open areas of grasslands containing native bunchgrasses and dominated by Arizona fescue - mountain muhly (*Festuca arizonica - Muhlenbergia montana*). The narrow riparian area just outside the site along Trout Creek is dominated by willow shrubs and herbaceous vegetation. Uplands surrounding the site mainly include communities of ponderosa pine (*Pinus ponderosa*) woodland, but there are areas with sparse Douglas-fir (*Pseudotsuga menziesii*). The soils of the site along Trout Creek are deep, which is characteristic of the valley grasslands of the region. These deep valley soils provide perfect habitat for Gunnison's prairie dogs (*Cynomys gunnisoni*), three colonies of which inhabit the site. This complex of Gunnison's prairie dog occupies portions of the species range located in south-central Colorado and north-central New Mexico that the U. S. Fish and Wildlife Service designated as a candidate population for listing under the Endangered Species Act because threats within this part of the species range are significant and imminent (USFWS 2008). Local hydrology of the site is driven by soil characteristics, precipitation and infiltration. The natural hydrologic regime has been altered in the past by changes to vegetation and soil induced by grazing. Geology is dominated by sandstone formations of all ages (Tweto 1979).

Key Environmental Factors: The presence of Gunnison's prairie dogs at this site is attributable to the occurrence of unfragmented native montane grassland that has experienced only moderate disturbance. Ecological processes including climate, fire disturbance, and Gunnison's prairie dog (*Cynomys gunnisoni*) activity are key determinants of floristic characteristics of the site.

Climate Description: This site at an average elevation of approximately 7,780 feet experiences its coldest temperatures in January with an average maximum of 40.27 ° F and a minimum of 13.21 °F. Warmest temperatures occur in July with an average maximum of 81.09 °F and an average minimum of 50.07 °F. Annual average maximum precipitation is 21.2 inches. July and August are the wettest months of the year with 2.88 and 3.19 inches of precipitation respectively. The driest months are

December, January and February with 0.79, 0.56 and 0.74 inches of precipitation respectively. March through June and September through November have an intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B4): This site was drawn for an extant occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*). This occurrence is within the montane portion of the species population range, which occupies south-central Colorado and north-central New Mexico. The montane population of the Gunnison prairie dog is considered globally imperiled (G5T2) and is designated as a candidate population by the U. S. Fish and Wildlife Service under the Endangered Species Act.

Natural Heritage element occurrences at the Manitou Forest PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Mammals	Cynomys gunnisoni pop. 1	Gunnison's Prairie Dog - Montane Population	G5T2	S2	C		BLM/ USFS	E	2010-08-06

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary encompasses the entire extent of the prairie dog complex, surrounding montane grassland, and the (mostly) unoccupied space among these colonies. The site is bounded on all sides by land that is unsuitable for use by prairie dogs because it is much too hilly and wooded. The boundary also includes unoccupied habitat outside of the edge of the prairie dog complex and is intended to allow for suitable areas into which the population can expand.

Protection Urgency Rank Comments (P5): This site is within the Manitou Experimental Forest in the Pike National Forest and are sufficiently protected.

Management Urgency Rank Comments (M3): Sylvatic plague (*Yersinia pestis*) is the most serious management issue. Gunnison's prairie dog are highly susceptible to plague and dramatic declines in North Park, Colorado have been documented, where population occupancy fell from 915,000 acres in 1945 to 45 acres in 2002 due to reoccurring plague epizootics. The effects of plague are compounded by the small size and isolation of the montane populations of the prairie dog, making recolonization after plague epizootics difficult, and rebounding of the populations unlikely. The potential long-term viability of the grassland community at this site would be enhanced by restoring a natural fire regime, by eradicating alien plant species, and by promoting prairie dog colonization.

Exotic Species Comments: Portions of the montane grassland at this site include alien grasses including Kentucky bluegrass (*Poa pratensis),* smooth brome *(Bromus*

inermis), cheatgrass *(Bromus tectorum),* and common timothy *(Phleum pratense)*.

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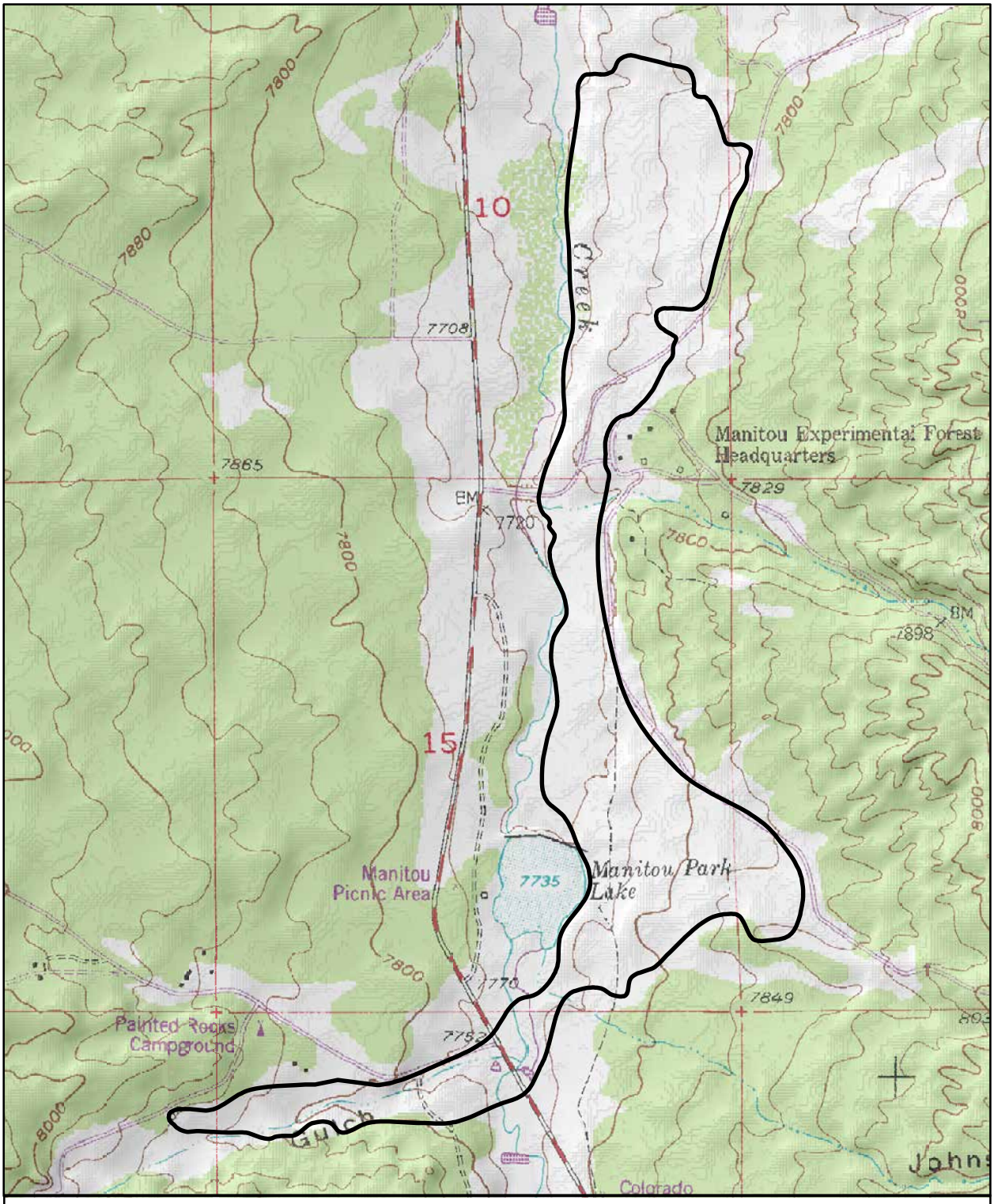
Version Author: Sovell, J.R.

Version Date: 01/04/2011



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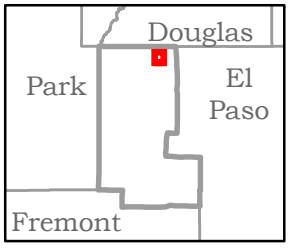
Legend

PCA Boundary

Mount Deception, 39105-A1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 39. Manitou Forest Potential Conservation Area, B4: Moderate Biodiversity Significance

Quinlan Gulch

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Mount Deception

Size: 241 acres (97 ha) **Elevation:** 7,760 - 8,200 ft. (2,365 - 2,499 m)

General Description: The site is located 0.8 miles from the southeastern edge of the 2002 Hayman burn. A U.S. Forest Service access road crosses the site as it heads southwest from Painted Rocks Campground. The north-facing slope adjacent to the wetland is a forest of Douglas-fir (*Pseudotsuga menziesii*), and the south-facing slope consists of relatively dense ponderosa pine (*Pinus ponderosa*) woodland with an intervening strip of fringed sage (*Artemisia frigida*), cheatgrass (*Bromus tectorum*), and smooth brome (*Bromus inermis*). The soil is Pendant extremely gravelly loam (USDA NRCS 2008). The geology is Arkosic sandstone from the Fountain formation (Tweto 1979), which is visible in several hoodoos. An intermittent stream enters the site from a sparsely-populated housing development that has several water detention ponds. It flows eastward through Douglas-fir forest, dropping steeply as it enters the site's gentle gradient. There is water year-round where a constructed spring in the center of the site empties into the stream. This has allowed the development of a wide water birch (*Betula occidentalis*) / mesic graminoids shrubland. The soil is moist in the southern half of the water birch (*Betula occidentalis*) / mesic graminoid shrubland, and it fades into a shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) / mountain rush (*Juncus arcticus* ssp. *littoralis*) shrubland near the forest margin. The soil is inundated in the northern half and grades into a tiny peatland. In the eastern end of the site where grazing occurs, the wetland narrows to a defined stream corridor dominated by Bebb's willow (*Salix bebbiana*).

Key Environmental Factors: The site's hydrology is altered but intact enough to maintain peat in a small area. The shrubland is probably not grazed much, because the dominant graminoids are sedges, indicating a high groundwater table, rather than introduced grasses (Carsey et al. 2003). The peat area and dense thicket of shrubs probably deter cattle from entering and degrading the wetland. Northern leopard frogs (*Rana pipiens*) live in wet meadows, ponds, and streams. They are preyed upon by fish and, at lower elevations, bullfrogs (*Rana catesbeiana*) (Hammerson 1999). The intermittent nature of the stream may protect the population from the fish of Manitou Park Lake downstream.

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual

precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): The site contains a fair viability (C-ranked) occurrence of a plant association, water birch (*Betula occidentalis*) / mesic graminoid shrubland, that is globally vulnerable (G3/S2). Two northern leopard frogs (*Rana pipiens*) were observed at the site, but no systematic animal survey was performed. Therefore it is ranked as an extant occurrence of a species that is globally demonstrably secure (G5) but vulnerable in Colorado (S3). This species spans the continental U.S. but is increasingly rare in Colorado. It has been impacted by bullfrog (*Rana catesbiana*) introduction, drought, water diversions, flood control structures, and/or fish stocking (Hammerson 1999). During the 2010 survey Veery (*Catharus fuscescens*), currently watchlisted by CNHP, was observed.

Natural Heritage element occurrences at the Quinlan Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Amphibians	Rana pipiens	Northern Leopard Frog	G5	S3		SC	BLM/ USFS	E	2010-07-22
Natural Communities	Betula occidentalis / Mesic Graminoids Shrubland	Lower Montane Riparian Shrublands	G3	S2				C	2010-08-25

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to incorporate the downstream section of Quinlan Gulch, separated from the inhabited upstream section by a steep drop-off. The upstream section is not included because it has been developed. The boundaries are drawn to the ridgeline on either side of Quinlan Gulch to protect the groundwater that maintains the water birch (*Betula occidentalis*) / mesic graminoid shrubland. The downstream boundary is a road that separates the site from a weedy willow carr adjacent to Teller County Road 67.

Protection Urgency Rank Comments (P3): The site is located on Pike National Forest. Current land management appears good, but if grazing intensity were to

increase, it could degrade the site.

Management Urgency Rank Comments (M3): Weed control would be beneficial on the margins of the wetland.

Exotic Species Comments: Many non-native plants occupy the drier edges of the wetland, including butter-and-eggs (*Linaria vulgaris*), common mullein (*Verbascum thapsus*), cheatgrass (*Bromus tectorum*), and Canada thistle (*Cirsium arvense*).

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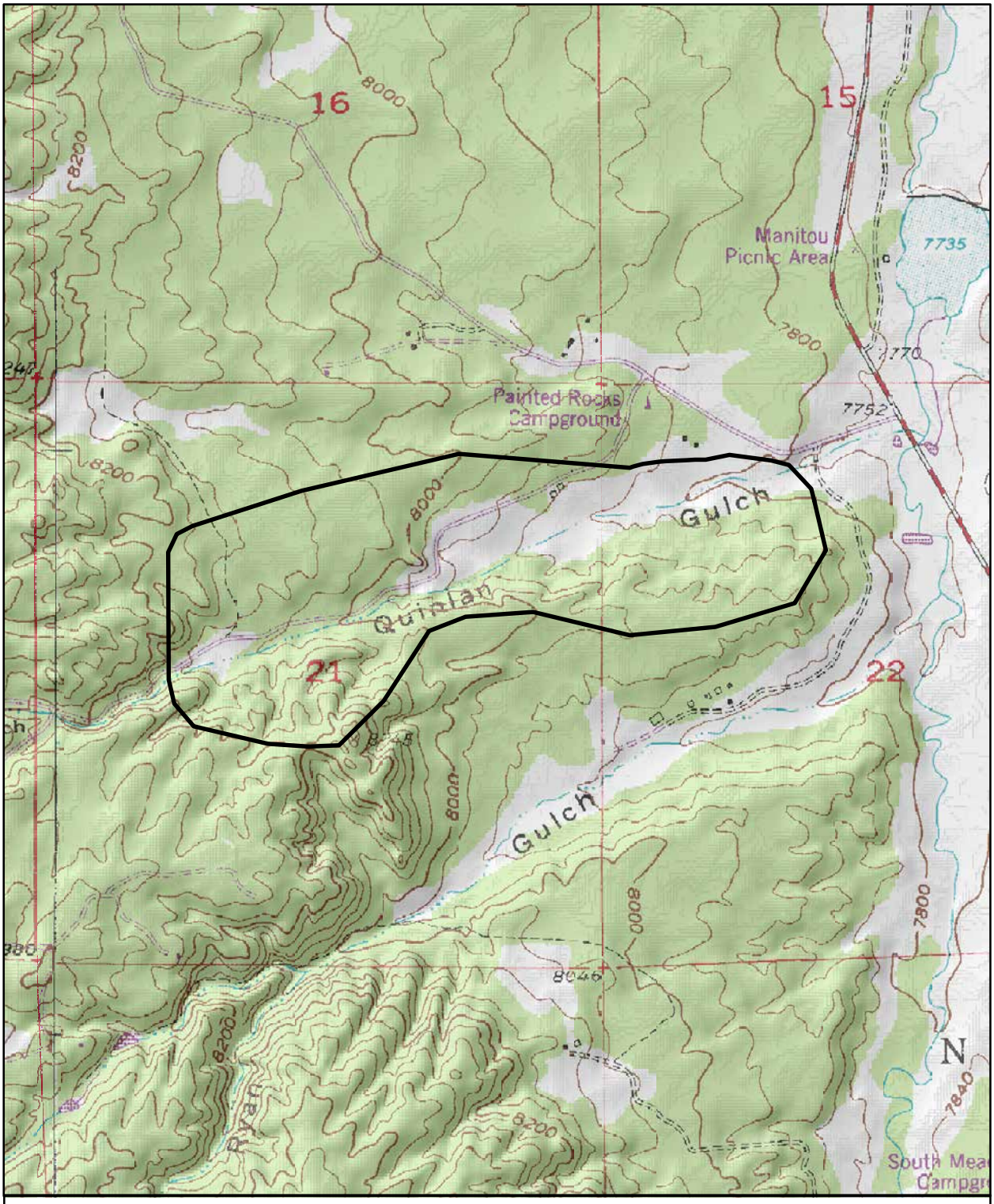
Version Author: Shaw, A.E. and D.R. Culver

Version Date: 12/03/2010



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Map Date: 03/08/2011

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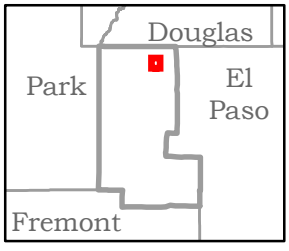
Legend

PCA Boundary

Mount Deception, 39105-A1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 40. Quinlan Gulch Potential Conservation Area, B4: Moderate Biodiversity Significance

South Catamount Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 658 acres (266 ha) **Elevation:** 9,360 - 10,080 ft. (2,853 - 3,072 m)

General Description: The site is located at the junction of South Catamount and Glen Cove creeks, and consists of braided channels and ponds resulting from past beaver activity. Water sedge (*Carex aquatilis*), beaked sedge (*C. utriculata*), and mixed shrubs have colonized the standing water. Hydrology is intact within the site and upstream, but South Catamount Reservoir has modified the natural hydrology 0.7 miles downstream from the site. Within the wetland, soil texture consists of mucky peat over gravelly sandy loam. Soils here in general consist of deep, poorly drained Aquolls (USDA NRCS 2008). Pikes Peak granite dominates the site's geology, but the southeastern corner contains glacial drift of the Pinedale and/or Bull Lake glaciations (Tweto 1979). There is a social trail that accesses the wetland from the reservoir. The Pikes Peak toll road passes 0.25 miles to the southeast.

Key Environmental Factors: Planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrublands occur in swales that are wet year-round (Carsey et al. 2003). Growth of planeleaf willow (*Salix planifolia*) may be stunted due to the water-logged soil.

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): The site is drawn for a good (B-ranked) occurrence of an apparently globally secure (G4/S4) plant association, planeleaf willow (*Salix planifolia*) / water sedge (*Carex aquatilis*) shrubland.

South Catamount Creek

Natural Heritage element occurrences at the South Catamount Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix planifolia / Carex aquatilis Shrubland	Subalpine Riparian Willow Carr	G5	S4				B	2010-09-15

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site incorporates the shrubland and a smaller wetland located 0.6 miles upstream. It travels the ridgelines surrounding South Catamount and Glen Cove creeks, which drain the area between The Crags and Devil's Playground and converge at the wetland. This boundary preserves South Catamount Creek and its watershed up to the point where it becomes intermittent.

Protection Urgency Rank Comments (P3): The majority of the site is within Pike National Forest. The northern tip of the site is owned by Colorado Springs Utilities.

Management Urgency Rank Comments (M3): Beaver (*Castor canadensis*) reintroduction would be beneficial, but could occur naturally from the population on North Catamount Creek. Control of butter-and-eggs (*Linaria vulgaris*) would also be beneficial.

References

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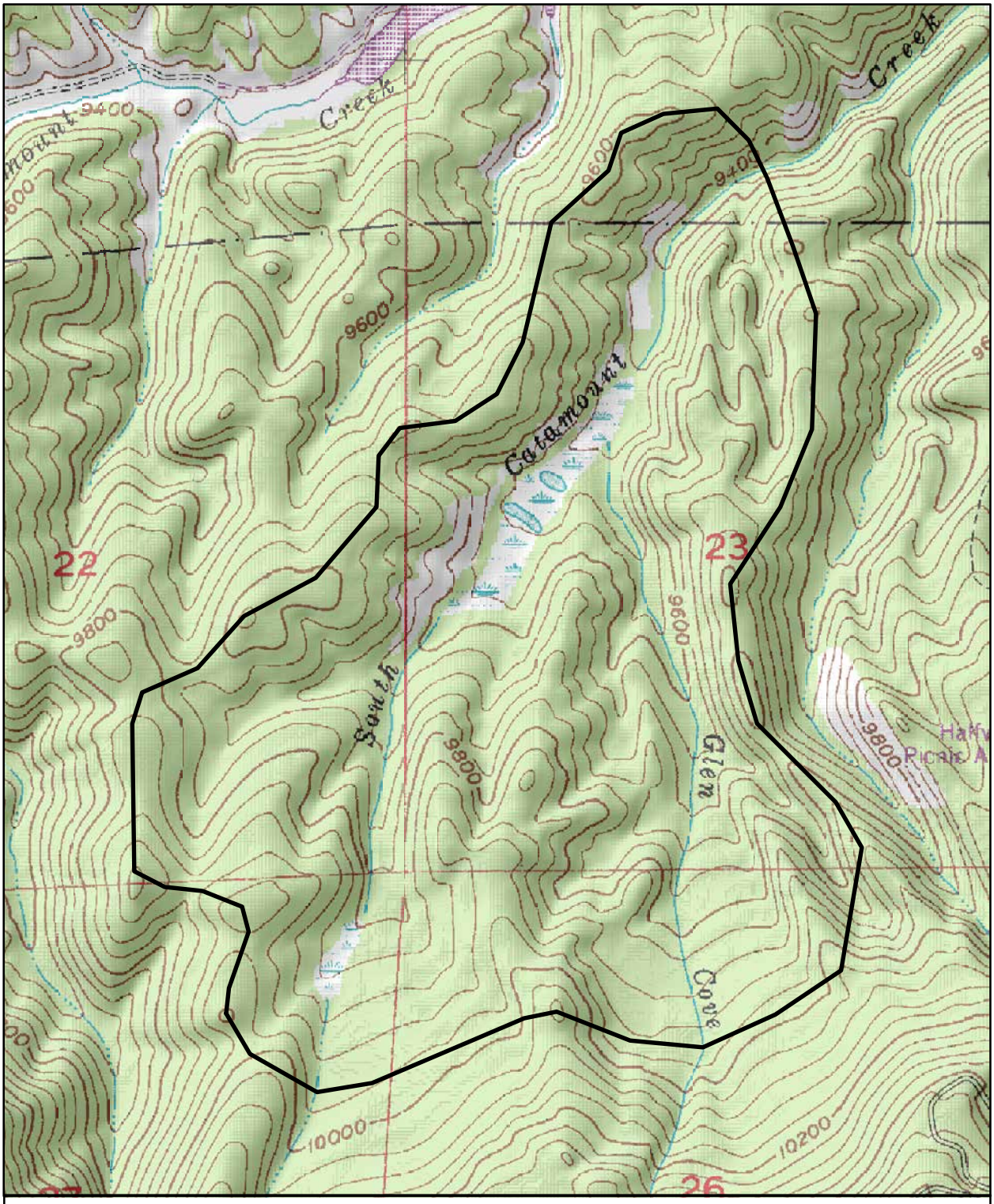
Version Author: Shaw, A.E.

Version Date: 12/17/2010



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http://www.cnhp.colostate.edu

Map Date: 03/08/2011

Miles
0 0.1 0.2

N

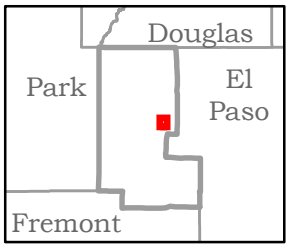
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 41. South Catamount Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

Straub Mountain

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Big Bull Mountain, Cripple Creek South

Size: 2,924 acres (1,183 ha) **Elevation:** 9,100 - 9,700 ft. (2,774 - 2,957 m)

General Description: The Straub Mountain site is located in the montane zone foothills on the west slope of the Front Range south of the City of Victor. Topography is characterized by expansive rolling hills and ridges interrupted by rock outcrops with steep canyons to the west. Uplands are drained by a small, south-trending, first order stream, Millsap Creek. The stream has its beginning as shallow groundwater discharge and is soon joined by several other 1st order streams, flowing to the south and having its confluence with the North Fork just below the County line. Stream riparian habitat is dominated by mesic graminoids and occasionally patches of willow (*Salix* spp.) Several stock ponds are located along the stream and in swales on ephemeral streams that are confluent with Millsap Creek. Northern leopard frogs (*Rana pipiens*) occur in a large stock pond on Millsap Creek and pale blue-eyed grass (*Sisyrinchium pallidum*) is occasionally found along the streambanks and on toeslopes above the stream. Upland habitat is mosaic of deciduous and coniferous woodlands and grasslands. Aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), and bristlecone pine (*Pinus aristata*) woodlands occupy a variety of sites depending on soil moisture and aspect. Open meadow grasslands are interspersed with forested site occupying ridgetops, toeslopes and benches. Rocky ridgetops are typically occupied by patches of limber pine (*Pinus flexilis*) and the, Front Range heuchera (*Heuchera hallii*) is also found in protected rocky sites. Domestic livestock grazing is ubiquitous throughout the site and has altered vegetation structure and composition and soil characteristics. Hydrology has been altered by dams and diversions and by grazing-induced impacts to soils and native vegetation. Geology is composed of granitic rocks of 1,700 m.y. age group (Tweto 1979). Soils are primarily Herbman gravelly sandy loam, 5 to 55 percent slopes, and Quander-Bushpark very gravelly loams, 5 to 40 percent slopes with small patches of Ivywild-Catamount complex, 30 to 70 percent slopes scattered throughout the site (USDA NRCS 2010).

Key Environmental Factors: Key ecological processes include fire, grazing intensity and hydrology (Rondeau 2001). Fire has been absent from this landscape that has evolved with low-intensity burns. Domestic livestock grazing intensity is excessive, particularly in riparian habitat, and has altered vegetation species' composition and structure and soil characteristics in both upland and riparian zones. Stream and

riparian hydrology is dependent on shallow groundwater discharge which has been impacted by grazing, diversions and small dams.

Climate Description: Wide climate variations occur within short distances due to dramatic topographic variation and elevational changes from the high peaks of the Front Range to the rolling foothills to the west. At this site on in the montane zone site at an average elevation of 9,400 feet, from 1971 through 2000, coldest temperatures occurred in January with an average maximum of 32.23 °F and a minimum of 9.32 °F. Warmest temperatures occurred in July with an average maximum of 70.77 °F and an average minimum of 44.02 °F. Annual average maximum precipitation was 18.46 inches. July and August were the wettest months of the year with 3.91 and 3.75 inches of precipitation respectively. Driest months are December, January and February with 0.44, 0.42 and 0.34 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Land Use History: The City of Victor, which is located to the north of the Straub Mountain site, was a gold mining camp and was known as the City of Gold because mining in the surrounding Cripple Creek area was the most productive gold mining district in the United States (City of Victor 2010). Gold mining declined after 1900 as the mines became worked out. In 1994 large-scale open pit mining began and the area is again producing gold (Cripple Creek and Victor Gold Mining Company 2010). However, open pit mining has dramatically altered the landscape and has eliminated large areas of habitat. Surrounding habitats were historically ranched and logged. Market hunting was also common throughout the region and was a key cause of the extirpation of many native wildlife species (Fitzgerald et al 1994).

Biodiversity Significance Rank Comments (B4): The site is drawn for a fair (C-ranked) occurrence of the globally vulnerable (G2G3/S2) pale blue-eyed grass (*Sisyrinchium pallidum*) and a fair (C-ranked) occurrence of the state rare (G4/S3) bristlecone pine / Arizona fescue (*Pinus aristata / Festuca arizonica*) woodland. Additionally, an extant occurrence of the state rare (G5/S3) northern leopard frog (*Rana pipiens*) is present. The northern leopard frog is also listed as sensitive by the Forest Service, Bureau of Land Management and the Colorado Division of Wildlife.

Straub Mountain

Natural Heritage element occurrences at the Straub Mountain PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Amphibians	Rana pipiens	Northern Leopard Frog	G5	S3		SC	BLM/ USFS	E	2010-06-17
Natural Communities	Pinus aristata / Festuca arizonica Woodland	Montane Woodlands	G4	S3				C	2010-09-16
Vascular Plants	Sisyrinchium pallidum	pale blue - eyed grass	G2G3	S2			BLM	C	2010-06-17

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary was delineated to encompass the known element occurrences and their potential extent as well as the ecological processes essential to their long-term persistence. Especially essential to upland ecosystems in this site is the inclusion of a natural fire regime to shaping sustainable bristlecone and ponderosa woodlands; ecological processes essential to maintaining sustainable riparian and stream habitat and dependent wildlife at this site are a natural hydrologic regime which here, is maintained by shallow groundwater discharge. Only private lands with written permission were accessed.

Protection Urgency Rank Comments (P3): The site is privately owned and managed for livestock production.

Management Urgency Rank Comments (M3): Domestic livestock grazing intensity is excessive in riparian habitats and also in some upland sites. In these grazed riparian areas alien plant species are common. Additionally, the natural fire regime has been altered. Reducing grazing intensity would improve the potential for long term viability of the site and help to restore natural hydrology of the watershed. Long-term potential for sustainability of both upland and riparian habitat would be improved by restoring a natural fire regime by utilizing prescriptive burns as a habitat enhancement/management tool. Additionally, eradication of alien plant species would enhance habitat productivity.

Exotic Species Comments: White clover (*Melilotus albus*), Kentucky bluegrass (*Poa pratensis*), and dandelion (*Taraxacum officinale*) were documented in the site.

Straub Mountain
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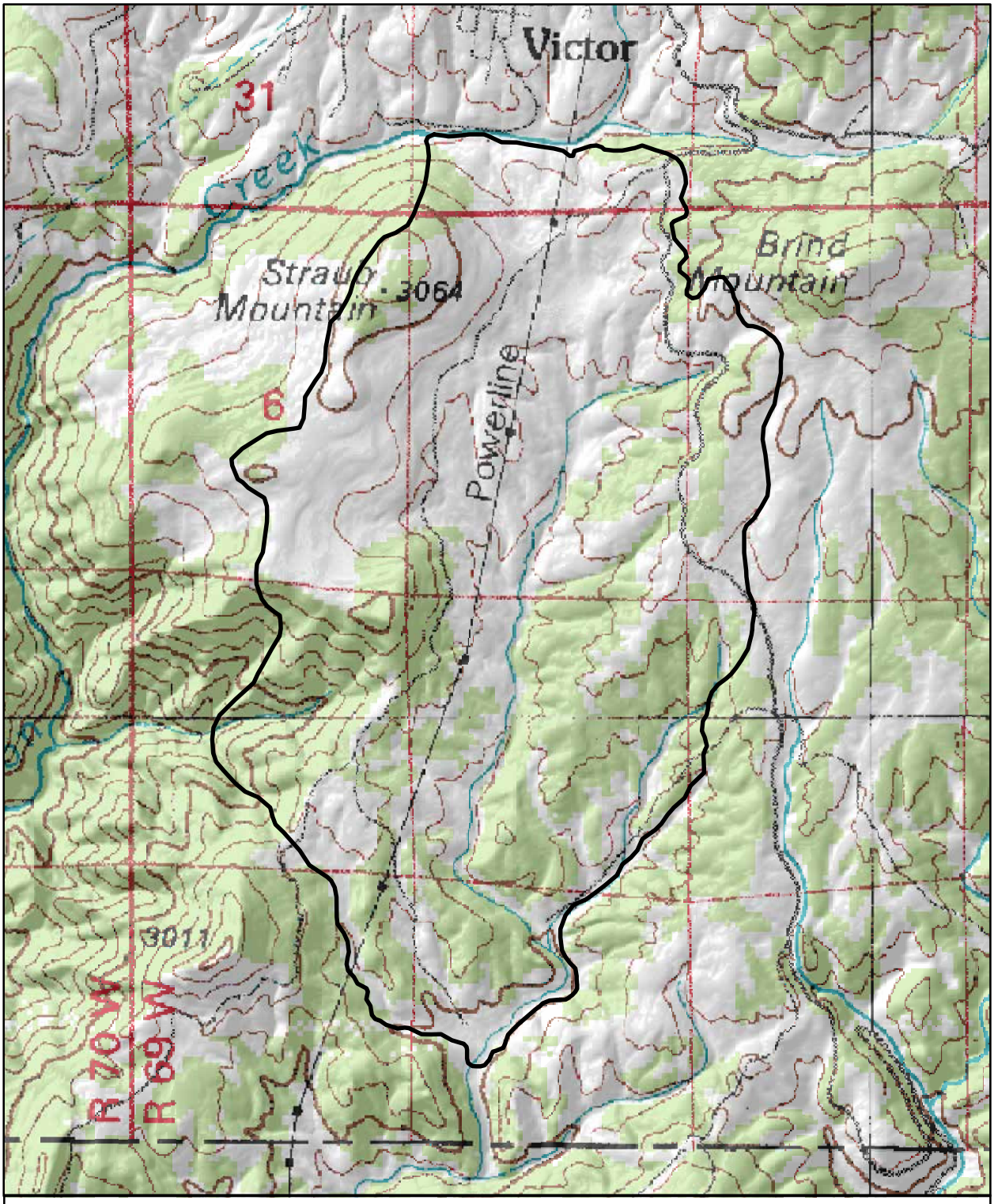
Version Author: Malone, D.G.

Version Date: 01/03/2011



Map 42. Straub Mountain Potential Conservation Area, B4: Moderate Biodiversity Significance

Trail Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Hackett Mountain, Signal Butte

Size: 3,227 acres (1,306 ha) **Elevation:** 8,480 - 9,510 ft. (2,585 - 2,899 m)

General Description: The site's underlying geology consists of Pikes Peak granite (Tweto 1979). Ponderosa pine *(Pinus ponderosa*) forest dominates the southeast to southwest-facing slopes. The Hayman Fire in 2002 destroyed portions of the forest. The northwest-facing slopes support mature Engelmann spruce (*Picea engelmannii*) forest, while the slopes affected by fire have been colonized by quaking aspen (*Populus tremuloides*). A narrow strip of blue spruce (*Picea pungens*) trees are found along the toeslope, but some have died from beaver-induced flooding. The lower-most pond on the west side of the road was installed by the landowner, but other ponds within the site are maintained by beaver (*Castor canadensis*). Planeleaf willow (*Salix planifolia*) / water sedge (*Carex utriculata*) shrubland surrounds the ponds. Elk (*Cervus canadensis*) browse is evident on willows (*Salix* spp.). Riparian soils consist of muck to mucky peat. Garber very gravelly coarse sandy loam dominates upland soils (USDA NRCS 2008). Trail Creek Road may introduce excessive sediment into the creek and limit lateral movement of Trail Creek. Within the site, the road serves as the southeastern boundary of the Hayman Fire. Erosion and weed infestations are severe downstream where both sides of Trail Creek Road burned.

Key Environmental Factors: Planeleaf willow (*Salix planifolia*) and water sedge (*Carex utriculata*) dominate saturated soils such as shallow pond margins (Carsey et al. 2003). Waterwort (*Elatine triandra*) also grows in shallow water (Weber and Wittmann 2001). Decker (2006) lists hydrological alteration allowing saturated peat soils (in this case mucky peat) to dry out and decompose as the primary threat to autumn willow (*Salix serissima*) in the southern Rocky Mountains.

Climate Description: Teller County is cool and relatively dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was

taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): The site supports a good (B-ranked) occurrence of planeleaf willow (*Salix planifolia*) / water sedge (*Carex utriculata*) shrubland, a plant association that has not yet been ranked globally (GNR) but is rare in Colorado (S2). There is also a fair (C-ranked) population of the state rare (G4/S1) autumn willow (*Salix serissima*) and a fair (C-ranked) population of the state rare (G5/S1) aquatic plant, longstem water-wort (*Elatine triandra*).

Natural Heritage element occurrences at the Trail Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix planifolia / Carex utriculata Shrubland	Diamondleaf Willow / Beaked Sedge	GNR	S2				B	2010-09-16
Vascular Plants	Salix serissima	autumn willow	G4	S1			USFS	C	2010-09-16
Vascular Plants	Elatine triandra	longstem water - wort	G5	S1				C	2010-09-16

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The downstream boundary is drawn to include a series of beaver ponds that could potentially serve as habitat for the two plants of biodiversity interest. The rest of the site boundary is drawn at the ridgelines that separate the drainage that feeds into these waterways from adjacent drainages. This boundary should protect the surface water flows that maintain the beaver ponds.

Protection Urgency Rank Comments (P3): The majority of the site is within Pike National Forest, but a significant portion is within unprotected private lands. Private land was only visited with written permission.

Management Urgency Rank Comments (M3): Current management, including continued weed control, promotes the persistence of the elements of biodiversity interest. Beaver (*Castor canadensis*) are required to maintain the ponds and saturated soil that support these elements.

Exotic Species Comments: Common mullein (*Verbascum thapsus*), Canada thistle (*Cirsium arvense*), and butter-and-eggs (*Linaria vulgaris*) occur in moist soil between the ponds and uplands.

Trail Creek
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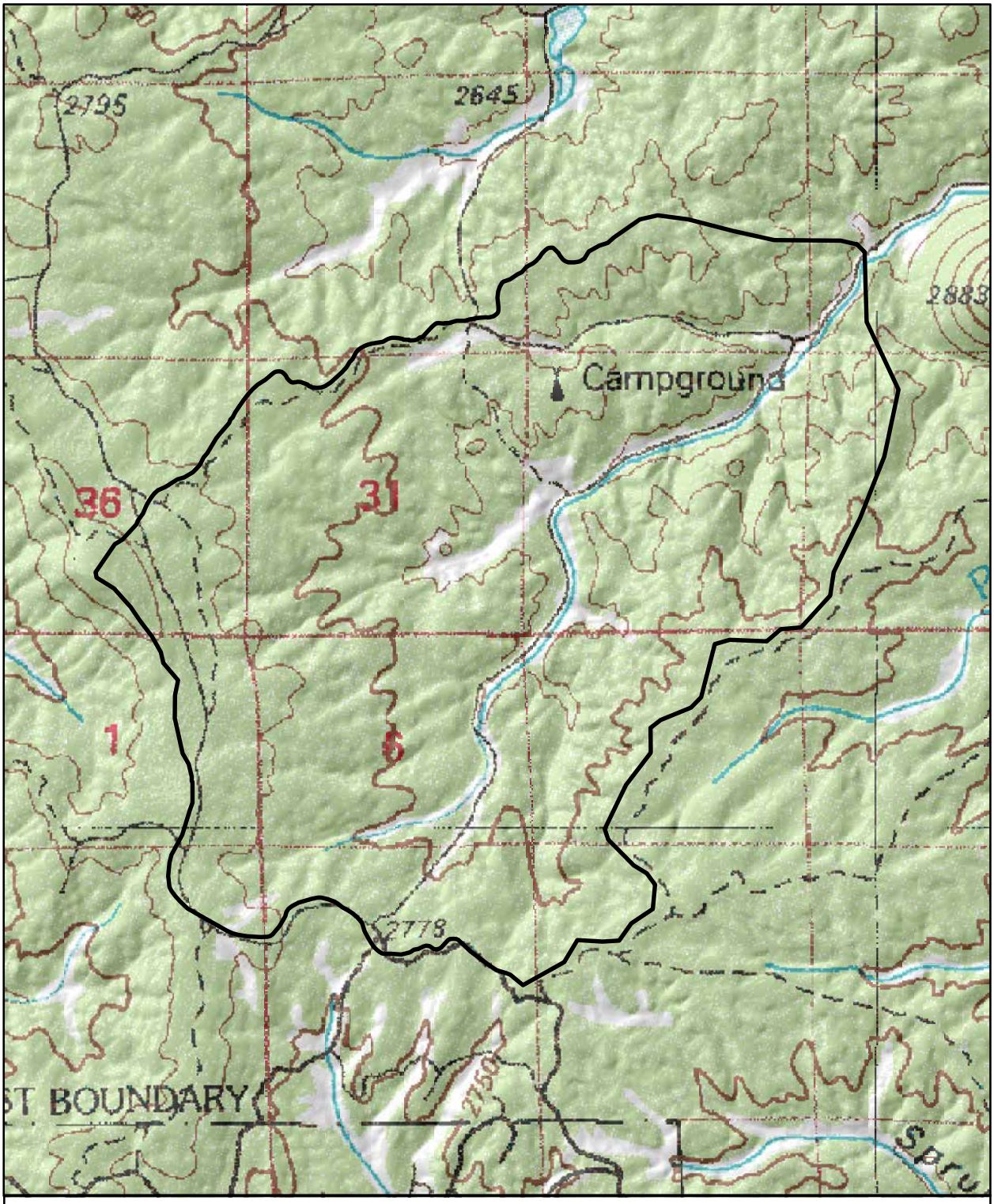
Version Author: Shaw, A.E. and D.R. Culver

Version Date: 12/17/2010



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Miles
0 0.2 0.4

N

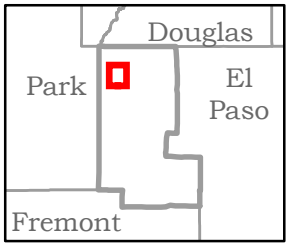
Legend

PCA Boundary

Bailey, 39105-A1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 43. Trail Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

Twin Rocks Road

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Divide

Size: 469 acres (190 ha) **Elevation:** 8,850 - 9,100 ft. (2,697 - 2,774 m)

General Description: Twin Rocks Road is a valley site within the lower montane foothills zone in the central region of Teller County. The site encompasses montane grassland at lower elevation relative to the surrounding area. Portions of the site lie along Twin Creek and two of the creeks unnamed tributaries. Habitat of the site is characterized by an intricate mosaic of large open areas of grasslands containing native bunchgrasses and dominated by Arizona fescue - mountain muhly (*Festuca arizonica - Muhlenbergia montana*) interlaced with narrow riparian areas dominated by herbaceous vegetation that occur along the watercourses. Uplands surrounding the site include communities of ponderosa pine (*Pinus ponderosa*) woodland. The soils of the site are deep, which is characteristic of the valley grasslands of the region. These deep valley soils provide perfect habitat for Gunnison prairie dogs (*Cynomys gunnisoni*), three colonies of which inhabit the site. This complex of Gunnison's prairie dog occupies portions of the species range located in south-central Colorado and north-central New Mexico that the U. S. Fish and Wildlife Service designated as a candidate population for listing under the Endangered Species Act because threats within this part of the species range are significant and imminent (USFWS 2008). Local hydrology is driven by soil characteristics, precipitation and infiltration. The natural hydrologic regime has been altered in the past by changes to vegetation and soil induced by grazing, which still occurs at the site. Geology is dominated by sandstone formations of multiple ages (Tweto 1979).

Key Environmental Factors: The presence of the Gunnison prairie dogs at this site is attributable to unfragmented native montane grassland that has experienced only moderate disturbance. Ecological processes including climate, fire disturbance, grazing intensity, and Gunnison prairie dog (*Cynomys gunnisoni*) activity are key determinants of floristic and site characteristics.

Climate Description: This site at an elevation of approximately 9,000 feet experiences its coldest temperatures in January with an average maximum of 36.5 °F and a minimum of 7.77 °F. Warmest temperatures occur in July with an average maximum of 73.81 °F and an average minimum of 44.26 °F. July and August were the wettest months of the year with 3.33 and 3.41 inches of precipitation

respectively. Driest months are December, January and February with 0.39, 0.41 and 0.43 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Western Regional Climate Center 2010).

Biodiversity Significance Rank Comments (B4): This site was drawn for an extant occurrence of the Gunnison's prairie dog (*Cynomys gunnisoni*). This occurrence is within the montane portion of the species population range, which occupies south-central Colorado and north-central New Mexico. The montane population of the Gunnison prairie dog is considered globally imperiled (G5T2) and is designated as a candidate population by the U. S. Fish and Wildlife Service under the Endangered Species Act.

Natural Heritage element occurrences at the Twin Rocks Road PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Mammals	Cynomys gunnisoni pop. 1	Gunnison's Prairie Dog - Montane Population	G5T2	S2	C		BLM/ USFS	E	2010-08-03

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary encompasses the entire extent of the prairie dog complex, surrounding montane grassland, and the (mostly) unoccupied space among these colonies. The site is bounded on all sides by land that is unsuitable for use by prairie dogs because it is much too hilly and wooded. The boundary also includes unoccupied habitat outside of the edge of the prairie dog complex and is intended to allow for suitable areas into which the population can expand.

Protection Urgency Rank Comments (P3): The land is in private ownership. Private lands in portions of this site will likely be developed in the near future which may impact the long-term viability of the occurrence.

Management Urgency Rank Comments (M3): Sylvatic plague (*Yersinia pestis*) is the most serious management issue. Gunnison's prairie dog are highly susceptible to plague and dramatic declines in North Park, Colorado have been documented, where declines in occupancy from 915,000 acres in 1945 to 45 acres in 2002 was attributable to plague. The effects of plague are compounded by the small size and isolation of the montane populations of the prairie dog, making recolonization after plague epizootics difficult, and rebounding of the populations unlikely. In some parts of this site, grazing intensity is incompatible with maintaining the health of the ecosystem and has resulted in floristic and soil alteration and degradation. Alien plant species are present in these areas and the potential long-term viability of the grassland community in this site would be enhanced by restoring a natural fire

regime, by reducing grazing intensity, by eradicating alien plant species, and by promoting prairie dog colonization.

Exotic Species Comments: Alien plant species are common in areas that have been over-grazed. Alien species include Kentucky bluegrass (*Poa pratensis),* smooth brome *(Bromus inermis),* cheatgrass *(Bromus tectorum),* common timothy *(Phleum pratense),* white clover *(Trifolium repens),* Canada thistle (*Cirsium arvense*).

Off-Site Considerations: There is some urban and exurban development within the surrounding landscape and depending upon the density of future developments this could be detrimental to the long term viability of the prairie dog population at this site.

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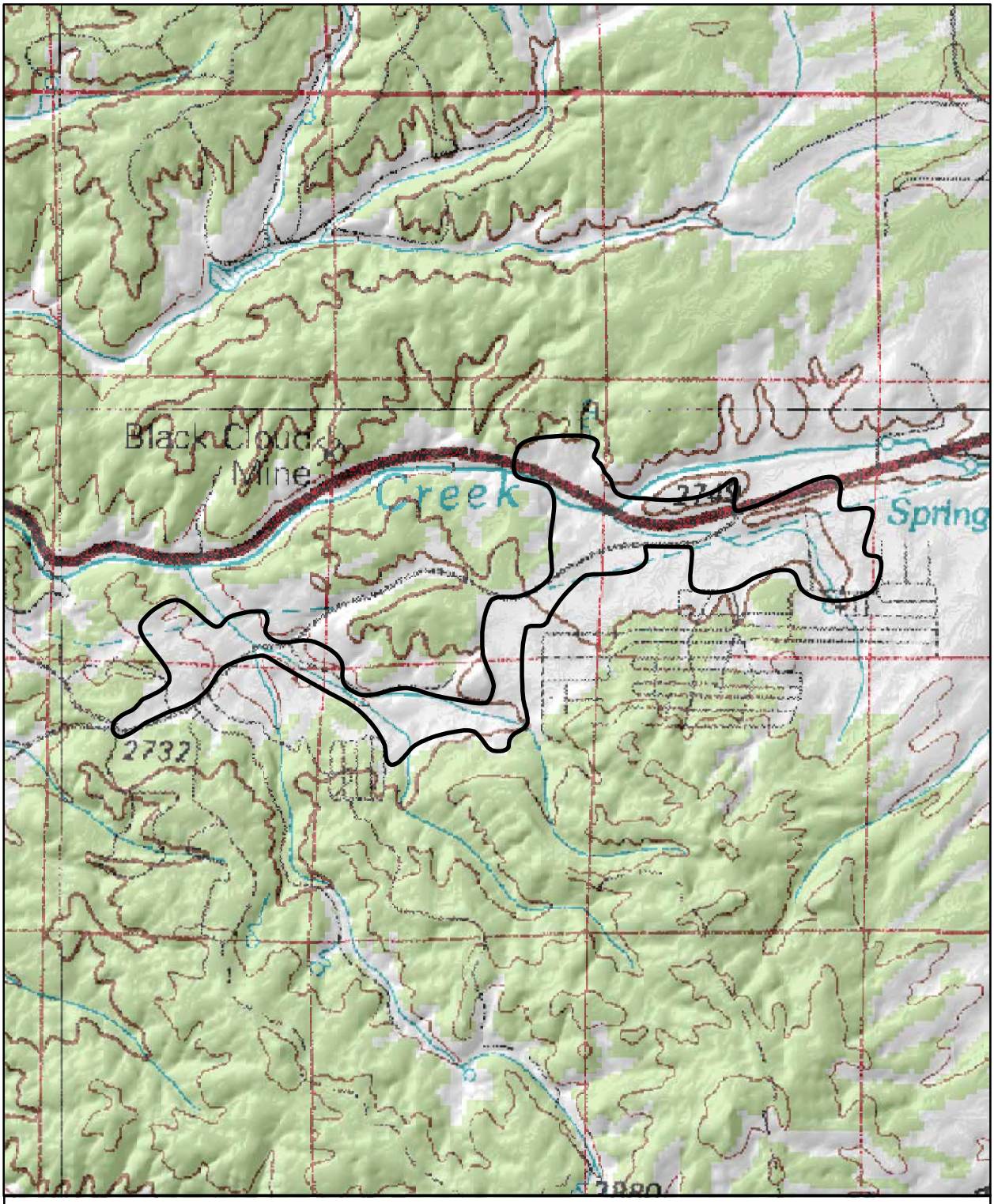

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Map Date: 03/08/2011

Miles
0 0.2 0.4

N

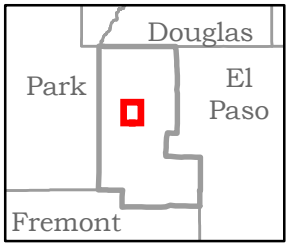
Legend

PCA Boundary

Pikes Peak, 38105-E1

30x60 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 44. Twin Rocks Road Potential Conservation Area, B4: Moderate Biodiversity Significance

Upper Crystola Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 640 acres (259 ha) **Elevation:** 9,160 - 9,800 ft. (2,792 - 2,987 m)

General Description: The headwaters of Crystola Creek drain Raspberry Mountain. Crystola Creek flows north/northeast through this high montane site before arcing to the southeast where it flows into Fountain Creek at the Town of Crystola. Unlike the adjacent North and South Catamount Creeks to the southeast, Crystola Creek does not have any major reservoirs affecting its hydrology. However, there are two stock ponds upstream of the shrubland. In 2010, there is little evidence of flooding, with no debris along stream banks nor redox soils. The ground surface also has high leaf litter cover indicating no flood scouring during the current growing season. Soils are deep poorly drained fine-textured aquolls (USDA NRCS 2008). Pikes Peak granite is the underlying geology (Tweto 1979). Grazing occurs throughout the occurrence. The uplands consist of coniferous forest fragmented by residential areas and agriculture. A Bebb's willow (*Salix bebbiana*) shrubland occurs in a narrow band along Crystola Creek.

Key Environmental Factors: Bebb's willow (*Salix bebbiana*) is palatable to cattle, so it is rare to find large occurrences of Bebb's willow shrubland (Carsey et al. 2003). This site supports horses, which may explain the persistence of this occurrence.

Climate Description: Teller County is relatively cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): The site is drawn for a fair viability (C-ranked) Bebb's willow (*Salix bebbiana*) shrubland, a plant association that is tentatively ranked as globally vulnerable (G3?/S2).

Upper Crystola Creek

Natural Heritage element occurrences at the Upper Crystola Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Salix bebbiana Shrubland	Montane Willow Carrs	G3?	S2				C	2010-07-09

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary upstream marks where the creek begins intermittently, while downstream marks the transition between the shrubland and the wet meadow. The other boundaries are adjacent ridgelines. This should protect surface water flows to try to restore the flooding missing from the shrubland.

Protection Urgency Rank Comments (P4): Much of the ridgeline is under conservation easement with Palmer Land Trust as part of Teller County's Catamount Open Space.

Management Urgency Rank Comments (M3): Weed management and removal of stock ponds could be beneficial.

Exotic Species Comments: Canada thistle (*Cirsium arvense*), butter-and-eggs (*Linaria vulgaris*), and various hay grass species were documented.

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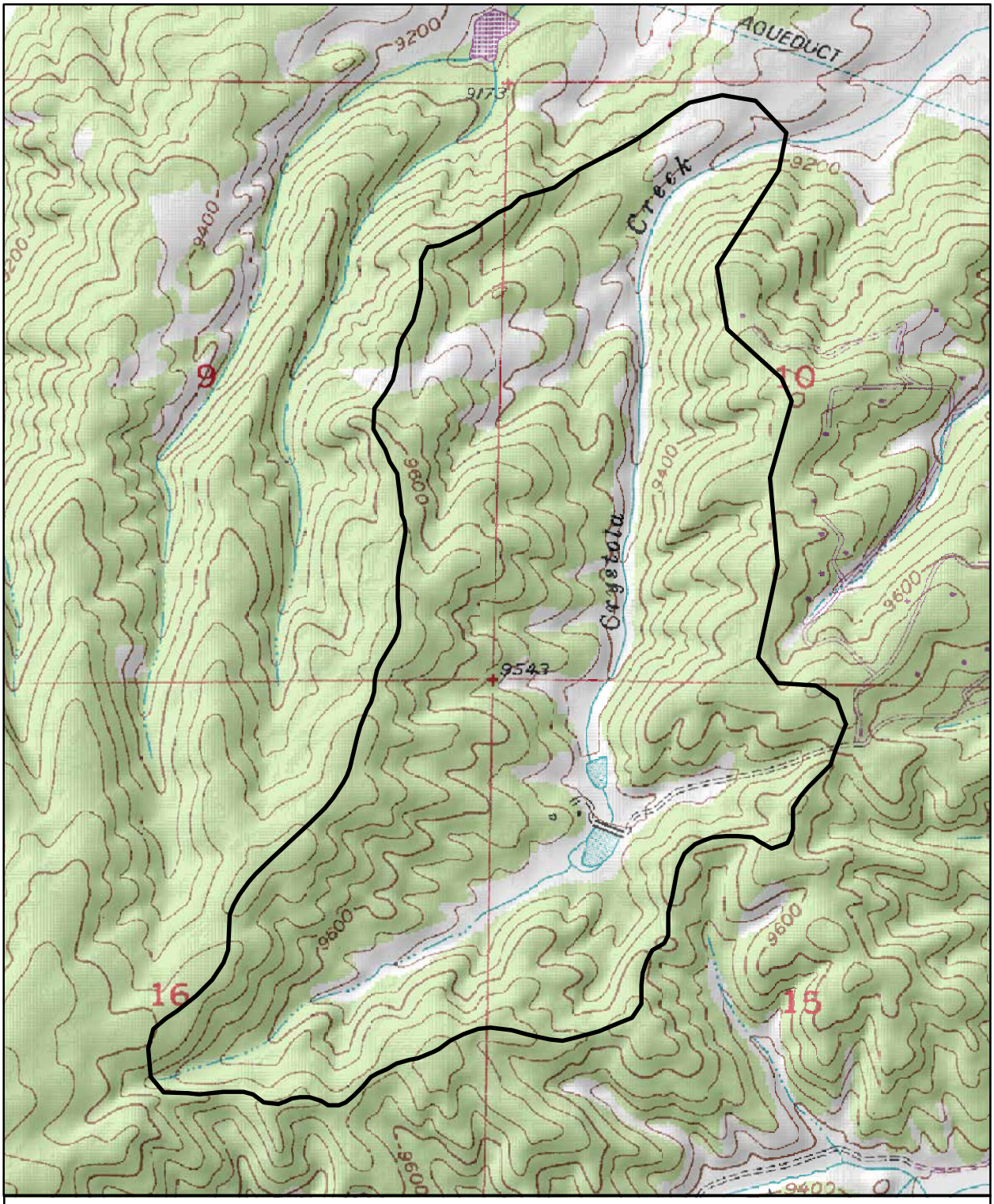
Version Author: Shaw, A.E. and D.R. Culver

Version Date: 12/13/2010



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Map Date: 03/08/2011

Miles
0 0.1 0.2

N

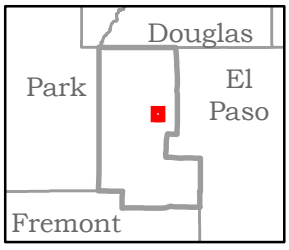
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 45. Upper Crystola Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

West Fourmile at Fourmile Creek

Biodiversity Rank - B4: Moderate Biodiversity Significance

Protection Urgency Rank - P2: Threat/Opportunity within 5 Years

Management Urgency Rank - M2: Essential within 5 Years to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Wrights Reservoir

Size: 658 acres (266 ha) **Elevation:** 7,760 - 7,960 ft. (2,365 - 2,426 m)

General Description: West Fourmile and Fourmile creeks converge in the middle of the site. They range from Rosgen Class B to C stream channels, which are characterized by downcutting due to headcuts. The creeks are currently creating cutbanks and depositing sediment in equilibrium, maintaining the creeks' sinuosity. Stock ponds are present along the creeks. Beaver are no longer present at the site. Mammals currently inhabiting the area include elk (*Cervus canadensis*), Gunnison's prairie dog (*Cynomys gunnisoni*), coyote (*Canis latrans*) and red fox (*Vulpes vulpes*). Seventeen species of birds were observed, including Mallard (*Anas platyrhynchos*), Common Snipe (*Gallinago gallinago*), and Red-winged Blackbird (*Agelaius phoeniceus*) that are dependent upon waterways. Other water-dependent animals observed include northern leopard frog (*Rana pipiens*), fish, waterstriders, mayflies, and damselflies. Housing developments are under construction, interrupting connectivity, but adjacent BLM lands preserve a corridor of wildlife habitat. The floodplain geology consists of pre-ashflow andesitic lavas, breccias, tuffs, and/or conglomerates. Pikes Peak granite dominates the uplands. Riparian soil consists of silty clay loam. Upland soils include Tolex and Guffey very gravelly sandy loams. Ponderosa pine (*Pinus ponderosa*) woodlands and patches of xeric grasslands occupy surrounding hillslopes. Rock outcrops are occupied by sparse cover of Ponderosa pine (*Pinus ponderosa*), Rocky Mountain juniper (*Juniperus scopulorum*), Douglas-fir (*Pseudotsuga menziesii*), and several shrub species including waxflower (*Jamesia americana*), Gambel oak (*Quercus gambelii*), and whitestem gooseberry (*Ribes inerme*). Herbaceous dry meadows are characterized by mixed graminoids and forbs with a few scattered shrubs. The wide, low gradient river valley is extensively irrigated. Mesic meadows and swales are dominated by domestic agricultural grasses such as timothy (*Phleum pratense*), smooth brome (*Bromus inermis*) and redtop (*Agrostis gigantea*), and weeds like Canada thistle (*Cirsium arvense*). Native species remain in abandoned meander scars with shallow groundwater discharge. Beaked sedge (*Carex utriculata)* herbaceous vegetation dominates most of the riparian zone, but there are also areas of mountain rush (*Juncus balticus*) herbaceous vegetation where the water table fluctuates.

Key Environmental Factors: Pale blue-eyed grass (*Sisyrinchium pallidum*) occurs in meadows with moist to saturated soils. Northern leopard frogs (*Rana pipiens*) live in

wet meadows, ponds, and streams (Hammerson 1999).

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B4): The site is driven by a poor viability (D-ranked) occurrence (one plant) of the globally imperiled (G2G3/S2) pale blue-eyed grass (*Sisyrinchium pallidum*). During the 2010 survey a Bobolink (*Dolichonyx oryzivorus*) currently watchlisted by CNHP was observed.

Natural Heritage element occurrences at the West Fourmile at Fourmile Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Sisyrinchium pallidum	pale blue - eyed grass	G2G3	S2			BLM	D	2010-07-27

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to encompass only the irrigated floodplain that the species of interest depend on directly for habitat. Because the site is irrigated, hydrological connections between the wet meadow and the surrounding uplands are of minimal importance, and the uplands are not included within the site boundary. Only with written permission were private lands visited.

Protection Urgency Rank Comments (P2): Residential development has started to encroach upon the meadow. One landowner has placed his land under conservation easement with Palmer Land Trust, and another is interested in doing so.

Management Urgency Rank Comments (M2): Installation of a wire cage could protect pale blue-eyed grass (*Sisyrinchium pallidum*) from grazing. Herbicides would be best kept away from this plant and the creek in general.

Exotic Species Comments: Introduced plants include Canada thistle (*Cirsium arvense*), yellow sweet clover (*Melilotus officinalis*), common mullein (*Verbascum thapsus*), Russian thistle (*Salsola iberica*), tall tumble-mustard (*Sisymbrium altissimum*),

field bindweed (*Convolvulus arvensis*), and jointed goatgrass (*Aegilops cylindrica*).

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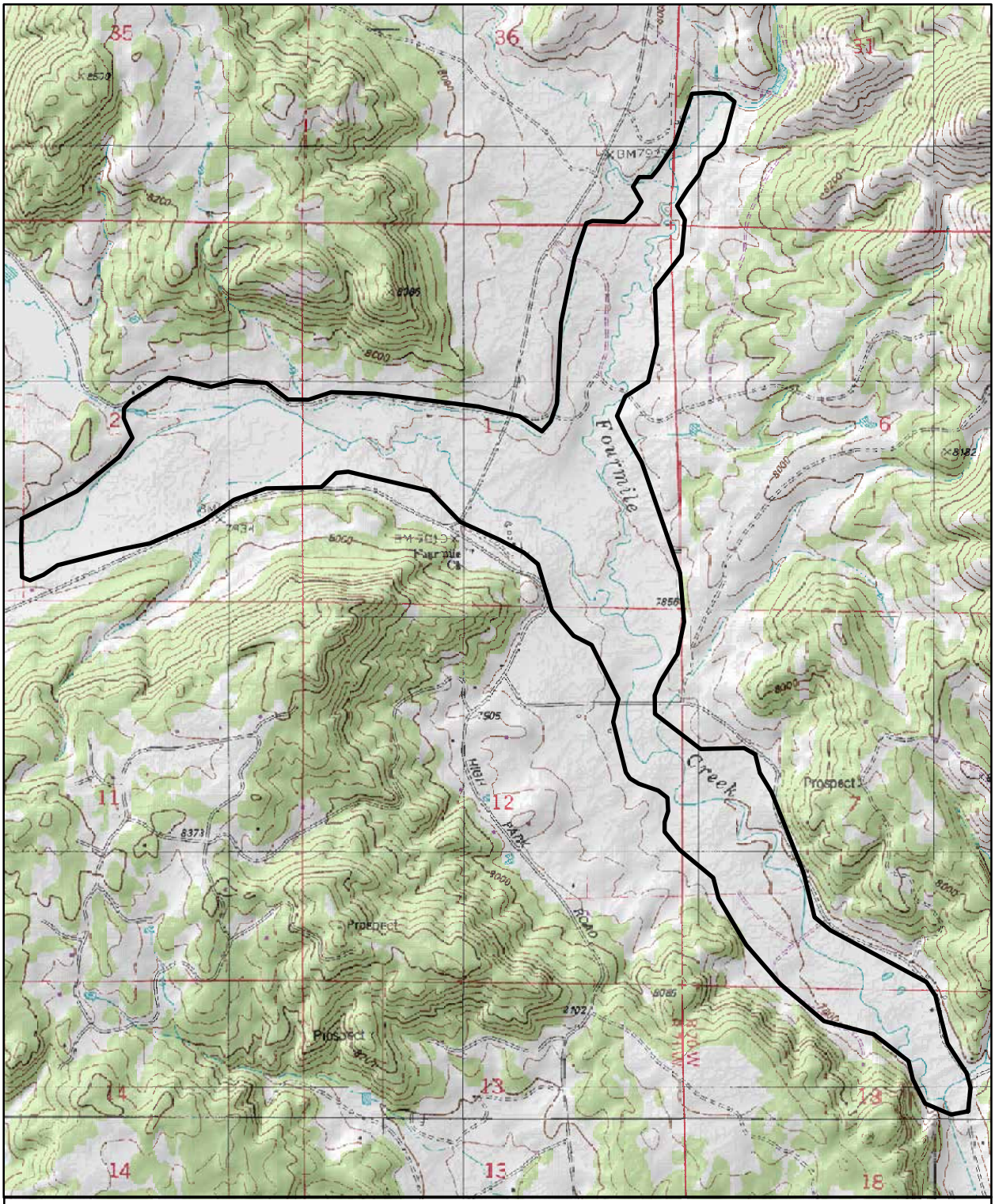
Version Author: Shaw, A.E. and D.G. Malone

Version Date: 12/17/2010



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0 0.2 0.4 Miles

N

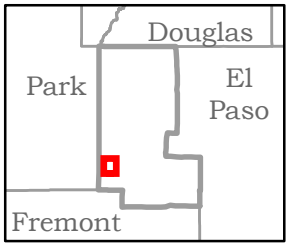
Legend

PCA Boundary

Wrights Reservoir, 38105-G3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 46. West Fourmile at Fourmile Creek Potential Conservation Area, B4: Moderate Biodiversity Significance

Crystola Creek at Aqueduct

Biodiversity Rank - B5: General Biodiversity Interest

Protection Urgency Rank - P2: Threat/Opportunity within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Woodland Park

Size: 298 acres (121 ha) **Elevation:** 8,200 - 9,080 ft. (2,499 - 2,768 m)

General Description: This site is located in a steep (10% grade) narrow canyon that drains to the east. The geology is primarily composed of Pikes Peak granite. However, the far northwestern portion of the site consists of Ogallala sandstone (Tweto 1979). The site's soil consists of poorly drained Aquolls soil, specifically sandy clay in the riparian zone (USDA NRCS 2008). Fish are present, benefitting from the cover of overhanging woody vegetation. There are intact willow (*Salix* spp.) carrs both above and below a water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland. The south-facing slope hosts ponderosa pine (*Pinus ponderosa*) woodland except on extensive bare rock outcrops. The north-facing slope is a forest of Douglas-fir (*Pseudotsuga menziesii*) and Engelmann spruce (*Picea engelmannii*). The site's forests connect to a patchwork of Pike National Forest, ranches and open space. Subdivisions line Highway 24, which encircles Crystola Creek to the north. Within the site, a subdivision sits above a tributary that flows into Crystola Creek from the south. The hydrology has been altered by small ponds and spillways constructed immediately below and above the water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland. An aqueduct runs parallel to Crystola Creek 0.25 miles to the north of the creek, and its right-of-way has been cleared of trees.

Key Environmental Factors: There is no encroachment of upland plants into the floodplain, suggesting that the water table is high. A scarcity of non-native grasses (less than 5% redtop) indicates that the riparian zone has not been heavily grazed (NatureServe 2010).

Climate Description: Teller County is cool and dry considering that Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8

°F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Cultural Features: Many historic wood and wire beverage cases litter the floodplain, probably from the era in which the Civilian Conservation Corp built the ponds.

Biodiversity Significance Rank Comments (B5): The site includes a fair viability (C-ranked) occurrence of water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland. This plant association is rare in Colorado (G4?/S2).

Natural Heritage element occurrences at the Crystola Creek at Aqueduct PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Betula occidentalis / Maianthemum stellatum Shrubland	Foothills Riparian Shrubland	G4?	S2				C	2010-09-23

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to incorporate the slopes that drain into the water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland to protect the occurrence from sedimentation associated with development. Areas with roads or residential development are excluded from the site boundaries. The upstream boundary is drawn immediately below a small pond, one of many that interrupt the site's natural hydrology. The ponds immediately below the water birch (*Betula occidentalis*) / false Solomon's seal (*Maianthemum stellatum*) shrubland are included because their close proximity could allow them to affect hydrology upstream within the occurrence. Only private lands for which permission was obtained were visited.

Protection Urgency Rank Comments (P2): The site is privately owned. The landowner of the vast majority of the site plans to develop the property for residential use, primarily the area to the north of the aqueduct that serves as the site boundary. Development may or may not impact the site significantly, depending on the specific plans for construction.

Management Urgency Rank Comments (M3): Weed control would be beneficial to the quality of the plant community. A variegated cultivar of the native species reed canary grass (*Phalaris arundinacea*) is one of the weeds that need control.

Exotic Species Comments: Crack willow (*Salix fragilis*), butter-and-eggs (*Linaria vulgaris*), Canada thistle (*Cirsium arvense*), and common mullein (*Verbascum thapsus*)

are among the many exotic species in this section of Crystola Creek.

References

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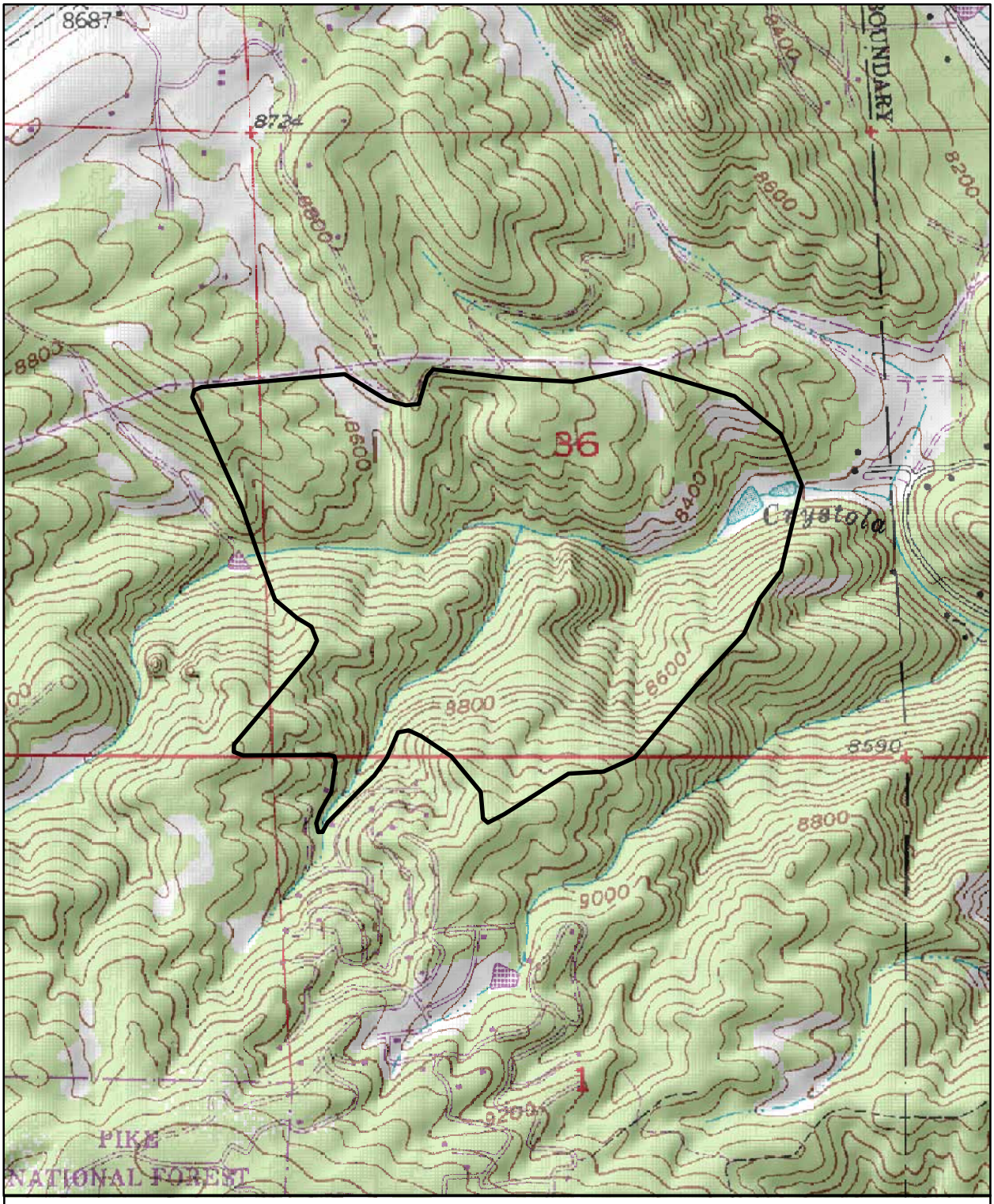
Version Date: 12/17/2010



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Miles
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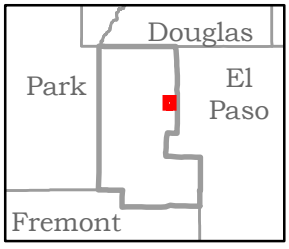
Legend

PCA Boundary

Woodland Park, 38105-H1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 47. Crystola Creek at Aqueduct Potential Conservation Area, B5: General Biodiversity Interest

Slater Creek

Biodiversity Rank - B5: General Biodiversity Interest

Protection Urgency Rank - P3: Definable Threat/Opportunity but not within 5 Years

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Wrights Reservoir

Size: 1,095 acres (443 ha) **Elevation:** 7,970 - 8,435 ft. (2,429 - 2,571 m)

General Description: This site is located in the montane zone on the west slope of the Front Range in the southwest region of Teller County. Landscape in this site is by rolling hills punctuated by an abrupt and steep-walled, east-facing rock outcrop. Cliff habitat is characterized by a widely spaced tree canopy dominated by ponderosa pine (*Pinus ponderosa*) with a limited shrub and herbaceous layer with graminoids and forbs including blue grama (*Bouteloua gracilis*) and mountain muhly (*Muhlenbergia montana*) and Front Range alum-root (*Heuchera hallii*) and American pasque flower (*Anemone patens*). Habitat at the base of the cliffs and in surrounding hill country is occupied by ponderosa pine woodlands and savannahs. The valley floor is dominated by agricultural fields. Several ephemeral/perennial streams flow out of the cliffs, eastward out into the surrounding hill country and have their confluence with Slater Creek which drains this south trending valley. Riparian habitat at the base of the cliffs is characterized by a mixed coniferous - deciduous tree canopy that includes narrowleaf cottonwood (*Populus angustifolia*) and ponderosa pine with understory shrubs that include river birch (*Betula occidentalis*) and Rocky Mountain maple (*Acer glabrum*). Stream channels at the base of the cliffs are structured by high energy floods that have formed deep pools. As the streams flow out onto the valley floor many disappear or transition to low-energy streams. Slater creek is a Rosgen type C stream but has been highly modified by agricultural-induced channelization and flow modification. Geology of hillslopes and cliff habitat is composed of Precambrian age igneous granitic rocks of 1,400 m.y. age group. Valley geology, where Slater Creek flows, is Tertiary age igneous rock composed of pre-ash-flow andesitic lavas, breccias, tuffs and conglomerates (Tweto 1979). Soils on hillslopes and cliffs are primarily classified as Rock outcrop-Cathedral complex, 35 to 70 percent slopes and are interspersed with patches of Cathedral very gravelly sandy loam, 3 to 15 percent slopes, Teaspoon-Rock outcrop complex, 5 to 45 percent slopes, and Teaspoon-Rock outcrop complex, 5 to 45 percent slopes. Valley soils are classified as Jode loam, 0 to 6 percent slopes and Corpen-High complex, 5 to 25 percent slopes (USDA NRCS).

Key Environmental Factors: Key factors that influence biota at this site are physical characteristics, especially topography that is characterized as cliff habitat and hydrology specifically seeps and springs that originate from cliff habitat.

Slater Creek

Climate Description: Although the site is located in the montane zone the climate is somewhat dry. At this site at an elevation of 7,970 feet coldest temperatures occurred in January with an average maximum of 37.83 °F and a minimum of 6.75 ° F. Warmest temperatures occurred in July with an average maximum of 78.04 °F and an average minimum of 45.28 °F. Annual average maximum precipitation was 15.40 inches. July and August were the wettest months of the year with 2.59 and 2.93 inches of precipitation respectively. Driest months are December, January and February with 0.39, 0.38 and 0.41 inches of precipitation respectively. March through June and September through November have intermediate amount of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B5): The site was drawn for an extant occurrence of the state rare (G4/S2B) Peregrine Falcon (*Falco peregrinus*) and for an extant occurrence of the state rare (G5/S3) northern leopard frog (*Rana pipiens*). Peregrine Falcon are listed as sensitive by the USFS, and Partners in Flight identifies Peregrine Falcon as a high priority species in the Southern Rocky Mountain Region which includes this site. Bird species, such as Peregrine Falcon, that use cliff/rock habitat for nesting are highly specialized and may be more susceptible to loss of nesting habitat than many other species because they rely completely on cliffs as nest sites. Thus, the number of suitable nest sites is finite and because all suitable nest sites in some areas may be used, every usurpation of a nest site by humans result in a direct reduction in the population (Partners in Flight 2010). Northern leopard frog populations have appeared to have declined, especially in the Rocky Mountains of Colorado, Wyoming, and Montana where the species no longer is extant in most localities where historically it occurred (NatureServe 2010).

Natural Heritage element occurrences at the Slater Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Amphibians	Rana pipiens	Northern Leopard Frog	G5	S3		SC	BLM/ USFS	E	2010-08-13
Birds	Falco peregrinus anatum	American Peregrine Falcon	G4T4	S2B		SC	BLM/ USFS	E	2010-09-14

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: This site was drawn to encompass the known elements and potential breeding and foraging habitat specifically for the Peregrine Falcon and northern leopard frog. Additional habitat was delineated for: sufficient landscape to enable ecological processes including hydrological processes and biological processes particularly habitat for a prey base; and a buffer to protect the elements from disturbance. Only those areas with landowner permission were surveyed. In Colorado, Peregrine Falcons breed on cliffs and rock outcrops from 1,370 m to more

than 2,740 m (4,500-9000 ft) in elevation. They most commonly choose cliffs that lie within pinon - juniper and ponderosa pine zones and hunt in adjacent open meadows, forested tree top areas, around lakes and rivers, and shrubsteppe (Partners in Flight 2010). It is important to protect not only nesting habitat, but also foraging habitat and a prey base. Northern leopard frogs live in the vicinity of springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually they are in or near permanent water with rooted aquatic vegetation. In summer, they commonly inhabit wet meadows and fields. The frogs take cover underwater, in damp niches, or in caves when inactive. Wintering sites are usually underwater, though some frogs possibly overwinter underground. Available information indicates that individual ranids occasionally move distances of several km but most individuals stay within a few kilometers of their breeding sites (NatureServe 2010).

Protection Urgency Rank Comments (P3): Site is in both public and private ownership. Public lands are managed by the BLM. Private lands contain a several uses including grazing and rural residential development. Residential development has the potential to adversely impact element occurrences. Although Peregrine Falcons are recovering their global, long-term population trend is moderate declines of 25-50% (NatureServe 2010). Widespread, low-severity threat dictates the need for continued protection of existing occurrences for breeding as well as foraging, roosting and wintering habitat (NatureServe 2010). Conflicts related to nesting Peregrine Falcon include rock climbing, mining, road construction, hiking, bicycle and horseback trails, and housing development. All these activities can have a negative impact and disturbance from recreational activities (rock climbing and hiking) can cause nest failure (Partners in Flight 2010). Threats to Northern leopard frogs include habitat loss, commercial overexploitation, vehicular traffic and, in some areas, probably competition/predation by introduced species. Decline in the Rocky Mountains may be due to an interaction between crowding, temperature, and mortality from bacterial infection (NatureServe 2010).

Management Urgency Rank Comments (M3): Primary threats to Peregrine Falcon are related to residual environmental toxins, habitat loss, human disturbance, and illegal take (NatureServe 2010). For Peregrine Falcon conservation, identify nest sites and restrict recreational activities during the nesting period. This may require seasonal closures or rerouting of some hiking trails around the base or top of some cliffs during the breeding season. Establish buffer zones to minimize conflicts around nesting sites to protect eyries (Partners in Flight 2010). For Northern leopard frog conservation, maintain sustainable stream habitat and flows. Fence cattle out of riparian and stream habitat. Additionally, alien plant species threaten to degrade both natural and agricultural habitat. Weed management and eradication would benefit long-term habitat sustainability.

Exotic Species Comments: No weeds were observed in cliff habitat. Aliens in

agricultural and grazed fields include yellow sweetclover (*Melilotus officinalis*), Kentucky blue grass (*Poa pratensis*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), wooly mullein (*Verbascum thapsus*), Russian thistle (*Salsola iberica*), tumble mustard (*Sisymbrium altissimum*), bindweed (*Convolvulus arvensis*) and jointed goatgrass (*Aegilops cylindrical*).

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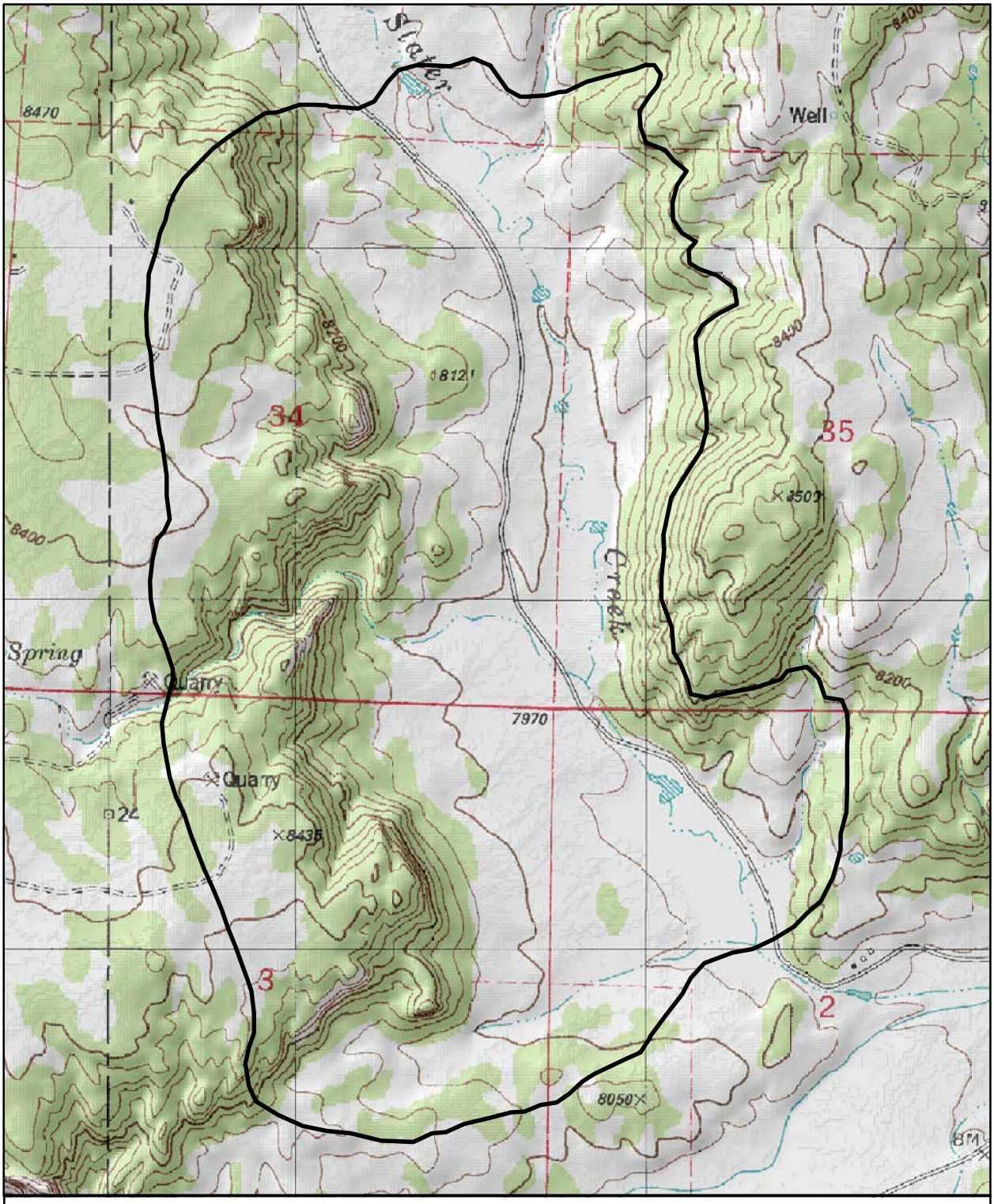
Version Author: Malone, D.G.

Version Date: 01/11/2011



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Miles
0 0.1 0.2

N

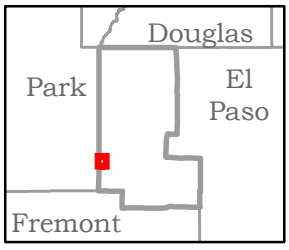
Legend

PCA Boundary

Wrights Reservoir, 38105-G3

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 48. Slater Creek Potential Conservation Area, B5: General Biodiversity Interest

Trout Creek Fen

Biodiversity Rank - B5: General Biodiversity Interest

Protection Urgency Rank - P4: No Threat or Special Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Divide, Woodland Park

Size: 394 acres (159 ha) **Elevation:** 8,970 - 9,600 ft. (2,734 - 2,926 m)

General Description: The Trout Creek Fen site consists of a mosaic of riparian and wetland plant communities that vary with topography and soils. Wetlands range from wide mesic graminoid-dominated meadows to willow carrs in low gradient valleys to narrow, forested communities in steeper gradient gullies. A water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) fen is located near the convergence of three parallel tributaries that form Trout Creek. The plant community immediately upstream and downstream from the fen is beaked sedge (*Carex utriculata)* herbaceous vegetation, which has filled in a series of abandoned beaver ponds. Surrounding upland habitat is a mosaic of xeric grasslands and woodlands dominated by ponderosa pine (*Pinus ponderosa*) on south-facing slopes and on north-facing slopes by Engelmann spruce (*Picea engelmannii*) and Douglas-fir (*Pseudotsuga menziesii*). A small quaking aspen (*Populus tremuloides)* / Thurber's fescue (*Festuca thurberi*) woodland is located immediately east of the site. An extensive cattle pasture is located immediately northwest of the site. There are no human-made ponds, evidence of livestock grazing, or non-native plants within the fen. Vegetation recruitment and vigor is impacted by livestock grazing and elk (*Cervus canadensis*) browse. Stream hydrology, riparian habitat, upland vegetation structure, and species composition have been altered by livestock grazing. Age classes of dominant woody species are not evenly distributed with younger age classes reduced or missing. Willows (*Salix* spp.) are dying, which may indicate a fluxuating water table. An aqueduct and associated road run through the wetland 0.3 miles downstream of the fen, immediately north of the site. The intact landscape is large and only minimally fragmented by a few ranch roads. The site's geology consists of Pikes Peak granite (Tweto 1979). Soils are deep, poorly drained Aquolls (USDA NRCS 2008). The size of the water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) fen is small with low plant diversity. It is located in a complex of abandoned beaver ponds that are filling in with vegetation. The fen is fed by seepage from adjacent slopes and snowmelt water from a tributary of Trout Creek. The soils are fibrous peat, formed as a result of permanently saturated conditions. Shrub cover is 3%, with planeleaf willow (*Salix planifolia*) dominant but shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) also frequent. Graminoid cover is 90%. Beaked sedge (*Carex utriculata*) is dominant with 55-65% cover. Water sedge (*Carex aquatilis*) is also quite abundant. Tufted hairgrass (*Deschampsia cespitosa*) and

bluejoint reedgrass (*Calamagrostis canadensis*) are present in smaller numbers.

Key Environmental Factors: The water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) plant association may represent a transition zone between beaked sedge (*Carex utriculata*) herbaceous vegetation occupying wet habitats and water sedge (*C. aquatilis*) herbaceous vegetation occupying mesic habitats. It is associated with slow-moving to still water, poorly drained soils, and beaver (*Castor canadensis*) activity in high elevation meadows (Carsey et al. 2003).

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Biodiversity Significance Rank Comments (B5): The site supports a fair viability (C-ranked) occurrence of an apparently globally secure (G4/S4) plant community, water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) herbaceous vegetation. The site is also significant hydrologically, as a fen with groundwater supplementing surface water to maintain saturated soils year-round.

Natural Heritage element occurrences at the Trout Creek Fen PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex aquatilis - Carex utriculata Herbaceous Vegetation	Montane Wet Meadows	G4	S4				C	2010-08-11

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary is drawn to protect the immediate watersheds of nearby historic beaver ponds that could potentially support water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) herbaceous vegetation. The eastern-most two streams in the site were included up to the point where they become intermittent to protect water flows to an old beaver pond downstream. The downstream boundary is drawn where the aqueduct and road serve as barriers to wetland connectivity. Private lands were only visited with written permission.

Trout Creek Fen

Protection Urgency Rank Comments (P4): Approximately 90% of the site is already protected by conservation easements.

Management Urgency Rank Comments (M3): The site could benefit from a shorter and less intense grazing regime. Weed control could be beneficial to native vegetation.

Exotic Species Comments: The weeds butter-and-eggs (*Linaria vulgaris*) and Canada thistle (*Cirsium arvense*) are abundant.

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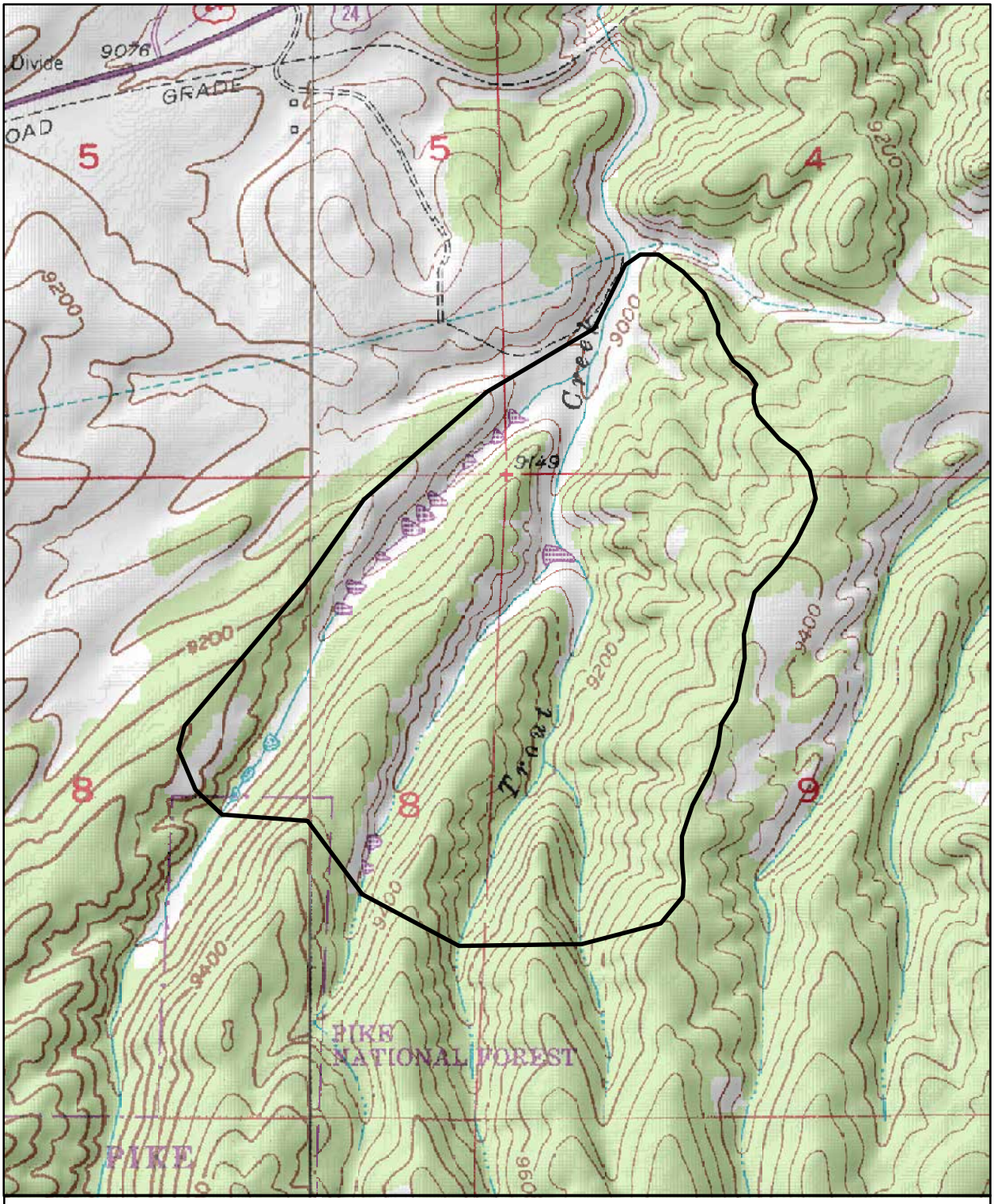
Version Date: 12/17/2010



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Map Date: 03/08/2011

Miles
0 0.1 0.2

N

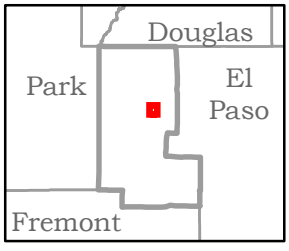
Legend

PCA Boundary

Woodland Park, 38105-H1
Divide, 38105-H2

7.5 Minute Digital Raster Graphics Produced by the U.S. Geological Survey

Location in Teller County



Map 49. Trout Creek Fen Potential Conservation Area, B5: General Biodiversity Interest

Upper Grape Creek

Biodiversity Rank - B5: General Biodiversity Interest

Protection Urgency Rank - P1: Immediately Threatened/Outstanding Opportunity

Management Urgency Rank - M3: Needed within 5 Years to Maintain Quality

U.S.G.S. 7.5-minute quadrangles: Divide

Size: 346 acres (140 ha) **Elevation:** 8,590 - 9,200 ft. (2,618 - 2,804 m)

General Description: The Upper Grape Creek site incorporates a wet meadow fed by a non-sinuous upper reach of Grape Creek. The creek has been dammed to create a pond within a subdivision at the upstream site boundary. Forest cover is dense in the vicinity of the pond, including a small patch of balsam poplar (*Populus balsamifera*) where the creek exits the forest. The creek enters a meadow which contains a matrix of water sedge (*Carex aquatilis*) / beaked sedge (*Carex utriculata*) herbaceous vegetation, Nebraska sedge (*Carex nebrascensis*) herbaceous vegetation, mountain rush (*Juncus balticus*) herbaceous vegetation, and dry patches of grasses and forbs. The soil is gleyed indicating saturated conditions within the wet meadow at the western end of the site. The riparian soil consists of silty clay containing organic matter such as rotting wood. Within the Nebraska sedge (*Carex nebrascensis*) community, graminoid cover is 80%, dominated by Nebraska sedge (*Carex nebrascensis*) with 65% cover. Other graminoids include woolly sedge (*Carex pellita*), Kentucky bluegrass (*Poa pratensis*), water sedge (*Carex aquatilis*), and mannagrass (*Glyceria* sp.). A ponderosa pine (*Pinus ponderosa*) woodland inhabits the ridgetop to the northeast of the wet meadow. The southwestern edge of the site supports a blue spruce (*Picea pungens*) / quaking aspen (*Populus tremuloides*) forest. An Arizona fescue (*Festuca arizonica)* / mountain muhly *(Muhlenbergia montana)* grassland occupies the intervening slopes. The combination of relatively dry climate with porous soils selects for plants that tolerate arid environmental conditions such as native bunch grasses. Upland soils are comprised of well-drained Guffey very gravelly sandy loam (USDA NRCS 2008). The geology of the northwestern third of the site is Wall Mountain Tuff, while the rest of the site is dominated by Pikes Peak granite (Tweto 1979).

Key Environmental Factors: Subdivisions interrupt landscape integrity to the north and east, but the site abuts the relatively intact Florissant Fossil Beds National Monument to the west. Residential development impacts ecological processes including the natural fire regime and hydrology; ponderosa pine (*Pinus ponderosa*) is encroaching into the grasslands and Grape Creek dries up briefly as it reaches the Nebraska sedge (*Carex nebrascensis*) plant community. The Nebraska sedge (*Carex nebrascensis*) and mountain rush (*Juncus balticus*) plant associations could be present as a result of season-long grazing, based on observations from Montana (Carsey et

al. 2003). On lands where livestock grazing occurs, bare soils are evident, organic matter is reduced, soils are somewhat compacted, erosion occurs, and infiltration reduced as indicated by water flow patterns.

Climate Description: Teller County is cool and dry although Pikes Peak has the topographic relief to cool humid air and initiate precipitation. Average annual precipitation is 10.5-16.2 inches (http://www.worldclimate.com), depending upon exact location within the county. Snowfall is greatest in April and May. Monsoon rains peak in July. Spring and summer therefore have the greatest precipitation, and sunny fall weather dries out the landscape. Teller County has the second highest rate of lightning strikes nationwide, an annual average of 5,700 strikes that reach the ground. (Precipitation timing and lightning information was taken from Teller County 2008). Average maximum temperature is lowest, 30 °F (-1.1 °C), in January, and highest, 75.4 °F (24.1 °C), in July. Average minimum temperature is lowest, -2.8 °F (-19.4 °C), in January, and highest, 45.9 °F (7.7 °C) in July (http://www.worldclimate.com).

Land Use History: A forest fire occurred at the site around 1915 (Toby Wells, personal communication, June 7, 2010).

Biodiversity Significance Rank Comments (B5): The site is drawn for a fair viability (C-ranked) occurrence of Nebraska sedge (*Carex nebrascensis*) herbaceous vegetation. This plant association is vulnerable in Colorado (G4/S3).

Natural Heritage element occurrences at the Upper Grape Creek PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Natural Communities	Carex nebrascensis Herbaceous Vegetation	Wet Meadows	G4	S3				C	2010-07-07

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The site boundary is drawn to the ridgelines on either side of the valley with the exception of a subdivision omitted because it is no longer available for conservation. This boundary would protect the wet meadow from the risk of reduced water quality from additional development. The upstream boundary is drawn immediately below a pond that serves as a hydrological barrier. The downstream boundary is drawn immediately above a spring where a cattle watering hole has been installed.

Protection Urgency Rank Comments (P1): The site is currently privately owned and almost half of the site's land is for sale as of 2010.

Upper Grape Creek

Management Urgency Rank Comments (M3): Exotic plants may be able to outcompete (*Carex nebrascensis*) due to the uncharacteristic dryness of the occurrence. Removal of the pond at the upstream site boundary and/or reduced grazing intensity might restore the water table.

Exotic Species Comments: Canada thistle (*Cirsium arvense*) and smooth brome (*Bromus inermis*) are abundant in drier sections of the wet meadow.

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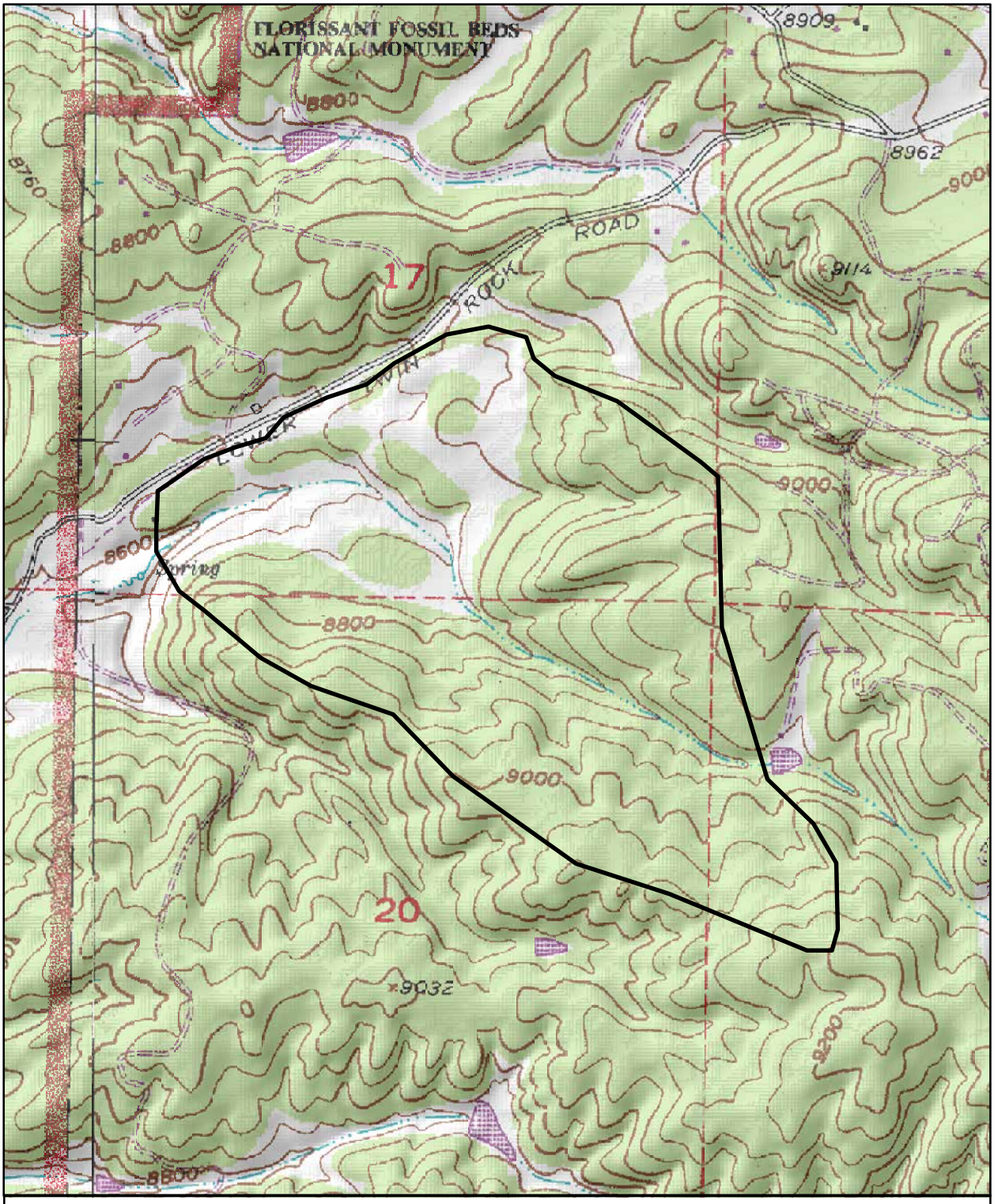

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Map Date: 03/08/2011

Miles
0 0.1 0.2

N

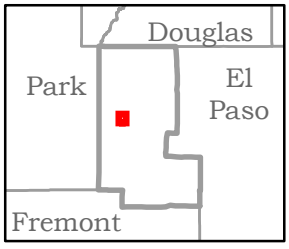
Legend

PCA Boundary

Divide, 38105-H2

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 50. Upper Grape Creek Potential Conservation Area, B5: General Biodiversity Interest

White Gulch

Biodiversity Rank - B5: General Biodiversity Interest

Protection Urgency Rank - P1: Immediately Threatened/Outstanding Opportunity

Management Urgency Rank - M1: Essential within 1 Year to Prevent Loss

U.S.G.S. 7.5-minute quadrangles: Mount Deception

Size: 1,371 acres (555 ha) **Elevation:** 8,330 - 8,600 ft. (2,539 - 2,621 m)

General Description: This site is located in the montane zone foothills on the west slope of the Front Range. Habitat is a complex mosaic of communities. Northeast-facing slopes are dominated by Douglas-fir (*Pseudotsuga menziesii*) forest. Southwest-facing slopes are dominated by ponderosa pine (*Pinus ponderosa*) woodlands with an understory dominated by graminoids including Parry's oatgrass (*Danthonia parryi*) and Arizona fescue (*Festuca arizonica*). Moist gullies are characterized by stands of quaking aspen (*Populus tremuloides*) with a shrub layer characterized by species such as Rocky Mountain maple (*Acer glabrum*) and mountain ninebark (*Physocarpus monogynus*) and an herbaceous layer dominated by forbs including mountain lupine (*Lupinus argenteus*), clustered penstemon (*Penstemon procerus*), narrowleaf paintbrush (*Castilleja linariifolia*), blue-eyed grass (*Sisyrinchium montanum*) and owl clover (*Orthocarpus luteus*). The northern half of this site remains in a fairly natural condition. In the southern half of this site native habitat has been converted to suburban, residential development since the element occurrence in this site was documented in 1994. Anecdotal accounts indicate that prior to development the number of individuals, sub-populations, overall population size and areal extent was much greater. Geology is composed of Permian and Pennsylvanian age sedimentary rocks of the Fountain Formation and are Arkosic sandstone and conglomerates (Tweto 1979). Soils are predominantly Plome-Pimsby complex, 5 to 40 percent slopes that are interspersed with patches of Typic Haplustolls, 3 to 8 percent slopes (USDA NRCS 2008).

Key Environmental Factors: Key environmental factors influencing site biota include ecological processes and specifically edaphic properties including soil moisture and organic matter.

Climate Description: Broad elevational changes and complex topography in the Pikes Peak region result in broad differences in the local climate. Due to geography, precipitation in Front Range ecosystems in Teller County comes primarily during summer months. At this site at an elevation of 8,200 feet, from 1971 to 2000, coldest temperatures occurred in January with an average maximum of 38.7 °F and a minimum of 8.42 °F. Warmest temperatures occurred in July with an average maximum of 76.33 °F and an average minimum of 46.44 °F. Annual average

maximum precipitation was 24.57 inches. July and August are the wettest months of the year with 3.21 and 3.79 inches of precipitation respectively. Driest months are December through February with 0.89, 0.73 and 0.90 inches of precipitation respectively. March through June and September through November have intermediate amounts of precipitation (Prism 2010).

Biodiversity Significance Rank Comments (B5): The site is drawn for a fair to poor (CD-ranked) occurrence of the state rare (G5/S2) American yellow lady's-slipper (*Cypripedium parviflorum*). Although American yellow lady's-slipper is imperiled in Colorado, the species is widespread in North America, apparently with thousands of occurrences and is common to occasional in appropriate habitat (NatureServe 2010).

Natural Heritage element occurrences at the White Gulch PCA.

Major Group	State Scientific Name	State Common Name	Global Rank	State Rank	Federal Status	State Status	Fed Sens	EO Rank	Last Obs Date
Vascular Plants	Cypripedium calceolus ssp. parviflorum	American yellow lady's - slipper	G5	S2			USFS	CD	2010-06-29

** The records above are sorted in the following order 1) Major Group 2) Global Rank and 3) Scientific name.

Boundary Justification: The boundary for this site was delineated along ridgelines to include the watershed boundary for immediate watershed protection to enable hydrologic processes related to precipitation infiltration and groundwater recharge and to enable edaphic properties. Constant moisture is very important during germination and early development. Habitat is characterized by soils with rich, humus and decaying leaf litter in wooded areas, often on rocky wooded hillsides on north or east facing slopes and also on moist creeksides or swales in spruce zones, with soils that are sandy loams to loams (NatureServe 2010). Only sites with landowner permission were surveyed.

Protection Urgency Rank Comments (P1): Habitat conversion to dense, residential development has resulted in habitat loss and alteration of natural hydrologic processes that are essential to the sustainability of the element.

Management Urgency Rank Comments (M1): Residential development has resulted in habitat loss and alteration of ecological processes essential to element viability. Identifying occurrences and establishing protective easements would benefit the long-term potential survivability of this orchid population.

Exotic Species Comments: Non-native plants documented in 2010 include yellow toadflax (*Linaria vulgaris*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), hoary allysum *(Berteroa incana*), and smooth brome (*Bromus inermis*).

White Gulch

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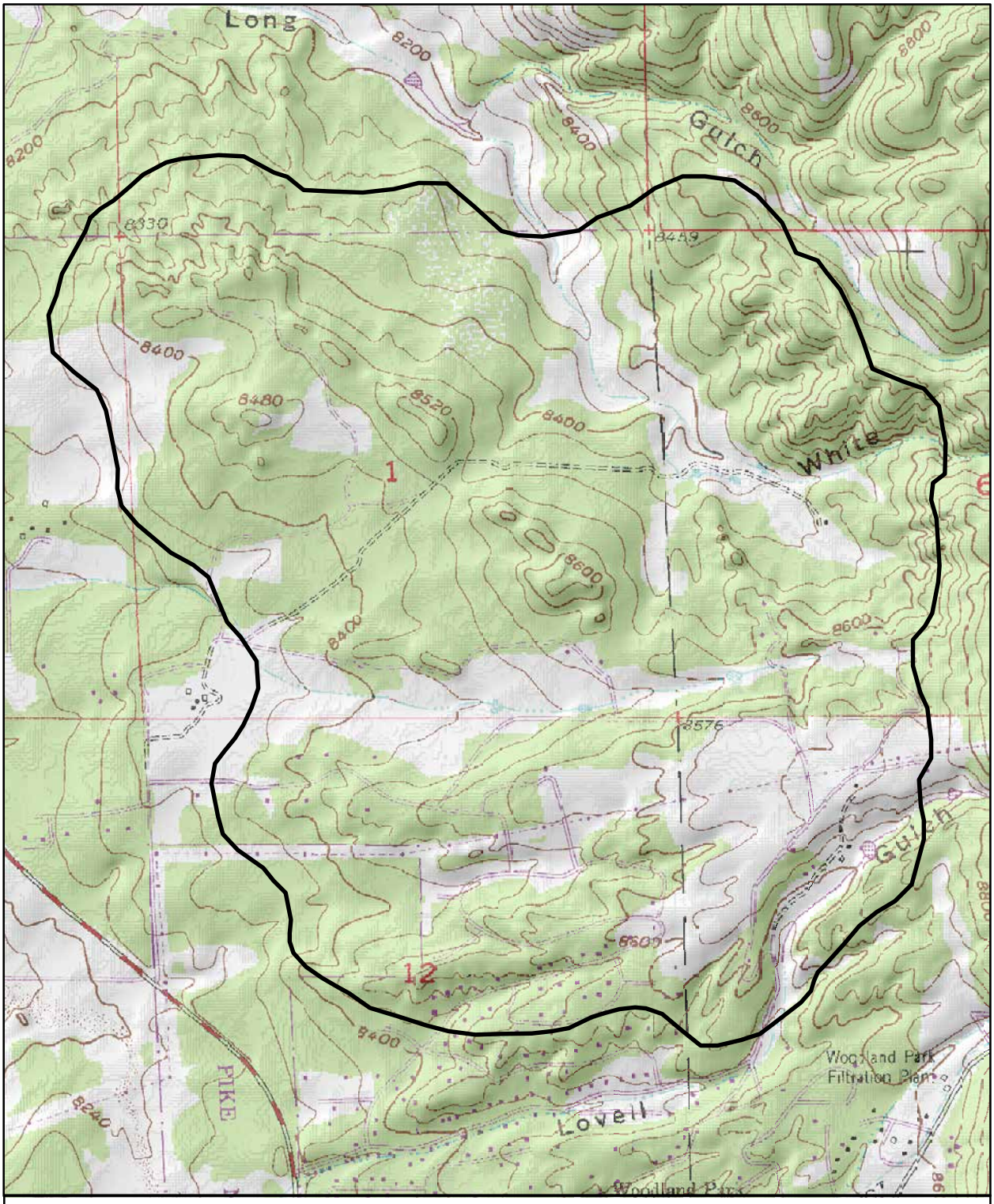
Version Author: Malone, D.G.

Version Date: 12/28/2010



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Miles
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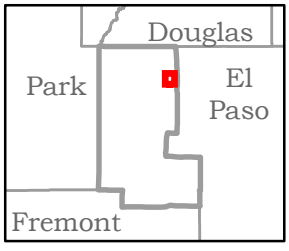
Legend

PCA Boundary

Mount Deception, 39105-A1

7.5 Minute Digital Raster Graphic Produced by the U.S. Geological Survey

Location in Teller County



Map 51. White Gulch Potential Conservation Area, B5: General Biodiversity Interest

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